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Thayne Area Water Supply

Level II Study

Turnerville Water Supply System

Wyoming Water Development Commission

August, 1998

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849 Front Street, Suite 201
Evanston, WY 82930
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STAR VALLEY MUNICIPAL WATER SUPPLY
LEVEL II STUDY
SMOOT WATER SUPPLY SYSTEM

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INTRODUCTION
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FIGURE 1.1
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INTRODUCTION

1.1 STAR VALLEY AREA WATER SUPPLY HISTORY

The Star Valley area, in Western Wyoming, can be characterized as a rural agricultural area. Most Star Valley communities are presently unincorporated and have no political jurisdiction or authority. Because of that fact the residents of many areas formed independent Pipeline Companies to provide drinking water to their communities. These pipeline companies developed community water supply and distribution systems, most of which are 35-50 years old. Spring water was (and is) the preferred supply source wherever available. These pipeline systems typically consist of many miles of small diameter steel and galvanized iron pipe to serve large rural areas. Although the pipeline companies have generally been diligent in fixing leaks and performing normal maintenance operations, most of the systems have not significantly changed since their initial construction.

As these rural communities have grown and water use habits have changed, the pipelines have experienced increasing demands along with pipeline tuberculation and loss of system efficiency. Low (or negative) pressures are an increasing problem. Lines are aging and leakage is becoming more common. The alluvial soils of the area make both small and large leaks difficult to detect. Many pipeline companies have placed a moratorium on new connections, thereby forcing new residents to rely on individual wells. These individual wells vary widely in reliability and quality even within the same communities.

Over the past several years, the Environmental Protection Agency has noted water quality problems with most (not all) of these systems. Microbiological contamination has been periodically evident in many systems. This contamination has generally been the result of low system pressures, leaking lines, unprotected sources, etc. EPA considers nearly all of the systems "at risk" due to the lack of disinfection capabilities.

This report is specifically intended to discuss the issues, recommendations, and conclusions of the Thayne Area Municipal Water Supply Level II investigation as they relate to the Community of Turnerville, Wyoming. Turnerville is presently served by the Willow Creek Pipeline Company.

1.2 TURNERVILLE SERVICE AREA

Prior to this study, it was suspected that domestic water problems were not limited to the existing pipeline service area. The Level II Study, therefore, included the entire area in and around Turnerville to insure a cohesive approach to planning and to avoid revisiting water supply problems in the future.

Based on the findings of this Level II Study, a realistic service area was defined in and around the community of Turnerville. Turnerville residents are presently in the process of forming a water district to incorporate that service area as shown in Figure 1.2 hereafter. The proposed district includes approximately 36 homes near the mouth of Willow Creek Canyon. The Willow Creek Pipeline Company currently serves 27 members within that service area as also shown in Figure 1.2. Service area boundaries have been established based on feasibility (elevations vs. spring elevation), economic constraints (cost per connection), and expressed interest of residents.
LEGEND
- "ORIGINAL" SERVICES
- "PIGGY-BACK" SERVICES
- HOMES NOT SERVED (WELLS)

PROPOSED DISTRICT BOUNDARY

TURNERVILLE
SERVICE AREA -
PROPOSED DISTRICT BOUNDARIES

FIGURE 1.2
1.3 **AUTHORIZATION**

Authorization for the Thayne Area Water Supply Project Level II Study was granted by contract between the Wyoming Water Development Commission and Forsgren Associates, Inc., dated June of 1996. The project sponsor is the Town of Thayne.

The Willow Creek Pipeline Company and its membership have been highly supportive of this study and have been directly involved in the resulting recommendations and conclusions.

1.4 **STUDY OBJECTIVES**

The purpose of this study, as expressed in the contract scope of services, is "to prepare a water supply study for the... community of Turnerville." This portion of the Level II investigation was conducted in two phases as follows:

**Phase I:** Water Supply Alternatives Analysis: This phase involved a scoping meeting and follow-up meetings with the Willow Creek Pipeline Company and Turnerville residents. Turnerville's existing water supply system was evaluated relative to condition, capacity, and integrity. Water supply needs and demands were projected based upon population, anticipated growth, and existing infrastructure adequacy.

**Phase II:** Conceptual Designs and Cost Estimates: Based on the Phase I and II findings, and on input from area residents, conceptual designs and cost estimates were generated. This phase involved computer modeling the Turnerville water system (existing and proposed). Conceptual designs were prepared and cost estimates generated. Probable funding scenario(s) were evaluated to ascertain rate impacts, and probable funding agency eligibility and participation.

1.5 **RELATED STUDIES**

Previous studies associated with Star Valley water systems are generally limited to the WWDC funded Level I and Level II investigations as follows:


In addition to the above reports, a sanitary survey was conducted on behalf of the Environmental Protection Agency by the Midwest Assistance Program. A copy of that survey is included as an Appendix to this report.
1.6  **ACKNOWLEDGEMENTS**

Forsgren Associates gratefully acknowledges the efforts and support of the Willow Creek Pipeline Company. Location of the system components for flow testing was vital for the performance of this study.
SECTION 2.0
EXISTING SYSTEM DESCRIPTION
SECTION 2.0
EXISTING SYSTEM DESCRIPTION

2.1 PRESENT POPULATION SERVED

This existing Turnerville (Willow Creek) Water System, shown schematically in Figure 2.1, is owned and operated by the Willow Creek Pipeline Company. There are presently 16 primary connections and 11 "piggy-bank" connections representing approximately 75 individuals served. The Willow Creek Pipeline system serves approximately 75% of the homes located in the Turnerville service area.

2.2 EXISTING SOURCE OF SUPPLY

Turnerville presently obtains its domestic water supply from a spring located approximately ¾ mile east of town in Willow Canyon. Water rights records indicate the spring elevation is approximately 6,800 feet. The measured capacity of the spring was 405 gpm on September 24, 1996.

Turnerville's spring is, in our opinion, an excellent "true" groundwater supply source.

2.3 SYSTEM STORAGE

The Turnerville water system incorporates a small concrete reservoir located approximately 2,100 feet downstream of the springs. The overflow elevations is estimated to be 6,740 feet. The reported capacity is 3,700 gallons. This tank acts as an overflow for excess spring yields delivered to that point. It also provides a free water surface to limit system pressures. Based on its minimal capacity the tank is wholly inadequate to provide a degree of fire protection or reserve storage.

There is an unscreened 6"-pipe in the top of the tank that acts as a vent and an overflow. The condition and configuration of this tank, in our opinion, make it highly susceptible to contamination.

2.4 EXISTING DELIVERY SYSTEM

The existing Turnerville community water supply system consists of 4-inch steel pipeline from the springs to the community, and then 2-1½-inch galvanized iron pipelines within the community as shown in Figure 2.1. The existing delivery system is over 30 years old. The main line along the county road is exposed where it crosses at Willow Creek. Leaks in this line are periodically discovered and repaired. Virtually all of the piping is under-sized, badly deteriorated, and has reached the end of its expected design life.

Turnerville water demands are somewhat higher than would normally be expected due to stock watering, system leakage, and continuous winter-time flows to prevent service line freezing. Forsgren Associates personnel measured the existing pipeline capacities in September of 1996, using an ultrasonic flow meter. At that time the spring was producing approximately 400 gpm (0.89 CFS) and the mainline was flowing at 190 gpm (0.42 CFS).

Maximum pipeline capacity (as verified by field measurements and modeling) is less than 200 gpm. Substandard pressures are frequently experienced, particularly at the south end of the system. These low pressures, combined with the deteriorated condition of the piping, represents a significant threat to public health and safety. For that reason, the Willow Creek Pipeline
LEGEND
- "ORIGINAL" SERVICES
- "PIGGY-BACK" SERVICES
- HOMES NOT SERVED (WELLS)

FIGURE 2.1 - TURNERVILLE EXISTING WATER SYSTEM (WILLOW CREEK PIPELINE)

SPRING 3,700 GAL. CONCRETE WATER STORAGE TANK
Company has imposed a moratorium on any new connections.

In summary, the existing system is undersized, badly deteriorated and simply incapable of meeting current or future water supply needs in the community.

2.5 WATER QUALITY HISTORY

In general, the Willow Creek Pipeline Company has a surprisingly good water quality history given the condition of their system. They have experienced only one EPA water quality violation during the past three years for bacteriological counts over the acceptable limit. These concerns which appear to be limited to the summer "high demand" periods, indicated that the contamination is likely related to the condition of the pipeline rather than the spring per se'. In 1996 the Willow Creek Pipeline Company began using solid chlorine tablets in their storage tank during the summer months. This procedure has been effective in keeping the system free of bacteriological problems.
SECTION 3.0
WATER SUPPLY CONSIDERATIONS
SECTION 3.0
WATER SUPPLY CONSIDERATIONS

3.1 IDENTIFICATION OF WATER USE

3.1.1 Service Area Population

There is no available population data that is specific to the Turnerville service area. The population history in the nearby Town of Thayne, in our opinion, may provide a much more realistic indicator for projecting Turnerville's population growth.

The State of Wyoming's latest published demographic statistics were published in 1994 (Equality State Almanac 1994, 2nd Edition). The decennial population in Lincoln County from 1920 to 1970 actually decreased 31% to a low of 8,640 residents. This indicated a general nation-wide move from rural to urban lifestyles. With the state-wide oil boom and the "back-to-the-land" lifestyle changes that began in the early 1970's, the twenty years from 1970 to 1990 saw a population increase in Lincoln County of 46%. From 1990 to 1993 the three-year population increase was 5%.

Historically, population growth (or decline) in the Thayne area has coincided with that of Lincoln County as a whole. This population history is shown in Table 4.1. We do not believe, however, that this relationship will likely hold true in the future.

Recent statistics released by the Lincoln County Planning Office reveal tremendous growth potential in Star Valley. The Casper Star Tribune newspaper ran a feature article on September 25, 1995, (Appendix "A") that stated:

"A year-long moratorium on subdivision approval in rapidly growing northern Lincoln County accomplished nothing, a county commissioner says. The moratorium was imposed in September 1993, amid an influx of new residents along with workers from Jackson looking for more affordable housing. The moratorium was originally scheduled to be lifted Jan. 1, 1994, to allow work on revisions in the county's land use plan. But in November 1993, the commissioners extended the moratorium until June 1994, to allow further work on the land use plan. Since the moratorium was lifted, an additional 19 subdivisions - all in the Star Valley - have been approved, adding 282 building lots to the scenic area, according to data supplied by the county planning office. Randy Wilson, the Lincoln County planner said there's no doubt that the lower Star Valley, between Afton and Alpine Junction is a "high growth area", and one that will likely continue to grow. The issuance of building permits in the area has grown at the rate of 8 percent annually since 1990, with a total of 647 building permits issued."
### TABLE 3.1
POPULATION HISTORY AND PROJECTIONS
LINCOLN COUNTY AND THAYNE

<table>
<thead>
<tr>
<th>Year</th>
<th>Lincoln County</th>
<th>Thayne Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population</td>
<td>Avg. Annual % Growth</td>
</tr>
<tr>
<td>1920</td>
<td>12487</td>
<td>-1.4%</td>
</tr>
<tr>
<td>1930</td>
<td>10894</td>
<td>-0.6%</td>
</tr>
<tr>
<td>1940</td>
<td>10286</td>
<td>-1.3%</td>
</tr>
<tr>
<td>1950</td>
<td>9023</td>
<td>-1.3%</td>
</tr>
<tr>
<td>1960</td>
<td>9018</td>
<td>0%</td>
</tr>
<tr>
<td>1970</td>
<td>8640</td>
<td>-0.4%</td>
</tr>
<tr>
<td>1980</td>
<td>12177</td>
<td>3.5%</td>
</tr>
<tr>
<td>1990</td>
<td>12625</td>
<td>0.4%</td>
</tr>
<tr>
<td>1994</td>
<td>13666</td>
<td>2.0%</td>
</tr>
<tr>
<td>*2005</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>*2015</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>*2025</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

Average Annual Growth for the past 24 years (1970-1994)

- Lincoln County: 1.94%
- Thayne Area: 1.73%

Notes:

1) Source of Data: State of Wyoming Dept. of Administration and Information - Economics Analysis Division

2) Thayne projected population based on 3% average annual growth.
In the September 21, 1995, Star Valley Independent newspaper, (Appendix "A"), a similar concern was raised:

"Anticipated growth in Star Valley this year is expected to more than double the growth of five years ago, reported Lincoln County Commissioner Stan Cooper. Cooper said an estimated 145 new home permits will be requested by the end of 1995 - 60 for Upper Valley and 85 for Lower Valley. This compares to only 66 in 1990 - 15 in Upper Valley and 51 in Lower Valley."

Given the relatively high potential for developmental growth, it is difficult to accurately predict the rate of future growth for the Thayne area. Over the past twenty-four years Lincoln County and Thayne have averaged 1.94% and 1.73% annualized growth respectively. The State of Wyoming Department of Administration and Information predicts a 0.7% annual growth for Lincoln County over the next twelve years. For the reasons stated above, it is felt that 0.7% annual projected growth in the Thayne (and Turnerville) area is probably low. A minimum annual growth rate of at least 2% would better reflect the actual population patterns and history of Thayne. A higher 3% growth rate has been adopted in this study for planning and projecting water supply needs over the next thirty years. It is felt that this higher growth rate better accounts for the developmental pressure being experienced in Star Valley and is more reasonable and realistic for planning.

The Willow Creek Pipeline service area population is estimated to be 133 persons. That estimate is based on a visual house count of 36 homes with an average of 3.7 persons per household as indicated on Star Valley resident questionnaires distributed by Forsgren Associates. The projected 30-year population with 3% annual growth is 323 persons (87 homes).

3.1.2 Equivalent Connections

Federal agencies require a calculation of "equivalent connections" to be utilized in funding considerations. In general, one equivalent connection can be assumed as a single 3/4-inch residential connection with larger connections being calculated as follows:

<table>
<thead>
<tr>
<th>Service Line Size (in.)</th>
<th>Orifice Area (sq. in.)</th>
<th>Equivalent Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>¾ inch</td>
<td>0.44</td>
<td>1</td>
</tr>
<tr>
<td>1 inch</td>
<td>0.79</td>
<td>1.8</td>
</tr>
<tr>
<td>1.25 inch</td>
<td>1.23</td>
<td>2.8</td>
</tr>
<tr>
<td>1.5 inch</td>
<td>1.77</td>
<td>4</td>
</tr>
<tr>
<td>2 inch</td>
<td>3.14</td>
<td>7.1</td>
</tr>
<tr>
<td>4 inch</td>
<td>12.57</td>
<td>28.5</td>
</tr>
<tr>
<td>6 inch</td>
<td>28.27</td>
<td>64</td>
</tr>
</tbody>
</table>

All of the connections in the Turnerville system can be reasonably assumed to be 3/4-inch. On that basis, the "immediate" number of equivalent connections proposed to be served by the Turnerville water system is 36.
3.1.3 Water Use

On September 24, 1996, at 5:00 p.m., Forsgren Associates personnel measured actual mainline water delivery to Turnerville at 190 gpm. That usage, in our opinion, was extraordinarily high and is likely reflective of line leakage and/or very unusual peak demands. Realistically, one would expect Turnerville's per capita water consumption to parallel that of surrounding communities if adequate supply were available at a comparable cost.

Table 3.2 summarizes water usage for Star Valley unmetered communities as well as for several other metered and unmetered communities in the area. The Star Valley communities average 4.6 to 6.2 gpm per user as a peak hour summer usage, whereas the communities of Idaho Falls, Preston, Rigby and Salmon average 3.2 to 4.8 gpm per user (see Table 3.3). The difference is easily explained since the Star Valley communities typically have very low user rates and large lots and residents tend to use more water than might normally be expected for lawn irrigation. Another explanation for the higher usage is that many of the Star Valley users use their home water connection to supply dairy barns and stock watering, which would not be the case for the Idaho Falls, Preston, Rigby and Salmon areas. With improved "tighter" water systems, it is felt that 4.6 gpm per user is a realistic peak hour usage rate typical for the Star Valley community.

Table 3.3 compares the peak day usage in gallons per minute per user and gallons per capita per day for unmetered as well as metered communities. The metered communities selected were the cities of Evanston, St. Anthony, Rock Springs and Green River since there are presently no metered communities in Star Valley. Since the unmetered water usage for Star Valley is typically higher than other unmetered communities in the area, Star Valley communities were not used in the comparison of metered and unmetered water usage. The unmetered communities selected were Idaho Falls, Preston, Rigby and Salmon. As you will note from the table, a reduction in water usage from unmetered to metered usage of 43 to 55 percent is documented. However, if one compares the cities of Idaho Falls and Preston to the communities of St. Anthony and Evanston, which are very similar in type and elevation, the percent reduction from unmetered to metered is 25 to 35 percent instead of 43 to 55 percent. We have selected a 25 percent reduction as being conservatively representative of the percent peak day reduction one might expect in Star Valley if meters are installed (and used) as part of the system upgrade or rehabilitation. It should be noted that most state and federal funding sources require meters as a condition of their grants and loans. Table 3.4, therefore, summarizes the actual water usage for metered as well as unmetered conditions that should be used for the design of Star Valley community water systems and documents the percent reduction from unmetered to metered water usage for winter day, average day, peak day and peak hour.

Based on this information, "immediate" and "future potential" water usage has been projected for the community of Turnerville. These projections, shown in Table 3.5, are based on an unmetered condition for existing homes. As growth occurs it is presumed that the future (30-year) system will ultimately be metered.
<table>
<thead>
<tr>
<th>COMMUNITY</th>
<th>Total (GPM)</th>
<th>WINTER GPM/ Conn.</th>
<th>Winter Gal/ Person/ Day</th>
<th>Total (GPM)</th>
<th>SUMMER GPM/ Conn.</th>
<th>Summer Gal/ Person/ Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Afton</td>
<td>320</td>
<td>3.56</td>
<td>1,708</td>
<td>560</td>
<td>6.22</td>
<td>2,985</td>
</tr>
<tr>
<td>Bedford</td>
<td>250</td>
<td>2.78</td>
<td>1,250</td>
<td>414</td>
<td>4.60</td>
<td>2,070</td>
</tr>
<tr>
<td>Osmond</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>340</td>
<td>4.85</td>
<td>2,190</td>
</tr>
<tr>
<td>Etna</td>
<td>125</td>
<td>2.6</td>
<td>1,015</td>
<td>250</td>
<td>5.2</td>
<td>2,027</td>
</tr>
<tr>
<td>Afton</td>
<td>1,300</td>
<td>2.3</td>
<td>1,410</td>
<td>3,500</td>
<td>5.84</td>
<td>3,360</td>
</tr>
<tr>
<td>Idaho Falls</td>
<td>17,200</td>
<td>1.42</td>
<td>620</td>
<td>53,300</td>
<td>4.40</td>
<td>1,920</td>
</tr>
<tr>
<td>Preston</td>
<td>2,190</td>
<td>1.60</td>
<td>700</td>
<td>5,470</td>
<td>4.01</td>
<td>1,750</td>
</tr>
<tr>
<td>Rigby</td>
<td>2,100</td>
<td>2.48</td>
<td>1,080</td>
<td>4,100</td>
<td>4.84</td>
<td>2,110</td>
</tr>
<tr>
<td>Salmon</td>
<td>3,300</td>
<td>2.20</td>
<td>1,188</td>
<td>4,800</td>
<td>3.22</td>
<td>1,880</td>
</tr>
</tbody>
</table>

*(1) Data not available.
(2) Based on average of 3.2 persons/household per Bedford Level II Study
(3) Based on assumed average of 3.2 persons/household
(4) Based on average of 3.7 persons/household per resident questionnaire
(5) Based on average of 2.3 persons/household per Afton Level II Study
<table>
<thead>
<tr>
<th></th>
<th>WINTER</th>
<th>SUMMER</th>
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<tbody>
<tr>
<td></td>
<td>GPM</td>
<td>Gal/Person/Day</td>
</tr>
<tr>
<td><strong>COMMUNITY</strong></td>
<td>conn.</td>
<td>conn.</td>
</tr>
<tr>
<td>I. UNMETERED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idaho Falls</td>
<td>0.72</td>
<td>310</td>
</tr>
<tr>
<td>Preston</td>
<td>0.81</td>
<td>350</td>
</tr>
<tr>
<td>Rigby</td>
<td>1.24</td>
<td>540</td>
</tr>
<tr>
<td>Salmon</td>
<td>1.10</td>
<td>590</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>__</td>
<td>__447</td>
</tr>
<tr>
<td>II. METERED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Anthony</td>
<td>0.49</td>
<td>280</td>
</tr>
<tr>
<td>Evanston</td>
<td>0.38</td>
<td>220</td>
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<tr>
<td>Rock Springs</td>
<td>0.37</td>
<td>215</td>
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<tr>
<td>Green River</td>
<td>0.19</td>
<td>110</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>__</td>
<td>__203</td>
</tr>
<tr>
<td>III. % REDUCTION (Metered vs. Unmetered)</td>
<td>55%</td>
<td>43%</td>
</tr>
</tbody>
</table>
### TABLE 3.4

**STAR VALLEY**
**SUMMARY OF WATER USAGE**

<table>
<thead>
<tr>
<th>WATER USE CONDITION</th>
<th>UNMETERED</th>
<th></th>
<th></th>
<th></th>
<th>METERED</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GPM/ Day</td>
<td>Gal/ *Person/ Day</td>
<td>Percent Reduction</td>
<td>GPM/ Day</td>
<td>Gal/ *Person/ Day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter Day</td>
<td>3.10</td>
<td>1,210</td>
<td>20%</td>
<td>2.33</td>
<td>905</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Daily</td>
<td>3.33</td>
<td>1,300</td>
<td>25%</td>
<td>2.50</td>
<td>975</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Daily</td>
<td>4.20</td>
<td>1,640</td>
<td>25%</td>
<td>3.15</td>
<td>1,225</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak Hour</td>
<td>4.60</td>
<td>1,790</td>
<td>20%</td>
<td>3.68</td>
<td>1,435</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Based on an average household size of 3.7 persons as reflected on resident questionnaires.*
TABLE 3.5
TURNERVILLE WATER SUPPLY NEEDS

NUMBER OF CONNECTIONS: 16 Existing + 11 "piggybacks" = 27
36 Immediate "Probable"

WATER SUPPLY NEEDS:
(Based on Star Valley Averages)

<table>
<thead>
<tr>
<th></th>
<th>IMMEDIATE UNMETERED (36 CONN.)</th>
<th>FUTURE METERED (87 CONN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter Day</td>
<td>3.10 gpm/conn 0.16 MGD</td>
<td>2.33 gpm/conn 0.29 MGD</td>
</tr>
<tr>
<td>Average Day</td>
<td>3.33 0.17</td>
<td>2.50 0.31</td>
</tr>
<tr>
<td>Peak Day</td>
<td>4.20 0.22</td>
<td>3.15 0.40</td>
</tr>
<tr>
<td>Peak Hour</td>
<td>4.60 0.24</td>
<td>3.68 0.46</td>
</tr>
</tbody>
</table>

3.1.4 Comparative Usage and Water Conservation Measures

From Table 3.6 it can be seen that Star Valley's present per-capita water usage is significantly higher than that of most other Wyoming communities. It can also be seen, however, that this usage is much more comparable to nearby Southeast Idaho communities.

It is felt that this relatively high water consumption of the Star Valley area is the result of several factors including inexpensive rates, shallow service lines (requiring continual winter use), large irrigatable properties, stock watering practices, etc. It is our opinion that as the Star Valley population grows and groundwater availability continues to decline, domestic drinking water will become an increasingly valuable asset. Suggestions for reducing water consumption in the future include the following:
### TABLE 3.6
WATER USAGE COMPARISON
(Gallons per person per day)

<table>
<thead>
<tr>
<th>Community</th>
<th>Typical Winter Day&lt;sup&gt;(3)&lt;/sup&gt;</th>
<th>Typical Summer Day&lt;sup&gt;(3)&lt;/sup&gt;</th>
<th>Peak Day</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wyoming Communities&lt;sup&gt;(3)&lt;/sup&gt;:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casper&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>120</td>
<td>380</td>
<td>540</td>
</tr>
<tr>
<td>Sheridan&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>190</td>
<td>430</td>
<td>N/A</td>
</tr>
<tr>
<td>Kemmerer&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>140</td>
<td>350</td>
<td>910</td>
</tr>
<tr>
<td>Evanston&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>250</td>
<td>480</td>
<td>550</td>
</tr>
<tr>
<td>Rock Springs&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>210</td>
<td>430</td>
<td>540</td>
</tr>
<tr>
<td><strong>Southeast Idaho Communities:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idaho Falls</td>
<td>310</td>
<td>970</td>
<td>N/A</td>
</tr>
<tr>
<td>Preston</td>
<td>350</td>
<td>880</td>
<td>N/A</td>
</tr>
<tr>
<td>Rigby</td>
<td>540</td>
<td>1050</td>
<td>N/A</td>
</tr>
<tr>
<td>Salmon</td>
<td>590</td>
<td>940</td>
<td>N/A</td>
</tr>
<tr>
<td>St. Anthony&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>280</td>
<td>680</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Star Valley Communities:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unmetered&lt;sup&gt;(2)&lt;/sup&gt;</td>
<td>1210</td>
<td>1394&lt;sup&gt;(4)&lt;/sup&gt;</td>
<td>1640</td>
</tr>
<tr>
<td>Metered&lt;sup&gt;(2)&lt;/sup&gt;</td>
<td>905</td>
<td>1041&lt;sup&gt;(4)&lt;/sup&gt;</td>
<td>1225</td>
</tr>
</tbody>
</table>

**Notes:**
1) Metered communities
2) "Typical" only. Records not available to determine a true average.
3) Data based on highest winter and summer month averages for 1987/88. Information obtained through direct contract with communities.
4) Estimated Star Valley summer day = 85% of peak day.
5) Based on an average high month use.

**Metering:** Based on a comparison between similar metered and unmetered communities, it is estimated that a rate structure based on metered use could reduce summer-time consumption by as much as 35%. Meters must be included with any recommended distribution system improvements as a condition of RUS or Wyoming Farm Loan Board funding.

**Replace Shallow Services:** A primary reason for Star Valley's relatively high winter consumption is, in our opinion, the need to continually run water through shallow service lines to prevent freezing during the winter months. This is particularly true for part-time residents. Historically, Star Valley's worst domestic water supply problems have occurred in the winter months when springs typically exhibit their lowest flows.
Impose Rationing: Water rationing is typically used as an emergency response when water supply problems become evident. Reliance on imposed rationing is indicative of an inadequate supply system (relative to the system demands). The system must be continually monitored to insure that adequate fire storage is available and that excessive demands do not result in inadequate system pressures. Because of these health and safety risks, it is our opinion that this approach should be viewed as temporary until a more permanent water supply solution can be implemented. Rationing schemes include odd/even day watering, daytime watering restrictions, etc.

Education: A citizen education program that emphasizes water conservation and the overall value of that natural resource may result in reduced consumption.

It is recommended that system improvements be designed for an immediate "unmetered" condition and a future (30-year) "metered" condition. It is anticipated that improvements such as pipelines, however, could have a design life in excess of 50 years. Given the relatively high water use in Star Valley, it is not recommended that additional capacity be designed into the system. Should growth occur in excess of the 30-year projection, it is presumed that water conservation measures will be implemented without serious detriment to the community.

3.2 EXISTING WATER SUPPLY SOURCE

As indicated in Section 2.0, Turnerville presently receives its domestic water supply from the spring in the Willow Creek Canyon. Water quality testing and flow measurements were taken as part of the Level II investigation. The results of MPA water quality tests can be found in Appendix D. This testing was in addition to that testing required by EPA for normal operation of a public drinking water system. It should be noted that Turnerville’s spring is considered by EPA to be "at risk" from contamination due to the lack of metered disinfection capability in the system.

The evaluation of the supply spring indicates that it is a "true", high quality spring source. The spring should be redeveloped, however, to avoid potential surface water contamination or animal influence.

Measured spring discharge in September 1996, was 405 gpm. It should be noted that there are no flow measurements taken during February or March when Star Valley springs typically exhibit their lowest flows. The spring has adequate capacity to serve the existing 27 users connected to the Willow Creek Pipeline. It also appears that this spring is adequate to meet the projected summertime peak day demand needs of the community over the next 30 years if adequate piping and storage are in place.

3.3 WATER RIGHTS CONSIDERATIONS

3.3.1 Existing Domestic Water Rights

The initial Willow Creek Pipeline Company domestic water right is for 0.288 CFS (129 gpm). This water right has a July, 1967 priority. Although the filing is relatively junior, the Willow Creek Pipeline Company has never experienced any challenges or regulation to that right. Water rights documentation is included as Appendix A to this report.

3.3.2 Available Water vs. Legal Supply

As indicated above, Turnerville’s water right is 0.288 CFS (129 gpm). The measured spring capacity is approximately 0.90 CFS (405 gpm). Any improvements to the system will require that an enlargement be filed to reflect the increased system delivery capacity.
3.4 OTHER POTENTIAL SUPPLY SOURCES

Given Turnerville’s relatively junior water right and the desirability of having source redundancy, it would be prudent for Turnerville to consider the development of additional water supply (if reasonably available). The planning and ultimate development of additional water supply source(s) can ensure that the Turnerville community always has an adequate, safe drinking water supply. Options for providing additional supply include the following:

3.4.1 Additional Canyon Spring Sources

There is an undeveloped spring source of unknown quality or quantity located approximately ¾ mile down Willow Creek from the existing unnamed spring. Forsgren Associates was unable to quantify its yield or ascertain its quality because the spring discharges submerged into a large pond. The pond is filled when beavers dam up the culvert crossing the Forest road. Each year the dam must be removed and water drained to reveal the spring. Given the probable difficulties and cost of development, this spring was not considered for development at this time. However, it remains a likely and viable source of supply in the future as water needs in the valley continue to increase. As a minimum, therefore, it is recommended that the canyon piping be oversized in anticipation of developing this spring in the long-term future.

3.4.2 Surface Water and Treatment

The practicality of treating surface water vs. using springs or groundwater is primarily an economic consideration. Clearly, this is not a cost-effective alternative when compared to springs and wells.

3.4.3 Groundwater Well(s)

Groundwater well(s), in our opinion, are not a preferred alternative for meeting Turnerville’s water supply needs. Although this option guarantees a redundancy of supply and flexibility of operation, it is not felt to be economically justifiable at this time. Nor is the hydrogeology of the Turnerville area favorable to the drilling of a high yield municipal well. It is an economically risky proposition at best.
SECTION 4.0
ALTERNATIVE EVALUATIONS
SECTION 4.0
ALTERNATIVE EVALUATIONS

4.1 PUBLIC PARTICIPATION
It is essential that the conclusions and recommendations of this study realistically reflect the concerns of the Turnerville residents as well as the technical requirements of the project. It is equally important for public support to be based on a clear understanding of the project including water quality issues, water supply issues, economic impacts, etc. At key decision making points throughout the study process, meetings were held with the Willow Creek Pipeline Company and Turnerville residents. These meetings were well attended by water users. In addition, a great deal of contact was made with individual residents and Board members.

4.2 COMMUNITY WATER SUPPLY ALTERNATIVES
As indicated in Section 3.0, there are serious concerns about Turnerville's existing water supply system. Options for meeting Turnerville's long-term domestic water needs include the following:

4.2.1 "Do Nothing" Approach
The Turnerville water system is over 30 years old. Piping is under-sized and badly deteriorated. The existing spring and storage facility are at risk from contamination. Although the EPA has not issued an Administrative Order, they recently issued a letter to the Willow Creek Pipeline Company strongly requesting that action be taken to improve the system to be in full compliance with EPA regulations. Clearly, the "do nothing" approach is not a realistic option for the community of Turnerville.

4.2.2 Individual Wells
It is possible to simply abandon the existing water system and for residents to drill their own domestic wells. It is not felt that this is a viable alternative, however, given the relatively close proximity of some homes. The combination of wells and septic systems in a relatively confined area would, in our opinion, dramatically increase the potential for groundwater contamination. There is also a high probability that such wells will dramatically vary in terms of water quality, capacity, and depth. It is presumed that the initial formation of the Willow Creek Pipeline Company was at least partially in response to those kinds of concerns.

4.2.3 Community Water System
Improving and expanding Turnerville's water system is, in our opinion, the most viable solution to meeting Turnerville's long-term domestic water needs. This approach represents the lowest risk from an economic and water quality standpoint. This type of system also enables growth and economic benefit to the community that may not otherwise occur.
4.3 RECOMMENDED DESIGN CRITERIA

4.3.1 Intent of Design

When considering recommended improvements for the Turnerville water system, five major concerns were addressed as follows:

A. Health and Safety: The ability to provide an adequate, safe drinking water supply that meets EPA safe drinking water standards is of primary importance.

B. Fire Protection: The ability to deliver adequate fire flows at a safe (20 psi) residual pressure impacts the safety and economic well-being of the community.

C. System Reliability: Events such as power interruption and line breakages are a normal fact-of-life and should not, in our opinion, result in water service interruption to the community at large. Adequate reserve facilities can minimize that risk.

D. Ability to Accommodate Growth: It appears that the growth and economic development throughout Star Valley is limited by the capacity of respective water systems to accommodate such growth. It is our opinion, therefore, that improvements to the water system should be made with an eye toward realistic growth. Obviously, no one wants to invest in system improvements that would become obsolete before the end of their expected useful life.

E. System Simplification: A simplified system is easier to understand, more reliable, and less expensive to maintain. The minimization of pump stations, PRV valves, and service zones follow this intent.

4.3.2 Optimal Design Conditions

In considering needed system improvements, the following conditions were considered as optimal. These conditions were adhered to wherever practical.

4.3.2.1 Fire Protection

A rural residential fire requirement of 500 gpm during an average summer day was used in this study. There is no "standard" fire flow recommended by the Insurance Services Office (ISO). The 500 gpm requirement was subjectively adopted as a practical minimum flow based on discussions with the Afton Fire District and our experience with other small rural communities in Star Valley.

It should be noted that Turnerville is not located within five miles of a fire station. Realistically, therefore, we would not expect any significant homeowners insurance rate reductions associated with a fire protected system.

4.3.2.2 Optimal Pressures

For health and safety reasons, the minimum acceptable water pressure at each home is at least 35 psi under all normal operating conditions. At least 45 psi is the target minimum pressure under summer day demand conditions and 20 psi with fire flow demands. The desired range of system pressure is 45 to 90 psi.
4.3.2.3 System Storage

Water storage reservoirs serve three functions:

- Provide operational storage or reserve to meet short-duration peak demands that exceed the output of the supply source.
- Provide emergency storage for use during periods when the water supply may be temporarily lost. Examples might be a broken pipeline or the interruption of power to a well.
- Provide the additional volume of water, over and above immediate demand, needed for fire protection.

Wyoming DEQ suggests a minimum storage capacity of average daily demand, plus fire, calculated as follows:

**Present Demand:**

\[
\text{Fire - 500 gpm} \times 2 \text{ hours} = 60,000 \\
\text{Average Daily Demand} = 170,000 \\
\text{230,000 gallons}
\]

**Future (30 year) Demand:**

\[
\text{Fire - 500 gpm} \times 2 \text{ hours} = 60,000 \\
\text{Average Daily Demand} = 300,000 \\
\text{360,000 gallons}
\]

As indicated above, it is important to have adequate system redundancy in case of emergency interruption of supply. That is particularly true if Turnerville relies on a groundwater spring as their primary source. A peak day storage capacity is generally appropriate under those circumstances. Estimated present (metered) and future (unmetered) peak day use is 220,000 gallons and 400,000 gallons respectively.

Given the relatively high water consumption in the Star Valley, it would also be reasonable to assume that water consumption could be reduced during emergencies without serious detriment to the community. The recommended storage capacity for the Turnerville water system, therefore, is 250,000 gallons. This capacity is felt to be reasonable and reflective of Turnerville's actual needs.

It is also recommended that any new storage tank be a partially buried concrete structure for the following reasons:

- Freezing problems associated with Star Valley's severe climate will be minimized.
- Willow Creek Canyon aesthetics will be less impacted.
- Future maintenance will be minimized.
• The 50-year "life-cycle" cost of concrete vs. steel is nearly identical for this size tank with today's pricing.

4.3.2.4 Pipeline Sizing

Wyoming DEQ requires a minimum 8-inch diameter for any pipeline delivering one direction fire flows. All other lines were sized based on actual need except that 6-inch was generally considered as the minimum main line pipe diameter in areas with reasonable potential for development. The labor cost to install a 4-inch vs. a smaller diameter pipe is virtually identical. In most cases it was felt that the materials cost difference was not significant enough to offset the limited capacity (and limited future service potential) of the smaller line.

4.3.2.5 Pipeline Materials Selection

Federal (RUS) funding will likely be incorporated into this project. Federal agencies typically do not allow the exclusive bidding of one type of pipe. It is presumed, therefore, that class 50 ductile iron and C-900 PVC pipe will be competitively bid on this project.

4.4 SYSTEM MODELING

The best available planning tool today for municipal water systems is to develop a computer model which closely simulates the operation of that system. A computer simulation allows the evaluation of system response to proposed modifications prior to their implementation. It is a cost effective method of evaluating and optimizing pipelines and other system components before actual design and construction are initiated. An operational computer model can help system managers quickly and accurately predict system responses to modifications prior to implementation at a considerable cost savings.

The Turnerville water system as proposed in this report was computer modeled using the CYBERNET software. This approach was used to insure that the proposed system could cost-effectively provide adequate fire protection, safe working pressures, operational simplicity, etc.

4.5 AREA-WIDE WATER SYSTEM

The communities of Bedford and Turnerville are located in close proximity of each other. It seems prudent, therefore, to consider the long-term possibility of a single area-wide water system that incorporates both systems. As development continues to occur one would expect the ultimate creation of an area-wide water system as a matter of practicality. A single area-wide system could result in reduced operational costs, increased reliability through supply source redundancy, etc. That approach is not feasible in the short-term, however, for the following reasons:

1) The minimal development between the Turnerville and Bedford systems does not economically justify the costs associated with constructing a connecting pipeline.
2) Each respective community has a secure source(s) of supply adequate to meet their needs. Those sources include new wells in Bedford and Thayne. The economic feasibility of constructing connecting pipelines, therefore, is primarily dependent on the number of users tied to those pipelines.

3) The Bedford system is lower in elevation that the Turnerville system. Pumping would be required to allow Turnerville to benefit from a connection to the Bedford system.

For long range planning, there is a possibility that development between Bedford and Thayne will make the construction of piping (and connection of the two systems) economically viable and desirable. For that reason, it is suggested that piping running to the north end of the Turnerville system be sized to at least 6 inches in anticipation of that possibility.
SECTION 5.0
RECOMMENDATIONS AND CONCLUSIONS
5.1 GENERAL

The community of Turnerville has serious water supply, transmission, and distribution problems. Their system is over 30 years old and undersized for present and future needs. Deteriorated and under-sized pipelines represent a significant health and safety risk to system users. Their present spring source is adequate to meet the needs of the community as a whole, but is not, in our opinion, adequately protected against surface influence.

Extensive improvements are recommended for the Turnerville water system to address water quality and capacity deficiencies. These improvements are shown schematically in Figure 5.1.

5.2 RECOMMENDED SUPPLY, STORAGE, AND TRANSMISSION IMPROVEMENTS

Water system components eligible for funding by Wyoming Water Development Commission are generally limited to transmission lines, storage tanks, and supply related facilities. These recommended improvements are discussed below.

5.2.1 Source of Supply

It is recommended that the springs be retained and redeveloped to maximize yields and to conform to EPA requirements. A typical detail for spring development is shown as Figure 5.2.

5.2.2 System Storage

A 250,000 gallon partially buried concrete storage tank is recommended as discussed in Section 5.0. This tank will provide Turnerville with needed fire protection and adequate "back-up" storage in case of interruptions in supply. This tank will need to be located on Forest Service land in Willow Creek Canyon.

5.2.3 Transmission Pipelines

Only those lines that are 6-inches in diameter or larger have been viewed as transmission lines eligible for WWDC funding. Those lines are shown in Figure 5.1.

5.2.4 Disinfection

Based on discussions with EPA staff, it is recommended that stand-by disinfection facilities be provided on the system. In addition to simply being a wise precaution, it is felt that such disinfection capability will better insure long-term EPA regulatory compliance. It provides the community with an excellent "insurance policy" in the event that bacteriological contamination is again detected in the water supply. Disinfection could provide an emergency response without interrupting supplies until such time as the problem is corrected. A simple hypo-chlorite system is recommended for this project. That system is recommended because of its relatively low capital investment and simplified operational concerns. Chlorine gas systems, by contrast, require extensive safety equipment, specialized housing, and operator training that could cost many thousands of dollars more.
PROPOSED 250,000 GAL. CONCRETE WATER STORAGE TANK

FIGURE 5.1
TYPICAL SPRING DEVELOPMENT DETAIL

FIGURE 5.2
5.3 **RECOMMENDED DISTRIBUTION SYSTEM IMPROVEMENTS**

Recommended "distribution" related improvements are not eligible for WWDC funding. These improvements are discussed below.

5.3.1 **Meters**

As a condition of funding, RUS and the Wyoming Farm Loan Board require the installation of water meters. These meters will provide an excellent water management tool to eliminate waste and minimize excessive consumption.

5.3.2 **Service Connections**

It is recommended that new service lines be extended from the mainline to the property lines of new and existing water users. Meter boxes with shut-off valves and backflow prevention devices would typically be located at the property line(s). Upstream service line maintenance would be the District’s responsibility and downstream maintenance the responsibility of the water user. This approach eliminates problems associated with digging in resident's yards, dealing with interior plumbing problems, etc. For budgeting purposes, it was assumed that each connection would include a meter, meter box, and up to 50 feet of 3/4-inch copper service line.

5.4 **PROJECT ECONOMIC DATA**

5.4.1 **Recommended Project Budgets**

The primary purpose of this study is to identify problems and make recommendations relative to Turnerville's water supply needs as they pertain to WWDC funding. Of course, it is impossible to totally separate the "transmission and supply" considerations from "distribution" needs. For this project, therefore, the system was examined as a whole and the respective budgets subsequently broken out separately. The budgets for recommended WWDC eligible improvements and non-WWDC eligible improvements are shown in Tables 5.1 and 5.2 respectively.

Detailed cost break-downs and projected budget data are contained in Appendix "A".
**TABLE 5.1**  
**RECOMMENDED PROJECT BUDGET**  
**TURNEVILLE WATER SUPPLY SYSTEM IMPROVEMENTS**  
**WWDC ELIGIBLE COSTS**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Est. Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Existing Spring Renovation</td>
<td>$ 73,400</td>
</tr>
<tr>
<td>2</td>
<td>Stand-by Disinfection</td>
<td>$ 29,000</td>
</tr>
<tr>
<td>3</td>
<td>240,000 Gal. Storage Reservoir</td>
<td>$188,300</td>
</tr>
<tr>
<td>4</td>
<td>Transmission Piping</td>
<td>$413,300</td>
</tr>
</tbody>
</table>

**Subtotal**  
$704,000

- Preparation of Plans and Specs  
  $ 74,000  
- Permitting / Mitigation / Water Rights  
  $ 15,000  
- Legal Fees  
  $ 4,000  
- R.O.W. Acquisition  
  $0

- Construction Cost (from above)  
  $704,000  
- Construction Engineering (10%)  
  $ 70,400

**Subtotal**  
$774,400

Contingency (15%)  
116,100

**Construction Total**  
$ 890,500  
$890,500

**PROJECT TOTAL**  
$ 983,400
### TABLE 5.2
RECOMMENDED PROJECT BUDGET
TURNERVILLE WATER SUPPLY SYSTEM IMPROVEMENTS
NON-WWDC ELIGIBLE COSTS

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Est. Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Distribution Piping, etc.</td>
<td>$46,800</td>
</tr>
<tr>
<td>2</td>
<td>Service Lines &amp; Meters</td>
<td>$55,000</td>
</tr>
</tbody>
</table>

**Subtotal** $101,800

- Preparation of Plans and Specs $10,200
- Permitting & Mitigation / R.O.W $0
- Legal Fees $4,000

- **Construction Cost (from above)** $101,800
- **Construction Engineering (10%)** $10,200

**Subtotal** $112,000

- **Contingency (10%)** $11,200

**Construction Total** $123,200 $123,200

**PROJECT TOTAL** $137,400

5.4.2 Probable Project Financing

"Probable" financing for recommended system improvements is based on direct discussions with RUS, Wyoming Farm Loan Board, and WWDC staff. It is based on the following participation levels from each respective agency:

A. **Transmission and Supply:** Based on past experience, it is assumed that WWDC will provide grant funding for 60% of the cost of transmission and supply related improvements. The remaining 40% can be provided by WWDC in the form of a fixed rate 7.25% loan.

B. **Distribution and Services:** It is presumed that distribution related improvements will be funded 50% by a Wyoming Farm Loan Board grant. The remaining 50% can be provided by the Farm Loan Board in the form of a fixed rate 7.25% loan.
C. **USDA Rural Utility Service (RUS) Funding Involvement:**

The (RUS) program favors rural "low-to moderate" income communities. Funding eligibility is based on 1990 census data showing Wyoming's non-metropolitan median household income to be $26,148. Communities with median incomes of less than 80% of the state average are classified as "poverty communities" and are generally good candidates for RUS project funding involvement. Communities with median household incomes between 80% and 100% of the state median income are classified as "intermediate income communities". Based on verbal discussions with area residents, it appears that Turnerville would qualify as a "poverty community" and would thus be eligible for RUS grant and loan funding assistance for this project.

The probable scenario for RUS grant funding participation would involve targeting a water user rate comparable to other similar nearby communities. In Star Valley, it is anticipated that rate would be about $30.00 to $35.00 per connection per month. It should be noted that the RUS program requires the installation and use of individual water meters as conditions of funding. The use of RUS funding will also involve bonding, environmental reporting, etc.

Probable funding scenarios with and without RUS funding participation are summarized in Tables 5.3 and 5.4.

---

### TABLE 5.3

PROPOSED PROJECT FUNDING WITHOUT RUS INVOLVEMENT TURBEOVILLE WATER SYSTEM IMPROVEMENTS

<table>
<thead>
<tr>
<th></th>
<th>Transmission and Supply</th>
<th>Distribution and Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWDC Grant</td>
<td>$590,040</td>
<td>-0-</td>
</tr>
<tr>
<td>WWDC Loan</td>
<td>393,360</td>
<td>-0-</td>
</tr>
<tr>
<td>Farm Loan Board Grant</td>
<td>-0-</td>
<td>$68,700</td>
</tr>
<tr>
<td>Farm Loan Board Loan</td>
<td>-0-</td>
<td>68,700</td>
</tr>
</tbody>
</table>

**TOTAL**       $983,400        $137,400

**Annual Loan Payment:** (2)  
$38,175/year = $88.37/conn/mo

**Notes:** Based on

1) 60% WWDC Grand Funding, 50% FLB Grant Funding
2) State Loans assured to be 7-1/4% interest, 30-year duration, 36 connections
### TABLE 5.4
**PROPOSED PROJECT FUNDING WITH RUS INVOLVEMENT**
**TURNERVILLE WATER SYSTEM IMPROVEMENTS**

<table>
<thead>
<tr>
<th>Transition and Supply</th>
<th>Distribution &amp; Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWDC Grant (1)</td>
<td>$590,040</td>
</tr>
<tr>
<td>WWDC Loan</td>
<td>-0-</td>
</tr>
<tr>
<td>Farm Loan Board Grant (1)</td>
<td>-0-</td>
</tr>
<tr>
<td>Farm Loan Board Loan</td>
<td>-0-</td>
</tr>
<tr>
<td>RUS</td>
<td>293,360</td>
</tr>
<tr>
<td>RUS Loan</td>
<td>100,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$983,400</strong></td>
</tr>
</tbody>
</table>

*Annual Loan Payment: (2) $6,505.00/year = $15.06/conn/mo.*

**Notes:**
1) Based on 60% WWDC Grant Funding, 50% FLB Grant Funding
2) Assumed 100,000 RUS Loan @ 5% interest, 30-year duration

---

### 5.4.3 Projected User Rate Impact

Projected user rates could vary depending on the actual number of rate payers. That is because some costs, such as water quality testing and district audits, remain constant regardless of the number of users. Based on discussion with the Turnerville Board and input received from area residents, we would anticipate approximately 36 "probable immediate" connections to the system. Table 5.5, therefore, shows a range of projected rates for 32, 36, and 40 users respectively.
TABLE 5.5
PROJECTED RATE IMPACT
TURNERVILLE WATER SYSTEM IMPROVEMENTS

<table>
<thead>
<tr>
<th>Expense</th>
<th>No. of Connections</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>32 conn</td>
</tr>
<tr>
<td>RUS Loan Payment (1)</td>
<td>$16.94</td>
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<tr>
<td>O&amp;M_{(2)}</td>
<td>19.92</td>
</tr>
<tr>
<td>Reserve_{(3)}</td>
<td>1.69</td>
</tr>
<tr>
<td><strong>Total Rate</strong></td>
<td><strong>$38.55/Mo.</strong></td>
</tr>
</tbody>
</table>

**Notes:**
(1) Assumed $100,000 RUS loan amount @ 5%, 30 years = $6,505/year.
(2) Estimated District O&M = $7,650.00/year (See Appendix 'A')
(3) Reserve calculated as 10% of loan payment.
(4) Possible rate reduction associated with connection fees are not reflected herein.

5.5  PROJECT PERMITTING REQUIREMENTS

There are several State and Federal permits required for the construction of this project as follows:

5.5.1  U.S. Forest Service Special Use Permit

Portions of the recommended project will be constructed on Forest Service land. Those components include the tank, spring redevelopment, and associated transmission line(s). This work will require the approval of the Forest Service through the issuance (or amendment) of a Special Use Permit.

5.5.2  Wyoming DEQ Permit to Construct

This permit is required for all water system projects. DEQ will require final plans and specifications to review as part of the application process.

5.5.3  U.S. Army Corps of Engineers 404 Permit

All work impacting wetlands and/or waterways generally requires a 404 permit. The application for this permit requires that the project be briefly described and qualified in sufficient detail to ascertain its impact to the environment. Various private and public agencies (including Fish & Game, EPA, etc.) are then given an opportunity to comment on the project prior to issuing a permit.

Pipeline creek crossing(s) will require a 404 permit.
5.5.4 **Right-of-way Acquisition**

Some private land may be required for the construction of the pipeline facilities. License agreements will also need to be obtained from Lincoln County for pipeline construction in county road rights-of-way.

5.5.5 **Archeological Clearance**

In the State of Wyoming, all projects of this nature must be reviewed by a qualified archeologist to insure that archeological findings are not inadvertently lost or damaged. Virtually all of the land impacted by this project has already been disturbed. This clearance, therefore, will be relatively quick and inexpensive to obtain.

5.5.6 **Water Rights**

As a minimum, the water right for the spring will need to be transferred to the Turnerville Improvement District. That transfer can be performed with a simple one-page agreement provided by the State Engineer and approved by the Willow Creek Pipeline Company Board.

We also recommend expanded spring filing(s) to accommodate additional needs as projected in this report.

5.6 **TRANSFER OF WATER SYSTEM OWNERSHIP AND RESPONSIBILITY**

The Turnerville water system is presently owned and operated by the Willow Creek Pipeline Company. This project, however, will be constructed by the Turnerville Improvement District. It is the intention of the two Boards to negotiate a transfer of physical assets relative to the water system. These assets include water rights, rights-of-ways, permits, easements, and piping (if any) designated to remain in service.

No problems are anticipated relative to the fair and equitable transfer of needed Pipeline Company facilities to the Turnerville Improvement District.

5.7 **WHERE DO WE GO FROM HERE?**

Two recommendations deserving immediate attention are the formation of a Turnerville Improvement District and applications for WWDC, Wyoming Farm Loan Board, and RUS funding assistance.
APPENDIX A
DETAILED COST ESTIMATES AND FINANCIAL DATA
## DETAILED CONSTRUCTION COST ESTIMATE

**TURNERVILLE WATER SUPPLY**
**SUPPLY, MAINLINE TRANSMISSION, & STORAGE**
(WWDC FUNDED PROJECT COMPONENTS)

Estimate Updated - July 1997

### EXISTING SPRING RENOVATION & REPAIR (based on 50x100 collection area)

<table>
<thead>
<tr>
<th>NO.</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clear &amp; Grub \ access</td>
<td>Lump Sum</td>
<td>1</td>
<td>3500.00</td>
<td>3500.00</td>
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<tr>
<td>2</td>
<td>Site Earthwork \ water control</td>
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<td>15000.00</td>
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<td>3</td>
<td>Headwall</td>
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<td>4</td>
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<td>10000.00</td>
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<td>Imported Backfill</td>
<td>CY</td>
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<td>1800.00</td>
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<td>6</td>
<td>Crushed Washed Rock</td>
<td>Ton</td>
<td>550</td>
<td>15.00</td>
<td>8250.00</td>
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<td>7</td>
<td>8&quot; Perf. Collection Pipe</td>
<td>LF</td>
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<tr>
<td>8</td>
<td>Overflow Pipe</td>
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<td>50</td>
<td>22.00</td>
<td>1100.00</td>
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<tr>
<td>9</td>
<td>Hypolon Liner</td>
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<td>16.00</td>
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<tr>
<td>10</td>
<td>8&quot; Gate Valve</td>
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<td>1</td>
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<td>16.00</td>
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<tr>
<td>11</td>
<td>Topsoil Restoration &amp; Reveg.</td>
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<td>3500.00</td>
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<tr>
<td>12</td>
<td>Post &amp; Pole Fence</td>
<td>LF</td>
<td>350</td>
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Subtotal $73,366.00

### STAND-BY DISINFECTION FOR SPRINGS

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<tbody>
<tr>
<td>13</td>
<td>Electrical (Inc. Connection)</td>
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<td>7000.00</td>
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<tr>
<td>14</td>
<td>Structure</td>
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<td>15000.00</td>
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<tr>
<td>15</td>
<td>Hypochlorite System</td>
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<td>4500.00</td>
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<tr>
<td>16</td>
<td>Misc. Mechanical + Installation</td>
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Subtotal $29,000

### TRANSMISSION LINE PIPING

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<th>TOTAL</th>
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<tbody>
<tr>
<td>17</td>
<td>6-inch Canyon Piping</td>
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<td>0.00</td>
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<td>18</td>
<td>8-inch Canyon Piping</td>
<td>LF</td>
<td>7100</td>
<td>15.50</td>
<td>110050.00</td>
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<tr>
<td>19</td>
<td>6-inch Valley Piping</td>
<td>LF</td>
<td>7300</td>
<td>11.00</td>
<td>80300.00</td>
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<tr>
<td>20</td>
<td>8-inch Valley Piping</td>
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<td>5800</td>
<td>13.50</td>
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<tr>
<td>21</td>
<td>8-inch Bends &amp; Tee</td>
<td>Each</td>
<td>9</td>
<td>250.00</td>
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<tr>
<td>22</td>
<td>6-inch Bends</td>
<td>Each</td>
<td>8</td>
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<td>23</td>
<td>1/2-inch air valve station</td>
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<td>2200.00</td>
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<td>24</td>
<td>6-inch Valves</td>
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<tr>
<td>25</td>
<td>8-inch Valves</td>
<td>Each</td>
<td>6</td>
<td>850.00</td>
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<tr>
<td>26</td>
<td>Carsonite Markers</td>
<td>Each</td>
<td>15</td>
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<td>750.00</td>
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<td>27</td>
<td>Bore</td>
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<td>28</td>
<td>Creek Crossing</td>
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<td>Ditch Crossing</td>
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<td>Class B Asphalt Road Repair</td>
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<td>LF</td>
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Subtotal $413,250
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<td><strong>STORAGE RESERVOIR</strong></td>
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<td>Tank Ex, Backfill, Grading</td>
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<td>Concrete Tank Structure</td>
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<td>Tank Hardware &amp; Piping</td>
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<td>40</td>
<td>Topsoil &amp; Reveg.</td>
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<td>Tank Drainline</td>
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<td>42</td>
<td>Fencing</td>
<td>LF</td>
<td>400</td>
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Subtotal $188,300

CONSTRUCTION TOTAL $703,916

---

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<th></th>
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<tbody>
<tr>
<td>Preparation of Final Plans and Specs.</td>
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<tr>
<td>10.50%</td>
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<td>Permitting, Mitigation, Water Rights</td>
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<td>$15,000</td>
<td></td>
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<td>Legal Fees</td>
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<tr>
<td>Acquisition of Access and R.O.W</td>
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<tr>
<td>Const. Engineering Costs</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(10% of Const. Cost)</td>
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</tr>
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<td>$70,392</td>
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<tr>
<td>$774,308</td>
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<tr>
<td>Contingency (15 % of Const. Subtotal)</td>
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<td></td>
</tr>
<tr>
<td>$116,146</td>
<td></td>
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<td>CONSTRUCTION COST TOTAL</td>
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<tr>
<td>$890,454</td>
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<tr>
<td>TOTAL WWDC ELIGIBLE IMPROVEMENTS</td>
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<tr>
<td>$983,365</td>
<td></td>
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</table>
## TURNERVILLE WATER SUPPLY DISTRIBUTION, SERVICES, ETC.

(OPERATING COMPONENTS NOT ELIGIBLE FOR WWDC FUNDING)

**Estimate** Updated - September 1998

### DISTRIBUTION PIPING

<table>
<thead>
<tr>
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<th>QUANTITY</th>
<th>UNIT PRICE</th>
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<td>2900</td>
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<td>2</td>
<td>4-inch Gate Valve</td>
<td>Each</td>
<td>3</td>
<td>425.00</td>
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<td>3</td>
<td>Gravel Roadway Restoration</td>
<td>LF</td>
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<td>3.00</td>
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<td>4</td>
<td>4&quot; Boring</td>
<td>LF</td>
<td>80</td>
<td>125.00</td>
<td>7500.00</td>
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<tr>
<td>5</td>
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<td>2600</td>
<td>0.50</td>
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</tr>
<tr>
<td>6</td>
<td>Creek/Canal Crossings</td>
<td>Each</td>
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<td>0.00</td>
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<tr>
<td>7</td>
<td>Air-vac Stations</td>
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<tr>
<td>8</td>
<td>Fire Hydrants w/ valves &amp; Boxes</td>
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<td>5</td>
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<td>10000.00</td>
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Subtotal $46,775.00

### SERVICE LINE CONSTRUCTION

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<th>TOTAL</th>
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<tbody>
<tr>
<td>16</td>
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<td>Each</td>
<td>40</td>
<td>125.00</td>
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<tr>
<td>17</td>
<td>Meters</td>
<td>Each</td>
<td>40</td>
<td>75.00</td>
<td>3000.00</td>
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<tr>
<td>18</td>
<td>Frost-free Meter box w/PRV &amp; Check</td>
<td>Each</td>
<td>40</td>
<td>500.00</td>
<td>20000.00</td>
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<tr>
<td>19</td>
<td>3/4-inch Copper Service Line</td>
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<td>2000</td>
<td>12.00</td>
<td>24000.00</td>
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<td>20</td>
<td>Paved Roadway Repair or boring</td>
<td>LF</td>
<td>500</td>
<td>6.00</td>
<td>3000.00</td>
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Subtotal $55,000.00

**CONSTRUCTION TOTAL** $101,775

**-----------------------------------------------------------------------------------**

- **Preparation of Final Plans and Specs.** 10.00% $10,178
- **Permitting & Mitigation** $0
- **Legal Fees & Bond Counsel** Lump Sum $4,000 (RUS Eligible Only)
- **Acquisition of Access and R.O.W** Acre 0 4500.00 $0
- **Construction Cost (From Above)** $101,775
- **Const. Engineering Costs** $10,178
  (10% of Const. Cost)

**CONSTRUCTION SUBTOTAL** $111,953

- **Contingency (10 % of Const. Subtotal)** $11,195

**CONSTRUCTION COST TOTAL** $123,148

**TOTAL NON-WWDC ELIGIBLE IMPROVEMENTS** $137,325
## TURNERVILLE IMPROVEMENT DISTRICT
### PRELIMINARY ESTIMATED "FIRST YEAR" OPERATING EXPENSES

**OPERATING EXPENSES:**

<table>
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<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
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<td>Electricity</td>
<td>$400.00</td>
</tr>
<tr>
<td>Maintenance</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>Operator (Billing Clerk)</td>
<td>$1,500.00</td>
</tr>
<tr>
<td>Office Supplies/Postage</td>
<td>$500.00</td>
</tr>
<tr>
<td>Water Quality Testing</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>Legal/Accounting</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>Insurance</td>
<td>$750.00</td>
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<tr>
<td>Misc., Travel, Phone, etc.</td>
<td>$500.00</td>
</tr>
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**SUBTOTAL** $7,650.00

*Rates should be established to cover (as a minimum) operating expenses, loan payments and 10% reserve.*
USDA-FmHA
Form FmHA 442-7
(Rev. 9-89)

OPERATING BUDGET

<table>
<thead>
<tr>
<th>Name</th>
<th>Turnerville Improvement District</th>
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</thead>
<tbody>
<tr>
<td>Applicant Fiscal Year</td>
<td>From 19 To 19 First Full Year</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPERATING INCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Water User Fees</td>
</tr>
<tr>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
</tr>
<tr>
<td>4. Miscellaneous</td>
</tr>
<tr>
<td>6. Less: Allowances and Deductions</td>
</tr>
<tr>
<td>7. Total Operating Income</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPERATING EXPENSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Misc. Travel/Phone</td>
</tr>
<tr>
<td>9. Electricity</td>
</tr>
<tr>
<td>10. Maintenance</td>
</tr>
<tr>
<td>11. Office Supp/Postage</td>
</tr>
<tr>
<td>12. Testing</td>
</tr>
<tr>
<td>13. Legal/Accounting</td>
</tr>
<tr>
<td>14. Insurance</td>
</tr>
<tr>
<td>15. Interest (FmHA)</td>
</tr>
<tr>
<td>16. Depreciation Public Notices</td>
</tr>
<tr>
<td>17. Total Operating Expense</td>
</tr>
<tr>
<td>18. NET OPERATING INCOME (LOSS) (Line 7 less 17)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NONOPERATING INCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.</td>
</tr>
<tr>
<td>20.</td>
</tr>
<tr>
<td>21. Total Nonoperating Income</td>
</tr>
<tr>
<td>22. NET INCOME (LOSS) (Add Lines 18 and 21) (transfer to line A Schedule 2)</td>
</tr>
</tbody>
</table>

Budget and Projected Cash Flow Approved by Governing Body

Attest: ___________________________ Secretary ___________________________ Date _____________

Appropriate Official ___________________________ Date _____________

Public reporting burden for this collection of information is estimated to average 3 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Agriculture, Clearance Officer, OIRM, Room 404 W. Washington, D.C. 20250 and to the Office of Management and Budget, Paperwork Reduction Project (OMB No. 0575-0015), Washington, D.C. 20503.
## PROJECTED CASH FLOW

### Schedule 2

<table>
<thead>
<tr>
<th></th>
<th>19</th>
<th>19</th>
<th>19</th>
<th>19</th>
<th>First Full Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.</strong> Line 22 from Schedule 1 Income loss:</td>
<td></td>
<td></td>
<td></td>
<td>(1000)</td>
<td>1970</td>
</tr>
<tr>
<td><strong>Add</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B.</strong> Items in Operations not Requiring Cash:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Depreciation (line 16 Schedule 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Others:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C.</strong> Cash Provided From:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Proceeds from FmHA loan/grant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>462,060</td>
</tr>
<tr>
<td>2. Proceeds from others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>658,740</td>
</tr>
<tr>
<td>3. Increase (Decrease) in Accounts Payable, Accruals and other Current Liabilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Decrease (Increase) in Accounts Receivable, Inventories and other Current Assets (Exclude Cash)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.</strong> Total all A, B and C Items</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,120,800</td>
</tr>
<tr>
<td><strong>E.</strong> Less: Cash Expended for:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1505.00</td>
</tr>
<tr>
<td>1. All Construction, Equipment and New Capital Items (loan and Grant funds)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,120,800</td>
</tr>
<tr>
<td>2. Replacement and Additions to Existing Property, Plant and Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Principal Payment FmHA Loan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Principal Payment Other Loans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Total E 1 through 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,120,800</td>
</tr>
<tr>
<td><strong>F.</strong> Beginning Cash Balances</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>* 14,400</td>
</tr>
<tr>
<td><strong>G.</strong> Ending Cash Balances (Total of D Minus E 6 Plus F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 13,400</td>
</tr>
<tr>
<td><strong>Item G Cash Balances Composed of:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13,865.00</td>
</tr>
<tr>
<td>Construction Account</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenue Account</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt Payment Account</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O&amp;M Account</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserve Account</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funded Depreciation Account</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total - Agrees with Item G</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 13,400</td>
</tr>
</tbody>
</table>

**Assumed $400 X 36 Connection Fees. No fees yet established.**
THE STATE OF WYOMING
Certificate of Appropriation of Water

Proof No. 28803
Certificate Record No. 69, Page 93

WHEREAS, Willow Creek Pipe Line Company has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from Willow Creek, Tributary Salt River, Tributary Snake River through the Willow Creek Pipe Line, Beck under Permit No. 22811 for stock and domestic use in Lincoln County, Wyoming.

NOW KNOW YE, That the State Board of Control, under the provisions of the Statutes of Wyoming, has, by an order duly made and entered on the 15th day of April, 1969, in Order Record No. 27, Page 510, determined and established the priority and amount of such appropriation as follows:

Name of Appropriator: Willow Creek Pipe Line Company
Postal Address: Bedford, Wyoming
Date of Appropriation: July 18, 1969
Total Amount: None
Amount of Appropriation: .028

The following table shows the points of use:

<table>
<thead>
<tr>
<th>Twp</th>
<th>Range</th>
<th>Sec</th>
<th>NW1/4</th>
<th>NW1/4</th>
<th>SW1/4</th>
<th>SE1/4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 W</td>
<td>118 N</td>
<td>10</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>33 W</td>
<td>118 N</td>
<td>14</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33 W</td>
<td>118 N</td>
<td>15</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This appropriation is limited to an amount not to exceed 0.280 cubic feet per second for stock and domestic use at the points of use described above.

The right to water hereby confirmed and established is limited to stock and domestic use, and the use is restricted to the place where acquired and to the purpose for which acquired: subject to adjustments and appropriative priorities as may be determined by the proper authorities.

IN TESTIMONY WHEREOF, I, FLOYD A. BISHOP, President of the State Board of Control, have hereunto set my hand this 15th day of April, A. D. 1969, and caused the seal of said Board to be hereunto affixed.

Attorn: BRYCE CHRISTOPHER, Ex-officio Secretary.

FLOYD A. BISHOP, President.
PERMIT NO. J-12

PERMIT STATUS

July 18, 1967

Approval Date: February 6, 1968

March 5, 1968—Notice of Commencement of Work, October 30, 1967, received
March 5, 1968—Notice of Completion of Work, November 18, 1967, received
March 5, 1968—Notice of Completion of Beneficial Use, November 18, 1967, received

Gus (Zruf 62) Silted Dam 0.271 ce.s.

NOTICE

A Manual of Regulations and Instructions for Filing Applications will be furnished by the State Engineer's Office upon request. By carefully complying with the instructions contained in the Manual, much trouble and delay will be saved the applicant, the surveyor, and the State Engineer's Office.

This application must be accompanied by maps in duplicate, prepared in accordance with the Manual, and by a filing fee of two dollars.

Applications returned for corrections must be resubmitted to the State Engineer within ninety days with the corrections properly made; otherwise the application will be canceled.

This application when approved does not constitute a complete water right. It is your authority to begin construction work, which must be commenced within one year from the date of approval of this application.

Notice of commencement of work, completion of the work, and of application of the water to the beneficial uses described in the permit, should be filed in the State Engineer's Office before the expiration of the time allowed in the permit.

If extensions of time beyond the time limits set forth in the permit are required, requests for same must be in writing, stating why the additional time is required, and must be received in the State Engineer's Office before the expiration of the time allowed in the permit.

To perfect your water right, notify your Division Superintendent that you are ready to submit final proof. This notice should be sent to the Superintendent as soon as possible after you apply the water to the beneficial uses described in your permit. When you have submitted your proof before the Superintendent it will be considered by the State Board of Control, and, if found to be satisfactory, the Board will issue to you a Certificate of Appropriation which will constitute a completed water right.

The granting of a permit does not constitute the granting of right of way. If any right of way is necessary in connection with this application it should be understood that this responsibility is the applicant's.
THE STATE OF WYOMING,
STATE ENGINEER'S OFFICE

THIS IS TO CERTIFY that I have examined the foregoing application and have rejected same for the following reason:

Witness my hand this______ day of _______, A. D. ______.

State Engineer

THE STATE OF WYOMING,
STATE ENGINEER'S OFFICE

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 permit grants only the right to use the water available in the stream after all prior rights are satisfied.

The amount of appropriation shall be limited to the amount beneficially used for domestic and stock purposes on or before December 31, 1969, not to exceed 0.288 cubic feet of water per second of time.

Construction of proposed work shall begin within one year from the date of approval.

The time for completing the work shall terminate on December 31, 1969.

The time for completing the application of water to beneficial use shall terminate on December 31, 1969, and final proof of appropriation shall be made within five years thereafter.

Witness my hand this 6th day of February, A. D. 1969.

Floyd A. Bishop
State Engineer

22811

Permit No.

Page No. 95
15. The land to be irrigated is described in the following tabulation:
   (Give irrigable acres in each 40-acres subdivision. Designate ownership of land, Government, State or Private. If Private, give names of owners.)

<table>
<thead>
<tr>
<th>Township</th>
<th>Range</th>
<th>Sec.</th>
<th>Irrigated Acres</th>
<th>Ownership of Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/24/97 13:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Applicants: Willow Creek Pipe Line Company, Members

- Band Merritt (SW1/4 Sec 16)
- Gordon Garrett (SW1/4 Sec 16)
- Russ Hill (S1/2W1/2 Sec 16)
- Erti Coe (NW1/4 Sec 16)
- James Simpson (SE1/4 Sec 15)
- Jack Flynn (SE1/4 Sec 15)
- Lee Turner (SW1/4 Sec 16)
- Ernest Wofley, Jr (SW1/4 Sec 4)
- Oval Harter (NW1/4 Sec 16)
- Earl Harter (SW1/4 Sec 16)
- Harry Roehl (SW1/4 Sec 10)
- Larry Hall (SW1/4 Sec 10)

0.266 cfs

For Domestic and Stock purposes only, not to exceed 0.266 cfs, any partments of use shown above.

THE STATE OF WYOMING,

County of ________________

I hereby certify that the foregoing application was signed in my presence and sworn to before me by ________________

My Commission Expires ________________ 1997

Notary Public.

REMARKS

11/24/97 12:06 TX/RX NO.4546 P.003
NOTE: "DO NOT FOLD THIS FORM. ONLY FORMS COMPLETED WITH TYPEWRITER OR NEATLY LETTERED WITH WATERPROOF INK WILL BE ACCEPTED."

From A-1
Temp. Filing No. 201/75

PERMIT NO. 22811
NAME OF FACILITY Willow Creek Pipe Line

APPLICATION FOR A PERMIT TO DEVERT AND APPROPRIATE THE WATER OF THE STATE OF WYOMING

WATER DIVISION NO. 4

1. Ivan L. Call

County of Lincoln

State of Wyoming

being duly sworn according to law, upon my oath say:

1. The name of the applicant: Willow Creek Pipe Line Company

Rand Merritt Pres Clifford Turner Secretary

2. The postoffice address of the applicant: Bedford, Wyoming 83302

3. The use to which the water is to be applied: Domestic and stock

4. The name of the ditch, canal, pipe line or other facility: Willow Creek Pipe Line

5. The source of the proposed appropriation: Willow Creek, tributary of Salt River

6. The point of diversion of the proposed works is located: 57° 30' W 6620 ft.

7. The said pipe line or other facility is to be 3.75 miles long.

8. (a) The carrying capacity of the pipe line or other facility at the point of diversion: 0.288 cu. ft. per sec.

   (b) If pipe line, size of pipe: 6" inches (6" at headgate)

9. (a) The nature of the material to be moved: Loom

   (b) Number, length and size of tunnels: none

10. The estimated cost of said work: $24,000.60

11. Construction work will begin within one year from date of approval of this application: Yes

12. The time required for completion of the works is: 19.67 years from December 31st, 1997.

13. The time required to complete the application of water to the beneficial use stated in this application is: 19.67 years from December 31, 1997.

14. The accompanying map is prepared in accordance with the Manual of Regulations and Instructions for Filing Applications in the State Engineer's Office and is hereby declared a part of this application.

Permit No. 22811

Page No. 95
APPENDIX C
INSPECTION PHOTO LOG
SMALL STORAGE TANK

TURNERVILLE PHOTO LOG

EXISTING SYSTEM

TANK OVERFLOW
BEAVER POND

TURNERVILLE PHOTO LOG

EXISTING SYSTEM

BEAVER POND

FORSgren ASSOCIATES / INC.
WILLOW CREEK CROSSING

TURNERVILLE PHOTO LOG

EXISTING SYSTEM

WILLOW CREEK CROSSING
SPRING OVERFLOW INLET

TURNERVILLE PHOTO LOG

EXISTING SYSTEM

SPRING OVERFLOW OUTLET
APPENDIX D
SPRING WATER QUALITY
MPA TEST RESULTS
Microscopic Particulate Analysis (MPA)
Analysis Request Chain of Custody

Sample Information

System Name: Willow Creek P. o. 1. e Comm. 
Sample Name: Mel Oberholtzer

Address: Randville PO. Box 344 
Bedford, IN 73114

Phone Number: (307) 876-8727

Sample ID: 960420

Date/Time Start: 4/19/95 - 8:12 AM
Date/Time Stop: 4/20/95 - 7:00 AM
Total Sample Time: 14 Hrs.

Field Measurements:

Water Temp: 79/3 3 0 C pH 7.5/7.4 Conductivity: 0.32/0.34 mhos NTU's: 0.33/0.37

Sample exposed to disinfectant? Yes _ No _
Sample DeChlorinated? Yes _ No _

Residual Chlorine Tested _____ mg/l

This sample is:
Raw Surfacewater _ Filtered Surfacewater _ Infiltration System: 
Name of lake/stream/river: ________________________________

Groundwater:
Spring _ Infiltration Gallery: _ Artesian Well: _ Drilled Well: _

Well Depth: ______ ft Distance from lake/stream/river: ______ ft

Notes: Sample collected at first tap, shut riles from spring. Egg at early stage. Hatch egg in warm, clean water. Final residual tap sample collected at minimum water conditions. Temp range 30-50°.5

Bill Jolley
Wyoming State Veterinary Lab 1174 Snowy Range Rd. Laramie, Wyoming 82070 (307) 742-6638

30/20/96 12:05 13077458473 MEL OBERHOLTZER MAP PAGE 02
### MPA Source Water Identification

**Wyoming State Veterinary Lab**  
**Sample # X-3412**  
**X-5401115**  
**Date Sampled: 04/20/95**  
**Date Received: 04/23/95**  
**Date Cut/Washed: 04/24/95**  
**Date Examined: 04/29/95**  
**Analyst: Jolley**

**Processing Information:**
- Total volume filtered: 801 gal
- Total filter sediment collected: 300 ul
- Ul sediment/100 gal: 37.45 ul
- Percoll/sucrose flotation pellet volume: 10 ul
- Percoll/sucrose flotation packed sediment: 270 ul
- Ul flotation pellet volume/100 gallons filtered: 3.7 ul

**Floatation Parameters:**
- X: Percoll/sucrose gradient
- Other: potassium citrate City/utility

**Time Required: 14 hr.**

### MPA Classification and Quantification of Particulates

<table>
<thead>
<tr>
<th>Dilution 3X</th>
<th>Microscopy BF and TC</th>
<th>Magnification 100x to 1000x</th>
<th>Vol final pellet 10 ul</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Particulates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giardia</td>
<td>Slide 1</td>
<td>Slide 2</td>
<td>Slide 3</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coccidia</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Diatoms</td>
<td>16</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>Other Algae</strong></td>
<td>35</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td><strong>Insect/Larvae</strong></td>
<td>7</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Rotifers</strong></td>
<td>20</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Plant Debris</strong></td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Secondary Particulates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large Amorphous Debris</td>
<td>25</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Fine Amorphous Debris</td>
<td>TNTC</td>
<td>TNTC</td>
<td></td>
</tr>
<tr>
<td>Minerals</td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td>Plant pollen</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Nematodes</td>
<td>25</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td><strong>Crustacea</strong></td>
<td>28</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Ameoba</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Ciliates/Flagellates</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
COMMENTS AND/OR CONCLUSIONS

Surface of uncut filter was faintly brown; sediment penetration into filter was less than 1/8", judged visually.

Diatoms counted contained chloroplasts; about equal numbers of *Fragillaria* and *Asterionella*.

Algae were *Chlamydomonas* and *Closterium* at about 10:1, respectively.

Insects were actually forage mite larvae.

Rotifers included *Fuchsia*, *Lepadella* and *Monostyla*.

Large amorphous debris consisted of sediment, fibers and plant stem/root fragments.

Fine amorphous debris was sediment and fuzzy, flocculent clumps; spore-casings of fungi were also seen.

Nematodes were largely late larval stages, juveniles and a few adults of free-living genera.

Crustacea included *Cyclops*, *Macrocyclops* and some Cladocerans, probably *Moina* or *Bosmina* species.

One "water bear" was identified (a Tardigrada).

Cryptosporidium oocysts were not seen on Fuchsin-stained smears of sediment.

Judging from the variety of wildlife in this sediment, the water source, bed or filter has a plentiful supply of micronutrient materials.

Analyst _Jolley_
Microscopic Particulate Analysis (MPA)
Analysis Request Chain of Custody

Sample Information
System Name: Willow Creek Pipeline Co.
Sample Name: Mel Oberholtzer
Address: R. D. Pigeon II
PO Box 364
Bedford, WY 83112
Phone Number: (307) 896-5679

PWS 26-0-115
Address: Midwest Assistance Program
PO Box 697
Laramie, WY 82070
Phone: (307) 742-2336

Sample ID: 050510
Date/Time Start: 05/10/96 - 6:00 PM
Date/Time Stop: 05/10/96 - 9:00 AM
Total Sample Time: 15 Hrs

Field Measurements:
Water Temp: 54.8 ° C pH 7.65 Conductivity: 0.33 mhos NTU’s: 0.29/0.27
Sample exposed to disinfectant? Yes No Sample DeChlorinated? Yes No
Residual Chlorine Tested mg/l

This sample is:
Raw Surfacewater _ Filtered Surfacewater _ Infiltration System _
Name of lake/stream/river: _______________________________

Groundwater:
Spring _ Infiltration Gallery: _ Artesian Well: _ Drilled Well: _
Well Depth: ___ ft Distance from lake/stream/river: ___ ft

Notes: This is the 2nd sample from this spring (1st sample collected 4/20/96). Snowpack is much reduced; runoff is in progress with peak expected in 7-10 days. Snowmelt is six weeks, rain/snow lies fallen over 1/2 inch of the 11 inch total, runoff over 1/2 inch of snow fallen over 11 inches. Soil moisture is 90% 10 days, with an estimated accumulation of over 2 inches. Soil moisture is 40% 10 days, with an estimated accumulation of over 2 inches. Soil moisture is 40% 10 days, with an estimated accumulation of over 2 inches. Sample was collected under high ICE conditions.

Wyoming State Veterinary Lab 1174 Snowy Range Rd. Laramie, Wyoming 82070 (307) 742-6638
### MPA SOURCE WATER IDENTIFICATION

**Processing Information:**
- Total volume filtered: 800 gal.
- Total filter sediment collected: 850 ul
- Sediment/100 gal: 106.25 ul
- Percoll/sucrose floatation pellet volume: 15 ul
- Percoll/sucrose floatation packed sediment: 165 ul
- UL floatation pellet volume/100 gallons filtered: 8.3 ul

**Floatation Parameters:**
- X Percoll/sucrose gradient
- X sucrose gradient
- X potassium citrate City/utility

### MPA CLASSIFICATION AND QUANTITATION OF PARTICULATES

<table>
<thead>
<tr>
<th>Dilution</th>
<th>Microscopy EF and TC</th>
<th>Magnification 100x to 1000x</th>
<th>Vol final pellet 15 ul</th>
</tr>
</thead>
<tbody>
<tr>
<td>3x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Primary Particulates</strong></td>
<td>Slide 1</td>
<td>Slide 2</td>
<td>Slide 3</td>
</tr>
<tr>
<td>Giardia</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Coccidia</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Scells</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other Algae</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Insect/larvae</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rotifers</td>
<td>10</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>Plant Debris</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Secondary Particulates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large Amorphous debris</td>
<td>TMT</td>
<td>TMT</td>
<td>TMT</td>
</tr>
<tr>
<td>Fine Amorphous debris</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minerals</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Plant pollen</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nematodes</td>
<td>9</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Crustacea</td>
<td>water flea 1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Anoeba</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ciliates/flagellates</td>
<td>26</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Data:**
- Date(s) sampled: 5/10/95
- Date received: 5/11/95
- Date cut/washed: 5/12/95
- Date examined: 5/19/95

**Analysis:** Jolley
COMMENTS AND/OR CONCLUSIONS

Surface of uncut filter was faint brown color, visibly penetrated to within about 3/8 inches of core. Concentrated sediment was dark brown and coarse.

Rotifers were Philodina and Euchlanis.

Large amorphous debris was fibrous and irregularly shaped fragments of plants, and sediment particles.

Fine amorphous debris included sedimentary grit, fungal spores/hyphal fragments and clumps of greenish-brown, flocculent fuzz.

Nematodes were developmental stages of free-living species.

Crustaceas included water fleas (Moina ?) and copepods.

Euglenoid flagellates and several small ciliates were common.

Sediment recovered after primary examination was reconcentrated with ZnSO4 and examined for Cryptosporidium oocysts.Crypto negative.

Analyst _ Jolley_
Microscopic Particulate Analysis (MPA)
Analysis Request Chain of Custody

Sample Information
System Name: Willow Creek Pipeline Co.
Sample Name: Mel Oberholtzer
Address: P.O. Box 344
Bedford, WY 83112
Phone Number: (307) 880-5678

PWS: 5601115
Address: Midwest Assistance Program
PO Box 689
Laramie, WY 82070
Phone: (307) 742-2234

Sample ID: 950205

Date/Time Start: 8/4/95 - 5:00 pm
Date/Time Stop: 8/5/95 - 8:00 am
Total Sample Time: 15 hours

Field Measurements:
Water Temp: 69.4°F  pH: 6.73  Conductivity 0.31000 µS/cm NTU's: 0.40/0.31
Sample exposed to disinfectant? Yes __ No X
Sample DeChlorinated? Yes __ No __
Residual Chlorine Tested: ___ 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

Notes: This is the third sample from this PWS (1st 4/16/95, 2nd 5/16/95)
Sample collected at moderate risk conditions.

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** 8-K-7103  
**PWS 85601135**

**Processing Information:**
- Total volume filtered: 825 gallons
- Total filter sediment collected: 200 ul
- Ul sediment/100 gal: 24.2
- Percoll/sucrose floatation pellet volume: 20 ul
- Percoll/sucrose floatation packed sediment: 10 ul
- Ul floatation pellet volume/100 gallons filtered: 0.7 ul
- Time required: 15 hrs

**Floatation Parameters:**
- X. Percoll/sucrose gradient
- Sucrose gradient
- Potassium citrate City/utility

**Copies To:**
- Rand Merritt - Willow Creek P.L.
- Mel Oberholtzer
- HWY 44

### MPA Classification and Quantitation of Particulates

<table>
<thead>
<tr>
<th>Dilution 2X</th>
<th>Microscopy BF and DTC</th>
<th>Magnification 100X to 1000X</th>
<th>Vol final pellet: 20 ul</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Particulates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giardia</td>
<td>Slide 1</td>
<td>Slide 2</td>
<td>Slide 3</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>occlia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diatoms</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Other Algae</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Insect/Larvae</td>
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<td>0</td>
<td></td>
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<tr>
<td>Rotifers</td>
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<td>96</td>
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<td>Plant Debris</td>
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<td>Secondary Particulates</td>
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<td></td>
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<tr>
<td>Large Amorphous debris</td>
<td>TWTC</td>
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<td>Fine Amorphous debris</td>
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</tr>
<tr>
<td>Plant pollen</td>
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<td>Nematodes</td>
<td>30</td>
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</tr>
<tr>
<td>Crustacea</td>
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<td>24</td>
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<tr>
<td>Amoebae</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>Ciliate/Flagellates</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
COMMENTS AND/OR CONCLUSIONS

Surface of uncut filter appeared faintly colored with brown sediment, which, when concentrated was gray-brown, of medium texture.

Rotifers were of 2 species; one was a very large Lecane or Lepadella species, whereas the other was a Habrotrocha, Rotaria or something similar. The large form was outnumbered by the smaller by about 20:1.

Nematodes were probably free living species, with larval stages predominating.

Crustacean specimens were appendage fragments.

Large and fine amorphous debris consisted of sediment, acicular crystals, fine fuzz, filaments and plant stem/root fragments.

Cryptosporidium oocysts were not seen on acid-fast stained, 2x concentrated sediment smears.

Analyst Jolley
APPENDIX E
SANITARY SURVEY REPORT
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: November 20, 1997    PWS ID No.: 5601115
2. Classification: Community Groundwater
3. Name of PWS: Willow Creek Pipeline Company
4. Mailing address: 210 Willow Creek Canyon Road 177
Bedford, Wyoming 83112
5. County: Lincoln        Telephone: (307)883-3685
6. Physical location and directions: Willow Creek is located off U.S. Route 89 at
Bedford, and 3 miles east to State Route 177.
7. Name of Surveyor: Mike Sposit, Midwest Assistance Program Inc.
8. Prior Survey (By whom and date): 10/19/92 MKS
9. Date of GWUDISW assessment & score: 10/19/92 score 45
10. Name and phone No. of Owner or Legal Representative, e.g.
    Mayor, or City Manager: Rand Merrit, President
11. Name(s) and phone no(s). of Public Works Director, City Engineer, and/or Water
    Plant Superintendent:
12. Name(s) and phone no(s). of Operators Rand Merrit
13. Certification(s) type and date None
14. Person contacted for survey and phone no. Rand Merrit (307)883-3685

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: November 20, 1997

PWS Name: Willow Creek Pipeline Company
PWS ID # 5601115

SERVICE DATA

1. Service Area(s) Rural Community
2. Owner type: Private
3. Population...
   Average daily 50
4. Period open Year Round
   Period qualified as PWS 01/01 to 12/31
5. No. of Connections 23 Metered? No
6. Water usage (gal/day) Est. 10,000
   Water lost (gal/day) NI
   Water usage per person/day Est. 200 gpd
7. Water sold to (Name(s) of consecutive system(s) & PWS ID#) None
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 NOT APPLICABLE

1. Water purchased from
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: November 20, 1997

SPRINGS AND INFILTRATION GALLERIES

1. Name/Number: Turnerville
2. Location:  Latitude 42° 53'08"  Longitude 110° 56'07"
3. Yield (gpm) Est. 10 - 15 gpm
4. Describe supply intake: See Attached Drawing
5. Subject to surface infiltration: Possible
6. Subject to flooding?: Possible
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?NI
11. How is collection chamber constructed?: See Attached Drawing
12. Are there seasonal or other conditions which change water quality?: NI
13. Describe emergency response action: No formal plan
Sanitary Survey
Date: November 20, 1997

PWS Name: Willow Creek Pipeline Company
PWS ID #: 5601115

TRANSMISSION DATA (RAW WATER)

1. Name or designation   Willow Creek
2. Point of origin       Spring
3. Point of termination  Collection Box and Distribution
4. Date in service       1967
5. Length                1,500'
6. Diameter              6" & 4"
7. Material              Black Pipe
8. Pressure range        NA
9. Flow Rate (gpm)       Est. 10 to 15 gpm
10. Controls and/or PRVs  Gravity Flow
11. (describe)           
12. ARVs (number)        
13. Condition            

<table>
<thead>
<tr>
<th>Have there been any breaks in the last two years?</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>If yes, describe</td>
<td></td>
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<tr>
<td>Is the pump station subject to flooding?</td>
<td>NA</td>
</tr>
<tr>
<td>Is there emergency power?</td>
<td>NA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pumps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

Comments
No pumps or electrical power on this system
Sanitary Survey

Date: November 20, 1997

PWS Name: Willow Creek Pipeline Company
PWS ID # 5601115

STORAGE DATA (RAW WATER)

TANKS AND CISTERNS

1. Name or designation: Willow Creek

2. Number and type of material...
   Ground level
   Underground  Est. 4,000 gallon concrete collection box
   Tower

3. Volume (Gal)  4,000  Gravity  [X] Pressure tank  []

4. Total days of supply (all sources)  NA

5. Date(s) in service  1976

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?  No
   c. terminated at least 3 diameters above ground?  Yes

   Are air vents...
   a. turned downward?  NA
   b. covered or screened?  NA
   c. terminated at least 3 diameters above ground?  NA

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

10. Is all storage covered or enclosed?  Yes

11. When was the tank last cleaned?  NI

12. If repaired, was it disinfected?  Yes

13. Describe emergency response plan  No formal plan
Sanitary Survey
Date: November 20, 1997
PWS Name: Willow Creek Pipeline Company
PWS ID #: 5601115

DISTRIBUTION DATA

1. Lines

<table>
<thead>
<tr>
<th>Origin</th>
<th>Material</th>
<th>Inside Diam</th>
<th>Length</th>
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<tbody>
<tr>
<td>Main Lines</td>
<td>Spring</td>
<td>Black Pipe</td>
<td>6 &amp; 4 inch</td>
</tr>
<tr>
<td>Dist Lines</td>
<td>Collection Box</td>
<td>Black Pipe</td>
<td>4 inch</td>
</tr>
<tr>
<td>Svc Lines</td>
<td></td>
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</table>

2. Does this PWS have any AC-pipe in its system? No

3. Pressure zones

<table>
<thead>
<tr>
<th>Area</th>
<th>Pressure</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL</td>
<td>60 psig</td>
<td>Gravity Flow</td>
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4. Cross connection control

<table>
<thead>
<tr>
<th>Location</th>
<th>Type</th>
<th>Size</th>
<th>Last Tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>NI</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Date of cross connection control training for operator NI

6. Dead ends Source to Use System

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

8. Is there interconnection with any other system? No
   Describe:

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

10. Describe emergency response plan (ruptures) No formal plan
Sanitary Survey
Date: November 20, 1997

PWS Name: Willow Creek Pipeline Company
PWS ID #: 5601115

SAFETY AND SECURITY DATA

<table>
<thead>
<tr>
<th>1. Security</th>
<th>Fenced</th>
<th>Locked</th>
<th>How Often Patrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wells</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Springs &amp; Infilt. Galleries</td>
<td>No</td>
<td>No</td>
<td>Weekly</td>
</tr>
<tr>
<td>Stream intakes</td>
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</tr>
<tr>
<td>Reservoirs/Lakes</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pump houses</td>
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</tr>
<tr>
<td>Treat. plant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage tanks</td>
<td>No</td>
<td>Yes</td>
<td>Weekly</td>
</tr>
<tr>
<td>Manholes &amp; vaults</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage shed for chems</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Is access to all facilities restricted to authorized personnel? No

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: November 20, 1997

PWS Name: Willow Creek Pipeline Company
PWS ID #: 5601115

**MONITORING AND RECORDS**

1. Number of bacteria samples per month required  
   One Monthly

2. Sample siting plan submitted to EPA?  
   None on file

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)  
   **Agency action**  
   **System response**

6. Samples taken during survey  
   No  
   **Type**  
   **Results**

7. Number of entry points at this PWS:  
   One

8. Are all system records and plans properly filed and available to the Surveyor?  
   Yes
   **Comments**
Summary - Addenda - Recommendations

Willow Creek Pipeline Co. water system is classified as a community groundwater supply. The unincorporated community is located within the Bridger-Teton National Forest. A spring provides water to a rural area of 50 residents through 23 service connections the year round. The rural community is experiencing growth and the desire to expand the current water facility is of concern. The community is currently considering forming a District with an objective of improving their water system.

A sanitary survey up-date was conducted on November 20, 1997, by Mike Sposit, Midwest Assistance Program Inc. Rand Merrit, responsible for operation and maintenance of the water system was interviewed. During the survey, the water system monitoring history was reviewed and the time table for water monitoring was up-dated.

Source water for this system is from a improved spring. The water facility consists of the spring source, a collection box, and the distribution system. The facility is operated by gravity flow, with excess water being diverted or over flowing the collection box. A water diversion point is located in the transmission line between the spring and the collection box. Both over flows are said to be always overflowing. The spring is apparently an adequate water supply for this rural community.

Bacteriological monitoring is conducted monthly. One water sample is taken randomly from the distribution system and sent to Sweetwater County Lab for analysis. EPA records indicate that a BacT sample site plan is not on file. A sample site plan up-date is recommended to be reissued to EPA, Denver. The yearly monitoring for nitrate is completed; results will be submitted to EPA after receiving the analysis report from the Lab.

Evaluation of the facility to provide adequate water quantity is apparent. However, microbiological contamination may be of concern. The spring's development appears to be adequate. However, there is some concern for spring protection. The unfenced spring area is clean, with no evidence of animal habitation, but it is located on Forest Service land, adjacent to a public traveled dirt road; there is a potential risk of contamination from human and wildlife activities. A source water protection program may be desirable.

Recommendations

Note: 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.

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.

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.

Note: 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.
NOTE: 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 water operator should receive training in water facility 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. For more information regarding operator certification, contact Louise Cordova, DEQ Certification Officer (307)777-6128.

NOTE: Nitrate/Nitrite: Under present EPA regulations, all groundwater systems must monitor nitrate yearly and nitrite once. The monitoring must be done at each entry point to the distribution system.
Sanitary Survey
Date: November 20, 1997

PWS Name: Willow Creek Pipeline Company
PWS ID # 5601115

MIDWEST ASSISTANCE PROGRAM INC.

[Diagram: Spring Collection with Hypalion Liner, 6" pipe, Overflow, Collection Box, Overflow, 4" pipe, Distribution]
APPENDIX F
SYSTEM MODELING
Scenario: Base

TURNERVILLE WATER SYSTEM - EXISTING

Title: Turnerville Water System
Project Engineer: CSK

Color Coding Legend
Link: Diameter (in)

- <= 1 1/2
- <= 2
- <= 4
- <= 6

Pipe from spring to tank
3700 gal Tank
Willow Creek Spring

P-9
J-9
P-1
J-1
P-5
J-5
P-6
J-6
P-7
J-7
P-8
J-8
P-4
J-3
P-3
J-2
P-2
J-4

3700 gal Tank
Pipe from spring to tank
Willow Creek Spring
### Scenario: Base
### Steady State Analysis
### Junction Report

<table>
<thead>
<tr>
<th>Node Label</th>
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#### Pipe Report

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### Fire Flow Report

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Scenario: Base

TURNERVILLE WATER SYSTEM - PROPOSED

Color Coding Legend
Link: Diameter (in)

- ≤ 2
- ≤ 4
- ≤ 6
- ≤ 8

3700 gal Tank
Pipe from spring to tank
Willow Creek Spring
Scenario: Base
Steady State Analysis
Junction Report

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### Steady State Analysis
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### Scenario: Base
#### Fire Flow Analysis
#### Fire Flow Report

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