MIDDLE FORK RURAL WATER DISTRICT DOMESTIC WATER SYSTEM
EXECUTIVE SUMMARY
LEVEL 1 RECONNAISSANCE STUDY

Prepared for

STATE OF WYOMING
WATER DEVELOPMENT COMMISSION

Prepared by

WRIGHT WATER ENGINEERS, INC.
Cheyenne, Wyoming and Denver, Colorado

and

WORTHINGTON, LENHART, CARPENTER, AND JOHNSON, INC.
Casper, Wyoming

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MIDDLE FORK RURAL WATER DISTRICT
The Middle Fork Rural Water District was formed in the vicinity of Kaycee, Wyoming to develop a domestic water system (see Figure 1). A suitable water supply and distribution system is needed for several reasons: (a) at the present time, the ranchers along the Middle Fork of the Powder River and those residing north and south of the Town of Kaycee, Wyoming use water of substandard quality, (b) they incur high costs of water treatment, softening, and fixture replacement, or (c) they haul their domestic water supplies.

Water Requirements
Domestic water requirements were identified for the 75 potential service customers. The District Board of Directors had polled its members for possible uses. It was found that including lawn and garden irrigation of up to 1/4 acre per service connection would not increase system costs substantially, thus providing a normal domestic supply that includes both household and lawn and garden water usage. Pipeline sizing requirements provide a side benefit by providing capacity for supplying livestock water during the non-irrigation season in the fall, winter, and spring. Providing livestock water will not only benefit the ranchers and other residents for their commercial and domestic stock, but also will raise needed revenues to repay system costs. The average annual water use is 106 acre-feet and the peak daily water requirement is 127 gallons per minute. The peak hourly requirement, used for pipeline sizing, is 190 gpm.

Water Supply Alternatives
Following the Wyoming Water Development Commission requirements of a Level I study, alternative surface water and groundwater sources were investigated. Surface water sources included:
o A direct flow diversion from the Middle Fork Powder River requiring purchase of an irrigation water right for summertime usage and eventual purchase of Middle Fork Powder River Reservoir water after that project is completed.

o Purchase of Middle Fork Powder River Reservoir water only.

o A direct flow diversion from the Red Fork of the Powder River requiring purchase of a direct flow water right for summertime diversion.

o Use of water from the North Fork Powder River requiring purchase of storage from Dull Knife or another reservoir.

Groundwater supplies of potable water quality have been found from previous exploration programs in the Tensleep and Madison aquifers. In general, water quality declines to the east of the Big Horn Mountains. Well depths and well costs also increase as one moves easterly. Groundwater alternatives include:

o Purchase and conversion of the Taylor Oil Test Wells, located several miles west of the service area.

o A well designated as the Red Fork Powder River site in Section 16, T. 43 N., R. 83 W., east of the junction of Brock Road and Red Canyon Road.

o EK Mountain sites.

Surface water sources would require water treatment such as sedimentation, filtration, chlorination, and perhaps softening. Groundwater treatment requirements necessitate only chlorination, provided that the well is located in a portion of the Tensleep and Madison aquifer that yields high
quality water. After cost analysis, it was determined that wells at the Red Fork Powder River site, with depths of about 1,600 feet, provide the apparent best potential for providing a water supply for the MFRWD system.

System Sizing and Selection
Cost analyses were conducted of various alternatives including quantities of water delivered to each customer, main distribution pipeline sizes, and joint use of a portion of the soon-to-be constructed Kaycee pipeline from its new well located northwest of Kaycee through the Town of Kaycee. From the cost analysis, a selected alternative was chosen for further analysis.

Operating Plan
An operating plan was prepared to set forth the requirements for an operational organization, and to enumerate the operational requirements such as operation of the two wells required for the water supply system, operation of the water supply regulating tank and the distribution pipelines. The staff requirements would include a part-time maintenance person and a part-time office person. The maintenance persons duties would include operating and maintaining wells and the standby power system, tank inspection, chlorine systems operation, preparation of samples for health department, coordinate system maintenance and call outside contractors for maintenance when necessary, and do emergency repairs.

The duties of the office person would be billing, keeping expense records, bookkeeping, and record keeping. Meter reading would also be a required duty of the office person or the maintenance person. The estimated annual operation and maintenance cost including an O&M contingency would provide for minor replacements and emergency repairs, is $36,162.00 per year.

Cost Estimates
The construction cost of the MFRWD system is estimated to be $4,307,100. If this cost is fully amortized at 4 percent for 25 years, the annual cost
of the construction or debt service is $275,706. When annual O&M is added, the total annual cost would be $311,868. These annual costs per user, expressed in terms of water costs, are as follows:

<table>
<thead>
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<th>Construction</th>
<th>O&amp;M</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Annual cost</td>
<td>$275,706</td>
<td>$36,162</td>
<td>$311,868</td>
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<tr>
<td>Cost per tap (annual)</td>
<td>3,676</td>
<td>482</td>
<td>4,158</td>
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<tr>
<td>(monthly)</td>
<td>306</td>
<td>40</td>
<td>346</td>
</tr>
<tr>
<td>Cost per acre-foot</td>
<td>2,601</td>
<td>341</td>
<td>2,942</td>
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<tr>
<td>Cost per 1,000 gallons</td>
<td>7.98</td>
<td>1.05</td>
<td>9.03</td>
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</table>

Reduced User Costs

The Wyoming Water Development Commission has a water project funding program. This program can provide a maximum of 75 percent of the total construction cost as a grant and may provide the remaining 25 percent as a loan with a maximum term of 25 years and a minimum interest rate of 4 percent. The following presents the reduced user costs when the maximum grant is provided:

<table>
<thead>
<tr>
<th></th>
<th>Construction</th>
<th>O&amp;M</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual cost</td>
<td>$275,706</td>
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<td>$311,868</td>
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<tr>
<td>WWDC grant</td>
<td>3,230,300</td>
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<tr>
<td>Annualized WWDC grant</td>
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<tr>
<td>Annual user cost</td>
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<td>36,162</td>
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<tr>
<td>Cost per tap (annual)</td>
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<td>482</td>
<td>1,569</td>
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<tr>
<td>(monthly)</td>
<td>91</td>
<td>40</td>
<td>131</td>
</tr>
<tr>
<td>Cost per acre-foot</td>
<td>769</td>
<td>341</td>
<td>1,110</td>
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<tr>
<td>Cost per 1,000 gallons</td>
<td>2.36</td>
<td>1.05</td>
<td>3.41</td>
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