WASHAKIE RURAL WATER SUPPLY PROJECT

LEVEL II - EXECUTIVE SUMMARY

NOVEMBER, 1998

WYOMING WATER DEVELOPMENT COMMISSION

STATE OF WYOMING
SCALE: 1" = approximately 70 miles

SUBMITTED BY:  IN ASSOCIATION WITH:
BRS Inc.  Lidstone & Anderson
FORWARD

Comments on the Draft Report issued in October, 1998 were received from the City of Worland and from the USDA Rural Utility Service (RUS). As appropriate, these comments were incorporated into the Final Report contained herein. A summary of the more significant comments follows:

1. **City of Worland**: The majority of Worland’s comments focused on rates which will be charged by Worland to Washakie Rural. Currently Worland has stated their intent to supply Washakie Rural with water, however, the final rate structure has not been negotiated. The matter is complicated by current State statute, Worland City Code, and current practices for outlying districts. The figures utilized in the report reflect the expected rates based on the most similar outlying district, the South Worland Water Users. During Level III and water purchase agreement will be negotiated.

2. **RUS**: RUS supports the project and requested only an additional breakdown of costs by individual project areas for possible multi-year funding based on funding availability.

CURRENT PROJECT STATUS

During the November 17, 1998 WDC meeting the commission recommended the Washakie Rural project be advanced to Level III. In addition, the commission required that the Level III design include the McNutt area and considerations for an emergency backup supply connection to the Basin Manderson system.

Funding for Washakie Rural Improvement District is now dependent upon the Wyoming State Legislature appropriation for the project.

ACKNOWLEDGMENTS

BRS Inc. would like to acknowledge the efforts, assistance, and data provided for this project by the City of Worland, Mayor Herm Emmett, the Worland City Council and Utilities Commission, Gary Thompson (Superintendent of Public Works), Gary Gerber (Department of Public Works), and Mike Donnell (City Engineer). BRS would also like to thank the Washakie Rural District Board members Connie Clark, Marlene Laudon, and Mike Hanify for their time and support. In addition, the project received support from the Washakie Rural Steering Committee whose participants included: Worland Mayor Herm Emmett, Larry Bond (Worland City Council), Washakie County Commissioners Bill Glanz and Alice Lass, WDC Commissioner George Bower, Washakie Rural Water District Board members Connie Clark, Marlene Loudan, and Mike Hanify, RUS staff members, John Cochran, Roy Prior, and Karlene Shoden; and our WDC Project Officer Jon Wade.
PROFESSIONAL CERTIFICATION

I, Douglas L. Beahm, President of BRS Inc., a Wyoming Corporation, hereby certify that the professional services required for the Washakie Rural Water Supply Project, Level II, were developed by me or under my direction and that I am a Professional Engineer licensed in Wyoming as required by the provisions of W.S. 33-29-105 through W.S. 33-29-113. IN WITNESS WHEREOF, I have hereunder set my hand and affixed my seal.

By: Douglas L. Beahm, P.E. #5499
President, BRS Inc.

I further certify that I am a Professional Geologist licensed as required by the provisions of W.S. 33-41-101 through W.S. 33-41-121, and that all geological work performed in relation to this Project was performed by me or under my direction. IN WITNESS WHEREOF, I have hereunder set my hand and affixed my seal.

By: Douglas L. Beahm, P.G. #1341
President, BRS Inc.
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1.0 INTRODUCTION

The Washakie Rural Water Supply Project is a Level II feasibility study, funded by the Wyoming Water Development Commission (WDC). Previous studies include the Washakie Rural Water Supply Project Level I Study, October 13, 1995. The Washakie Rural Water District serves Washakie County from Big Horn County to the north and Hot Springs County to the south, with the exception of those areas already served by the City of Worland, the Tensleep area, and the McNutt subdivision. McNutt District is also the subject of a Level II feasibility study being funded by the WDC. BRS Inc. is the project engineer for both projects.

The preferred option for water supply is connection to the City of Worland’s treated water system. The Worland system receives its water supply from artesian wells located some 18 miles from Worland’s East Tank. Water is delivered to the system by gravity flow.

The Washakie Rural Improvement District is located in Washakie County, Wyoming, near the City of Worland (Refer to Cover Sheet). The District boundary, shown on Figure 1.1, encompasses most private lands north and south of Worland, along the Big Horn River, to the Washakie County line in either direction. Figure 1.1 also shows the general system layout. The system is designed to operate almost exclusively by gravity flow. The only pump station required in the main system being for the Winchester area due to its elevation.

The Washakie Rural Improvement District was formed in 1997 by election. The Board consists of Connie Clark (Chairperson), Marlene Laudon, and Mike Hanify. Support for the project during the election was high (84%) and has increased during the Level II study as follows:

<table>
<thead>
<tr>
<th></th>
<th>Total Ballots/Contacted</th>
<th>Responses Received</th>
<th>Number in Favor</th>
<th>Percent in Favor</th>
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</thead>
<tbody>
<tr>
<td>1997 Election</td>
<td>582</td>
<td>312</td>
<td>256</td>
<td>84%</td>
</tr>
<tr>
<td>Current Project</td>
<td>516</td>
<td>404</td>
<td>390</td>
<td>97%</td>
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</table>

Many of the personal contacts were made through a series of neighborhood meetings or "block parties" held in conjunction with this study. The response to such meetings was overwhelming. The majority of those owners which have not yet responded, are out-of-town or corporate owners.

BRS participated with representatives of Worland, Washakie County, RUS and WDC on a Steering Committee for both the Washakie Rural and McNutt Water supply projects. Meetings were held on a monthly basis. Presentations were made to the Worland Utility Commission and Worland City Council. On October 1, 1998 the Worland City Council passed a resolution empowering Mayor Herm Emmett to issue a letter of intent to supply the Washakie Rural and McNutt Improvement Districts with water, subject to negotiation of water rates. The letter was received October 14, 1998.
2.0 PROJECT SETTING AND WATER SUPPLY ALTERNATIVES

The Washakie Rural Water District spans an area approximately 24 miles north-south and 4 to 5 miles east-west, covering some 90 square miles. The majority of the District is flat lying within a broad valley which follows the Big Horn River ranging in elevation from approximately 4,300 feet above sea level the Worland’s East Tank to approximately 4,000 feet at the lowest point along the Big Horn River.

At the neighborhood meetings the project status, potential schedule, and potential costs were discussed. The majority of the discussion focused on costs of the proposed system in comparison to the current cost currently being incurred for wells, treatment systems, and/or hauled water, and the poor quality of current water being used by the residents. Of 37 residents (10% of the District) responding to questionnaires on water supply sources, 46% utilized wells with extensive water treatment (filtration, reverse osmosis, and softening), 27% used well water untreated, and 27% hauled drinking water from Worland. Following the receipt of water quality analysis, several of the district members have switched from well use to hauling water. It is estimated that the current percentage of households in the District currently hauling water for drinking may approach 50%.

Sample data was collected from eleven wells across the county and one sample of the Big Horn River. All samples exceeded EPA secondary standards for TDS and Sulfate. Eleven of twelve samples exceed the EPA Health Advisory for sodium. Four of the wells exceed standards for selenium. Nitrate was detectable in seven wells and exceeded standards in one well. Thus, all current supply sources exceeded drinking water standards and/or health advisories and continued reliance on individual wells could pose health risks for certain members of the District.

Potential water supply sources include the purchase of water from the City of Worland, ground water sources and surface water sources. Based on water quality, health risk, and cost, the preferred water supply alternative is the purchase of water from Worland.

The source of water for the City of Worland is the Madison-Bighorn Aquifer from artesian wells located near Hyattville. These wells are located near the source of recharge, a pristine area of the Big Horn Mountains. Water quality is good with TDS levels of approximately 200 ppm and sulfate levels of 13 ppm (compared to EPA standards of 500 and 250 ppm, respectively). This water source meets all EPA primary and secondary standards and health advisories. The only required treatment is chlorination which is accomplished by an established system with qualified Level I operators employed by Worland. In considering the City of Worland as a source of supply, three key factors were considered to insure that the Washakie Rural demands to not over tax the Worland supply system.

1. **The ability of the wells at the source to meet the demand.** The current wells can produce up to 27 million gallons of water per day (MGD) under artesian flow or about 15% of the current peak demand of 4 MGD. Data on wellhead pressures over the last ten years shows no decline in pressure. Thus, the current wells can meet demand.
2. **The capability of the pipeline and storage system to deliver water to the systems.** The pipeline as operated in 1998 can deliver 5.2 MGD. With the SCADA (automated control system to be installed 1998/1999) in place the capacity will increase capacity to approximately 6.2 MGD. With addition storage on Rattlesnake Ridge the delivery capacity could be further increased to 7.1 MGD. Due to the recent break (1997) and current leak problems with the pipeline there is some concern as to the longevity of the pipeline. However, the presence or absence of Washakie Rural demand on the system would have no effect on the longevity of the pipeline. The Level II investigation of the pipeline did not recommend replacement of the pipeline in the short term. Level III design will consider connection of the Washakie Rural system to regional system as a potential backup supply.

3. **The current and projected demand for Worland and Washakie Rural.** Current average demand for the Washakie Rural system is 200,000 gpd with a peak demand of 690,000 gpd. Assuming a 1% growth in demand, the combined demand of Worland and Washakie Rural is projected to equal the pipeline by the year 2025.

In summary, the Worland water supply system can serve Washakie Rural with minimal impact or risk.

Other water supply alternatives considered were ground water and surface water sources. Of these two alternatives development of a ground water source would be preferable due to the lesser quality of surface water sources and the regulatory requirements and restraints for surface water treatment under EPA’s SWTR. Development of a ground water source would probably mimic the current Worland supply system with a well near Hyattville and a transmission pipeline of 15 to 17 miles. The cost of such a system would approach 10 million dollars, doubling the cost of the project.

### 3.0 SERVICE AREA/WATER DEMAND

The service area of the Washakie Rural Water District extends from the Washakie/Hot Springs County line at the south to the Washakie/Bighorn County line at the north, excluding the boundaries of the city of Worland. The district boundary is outlined on Figure 1.1. The service area includes areas on both the east and west sides of the Bighorn River with the large majority of the potential users located within 3 miles of the river.

There are approximately 380 individual land owners listed by the county assessors office within the District, corresponding to approximately 1,000 people whom could be served by this project. Due to the fact that some of the potential users will be requesting more than a single tap, **it is estimated that the maximum number of taps for this project is 500. For planning purposes, it is recommended that 400 taps be considered the most likely number.** Currently 334 active and 56 inactive individual service (3/4 inch) taps have been committed. This project has received a very positive response from the potential users, with only 3% to 4% of the potential users contacted not wanting a water tap.
Based on current demands from water systems in the region, as reported to the WDC, the average monthly demand was 13,582 gallons per tap with a corresponding peak monthly demand of 26,151 gallons per tap. For the purposes of this investigation an **average per tap demand of 15,000 gallons per month** and peak demand of 30,000 gallons per month was used.

Future growth projections range from ½ to 1 % per year. For planning purposes, a predicted growth rate of 1% was used based upon data and estimates from past reports and on discussion with city and county planners. It is likely that this project would lead to an increase in the population of rural Washakie County. Some land owners have expressed their future plans to subdivide property if this project is constructed.

Most rural water systems do not consider fire flows to be an option due to the expense involved. The majority of the areas to be served would fall into this category, and it is felt that the cost to increase the pipe sizes to provide fire flow would be prohibitive. However, the current design model predicts that the design node nearest the airport could provide a flow of 1,500 gpm. The airport is currently served by a fire hydrant which provides approximately 400 gpm. Worland has expressed the desire to connect to the Washakie Rural system at this point to provide fire flow to the airport.

**4.0 PRELIMINARY DESIGN**

The project consists of four main areas:

1. The North System, beginning with a connection to the Worland System at the junction of Highway 16 and Washakie 10 and proceeding north to the junction with Highway 20. From this junction service will continue to the Big Horn County line and return along Highway 20 to Worland.

2. The South System, beginning with a connection to the Worland System at the junction of Road 11 and Lane 12 (Washakie Avenue) and proceeding southward to the airport/golf course area, crossing the South Worland System, proceeding south and crossing Nowater Creek, then splitting at the South Flat Highway with one leg returning to Worland and the main supply line proceeding across the Big Horn River at the Gooseberry bridge to a storage tank on the ridge above Gooseberry Road. Additional legs of the system would connect the South Tank to the Wyoming Boy’s School and the South Flat main to the Tie Down area.

3. The Winchester System, beginning at the South Tank extending south to Winchester serving several users in route. This system would include a small storage tank and a booster pump station.

4. The West River Road System, beginning at the end of the current West River Road System and proceeding north to the Big Horn County line.

For the preferred design alternative, the majority of the water lines are located within existing rights-of-way. Most of the pipeline routes are adjacent to existing roads, highways, and canals. The main supply lines are 8" or 10", with 6" and 4" pipes branching off of the mainlines. At the points
of connection to the Worland system a master meter, backflow preventer, and meter pit would be installed, as a minimum. In addition an automatic shutoff valve is recommended.

The principal alternatives considered to the preferred design are:

1. Increase the North System mainline size from 8" to 10".
2. Increase the South System mainline size from 10" to 12"
3. Increase the new storage tank from 300,000 gallons to 500,000 gallons.

Of these alternatives only the increase in storage appears warranted on a cost/benefit basis. However, up sizing the Washakie 10 main line may be desirable from a regional supply perspective and will be investigated further in final design.

5.4 Design Flows/Network Modeling

System design and network modeling for this project was developed utilizing "Cybernet" hydraulic software developed by Haestad methods and licensed to BRS Inc. This software is an "AutoCAD" based software which allows the user to evaluate system layout and simulate flow conditions and demand scenarios. The system displays data on flow, pressure, and various other parameters in graphic and text formats. For peak demand network modeling a worst case daily demand was employed using 480 gallons per minute (690,000 gallons per day), this would simulate a peak daily demand of 1,725 gallons per tap assuming 400 taps. It is unlikely that the proposed system would ever experience this high of a peak daily demand, however, this high demand was chosen for design purposes in order to arrive at conservative pipe sizing and to allow for future growth.

The Washakie Rural Water System was designed to meet the WDEQ/WQD Chapter XII Regulations which require a minimum pressure of 20 psi under all conditions and a normal working pressure of 35 psi. However, there are some specific areas within the South System at which the operating pressures are borderline; the Winchester Area and two areas within the South System which may require individual pressure tank or lift stations. With the exception of these areas described above, the Washakie Rural Water System could be served entirely under gravity-flow conditions. It is feasible to place the new southern storage tank at an elevation equal to the Worland East Tank, thus maximizing available gravity pressures and allowing for the possibility of filling the existing Boy’s School Tank without a booster pump.

5.0 ESTIMATED COSTS AND FINANCING

The estimated construction cost subtotal for all components is estimated at $7,390,671.20. Unit cost data was derived from recent contractor bids in the vicinity, vendor quotations for materials, and cost data from city of Worland Public Works Department. With engineering, legal fees, permitting, rights-of-way, and contingencies the total cost is estimated at $9,950,000.00.
Approximately 87% of the system components are related to the water supply system, eligible for WDC funding, and 13% are related to the distribution system, eligible for State Land and Investment Board funding. The project has been discussed with RUS and would be eligible for RUS funding. RUS would fund both supply and distribution components. RUS requested funding options ranging from 100% loan to 50% grant/loan be evaluated.

The following table provides a comparison of financing alternatives. The lowest cost per month for debt retirement would be to obtain a WDC grant for the supply components, a State Land Investment grant for the distribution components, and then secure a grant/loan for the remaining debt from RUS. RUS will require a bond election at a minimum cost of $5,000.00 and a specific application process. Currently RUS loans are at a rate of 4.75%. A rate of 5% was used in the analysis since the rates change quarterly. The maximum term for a RUS loan, to an improvement district such as Washakie Rural, is 25 years.

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<th>Description</th>
<th>WDC Portion</th>
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<td>Grant</td>
<td>$5,160,000.00</td>
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<td>Balance</td>
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<th>Monthly Debt per Tap - 400 Taps</th>
<th>Monthly Debt per Tap - 500 Taps</th>
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<td>WDC 7.25%, 30 yrs</td>
<td>$26,546.81</td>
<td>$66.37</td>
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<td>RUS 5.0%, 25 yrs</td>
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** Assumed as most likely financing scenario
With approximately 80 miles pipeline currently planned, the materials and installation cost for the pipeline represents approximately 60% of the project component costs. Savings of $1.00 per foot of pipeline would result in project savings of approximately five hundred thousand dollars ($500,000.00). Final design should include detailed investigations of pipeline routes, sizing, materials, and encumbrances to construction, to more accurately define pipeline installation requirements and costs. The ultimate per tap costs are, also, very sensitive to the number of users. Monthly rate estimates have been based on 400 taps. Depending on the funding scenario an increase of users to 500 taps would lower monthly debt retirement costs by at least $5.70 per month.

6.0 RECOMMENDED RATE SCHEDULE

The Washakie Rural District rates must include debt retirement, water purchase charges, operation and maintenance costs (O&M), water use charges, and tap fees. It is critical in the development of a rate schedule, that all costs are covered, and to the extent possible, rates are equitable to all users. In addition, it is desirable that the rate schedule provide an affordable minimum rate with escalation of rates dependent on water use. The following rate schedule is recommended, however, the final decision of rates rests with the District.

An initial tap fee of $1,500.00 per active tap is recommended with the option of an inactive tap fee of $300.00 per tap with the balance due upon activation. Once the system is funded and construction contracts let, it is recommended that the tap fee double.

Debt retirement should be charged to all taps, active or inactive. It is recommended that a debt retirement fee of $30.00 per month per tap be assumed at this level of study. The actual debt retirement fee required will be a function of final project costs, grant/loan funding and the number of taps.

A water purchase agreement with Worland will be required that is compatible with Worland City code and Wyoming State law. Conservatively Worland charges are estimated at $7.50 per tap and $1.25 per 1,000 gallons.

Based on the forgoing assumptions and recommendations (assuming the 25% surcharge from Worland and assuming 400 taps) the following overall rate schedule is recommended.

Minimum rate for 5,000 gallons - $30.00 District debt retirement $7.50 Worland debt retirement $7.50 O&M $7.50 Water use $52.50 Total per month per tap

Monthly bill for 15,000 gallons - $67.50 Total per month per tap
7.0 ADDITIONAL REQUIREMENTS

1. WDC has reviewed the project, the Level II report and determined to recommend the project to the legislature for funding in 1999. If the project receives WDC funding, application can be made to the State Land and Investment Board for funding in the spring of 1999.

2. An application for RUS funding has been prepared. A bond election is required and will most likely be held in May 1999. Upon receipt and approval of the application, RUS will determine grant/loan mix based on projected user costs.

3. A water purchase agreement must be established with Worland for the supply of the water.

4. The following is a summary of the permits, easements, approvals, etc. which would apply to this project prior to construction and would have to be addressed:

   1. State Historical Preservation Officer (SHPO) Clearance.
   2. Wildlife Critical Habitats.
   4. Wyoming Department of Environmental Quality (WDEQ) Permits.
   5. Highway, Road, and Private Easements.
   6. Burlington Northern Railroad Permits.
   7. Canal Companies and Irrigation Districts Approval.
   8. Utility Companies location and crossings.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The Washakie Rural Project appears feasible based on monthly costs of comparable systems. The estimated per tap per month, and tap fee costs are in the range discussed with potential users which have committed to taps.

In this report the Washakie Rural Project has been presented, as a single project, designed to serve as many users as possible. It is likely, however, that the project would not be constructed in a single phase, even if the funding were available in a single year. Of the five major areas within the District the North and South Systems have the lowest per user cost, 96% and 89% of the overall system average per user cost, respectively. In addition, the North and South Systems will serve 86% of the users. These two systems will operate completely independent of one another and could be constructed separately or simultaneously. Depending on the annual level of funding available either project could be constructed first, the South System being roughly 1.5 times more costly than the North System.

With respect to the number of users, the Winchester area, representing 10% of the total users, is next most important area. Winchester's estimated per user costs are approximately 150% of the overall system average per user cost. The major factors in the higher cost per user are related to
pipeline distance, the need for a booster pump station and storage tank, the estimated cost of 2 highway and 1 railroad crossings, and the current estimate that a substantial portion of the pipeline route would require placement of select bedding and trench backfill due to soil and rock conditions. Cost savings for the Winchester portion of the project are possible with further design efforts. The West River Road System per user cost is approximately the same as the Winchester system. The higher cost per user is directly related to pipeline distance and probably cannot be reduced significantly. The best option for reducing per user costs would be to increase the number of users and/or equivalent taps. At the current level of study, both the Winchester and West River Road Systems appear feasible, however, design efforts should be directed at reducing costs and/or adding users.

The Washakie Rural Project will provide both short-term and long-term benefits to Worland. The short term benefits include an increase in jobs and revenues related to the construction activities in the vicinity. Potential long-term benefits include:

1. Increased revenues provided directly by Washakie Rural.
2. An increased user base to support future costs related to the water supply system.
3. Improvement in fire protection in the vicinity of Washakie water mains and at the airport specifically.
4. Increased system storage and improved pressure to the Boy’s School eliminating the need for the current booster pump station.
5. Additional options for directing water flow to minimize service outages in the event of line breaks and/or scheduled repairs.

The Washakie Rural Project will provide a substantial benefit to the members of the District who are currently relying on water sources of dubious quality. The project will increase property values, benefitting both the members of the District and Washakie County.

As the Washakie Rural Project proceeds opportunities to consolidate and/or improve existing water systems and districts should be explored. This could include the McNutt Water District, the Rairden portion of the Basin/Manderson system, and the South Worland Water Users.