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WYOMING
WATER DEVELOPMENT
COMMISSION

BEDFORD
WATER SUPPLY STUDY
LEVEL II

EXECUTIVE SUMMARY

NOVEMBER, 1987



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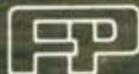
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FORSGREN-PERKINS ENGINEERING, p.a.

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PROJECT OVERVIEW

The Town of Bedford is situated in Star Valley of Western Wyoming. The Town is not incorporated and as such is not a legal entity. Therefore, the Bedford Community Pipeline Company was formed to provide domestic water to many of the residents of the Bedford area. This company constructed a pipeline in 1948 which has served the people of Bedford for 39 years without any major changes or improvements.

Over the years, the system has slowly aged and deteriorated. The present pipeline demand has far exceeded its design and new connections are no longer allowed. Low pressure (or no pressure) is a common problem. The existing system does not have an adequate legal supply of water. It is felt that the Bedford pipeline, as presently operating, has a significant risk of contamination. The pipeline is nearing the end of its useful life and should be replaced.

In 1986, the directors of the pipeline company entered into an agreement with the Wyoming Water Development Commission (WWDC) to improve their pipeline system. The WWDC in turn retained Forsgren-Perkins Engineering (FPE) to perform the initial investigation and evaluation of Bedford's domestic water system, i.e., The Bedford Community Pipeline.

WWDC funding of this project is based on a concept of four developmental levels. The determination of the project feasibility and need was addressed in the Level I Study completed during the Fall of 1986. Based on the conclusions of the Level I Study, the WWDC selected FPE to begin Level II activities including detailed water rights research & analysis, economic evaluations, water rights transfers & filings, water quality determination, refined cost estimates, etc. Final design activities will be completed in Level III, and construction in Level IV if authorized by WWDC and desired by the community.

The purpose of this report is to document the Level II activities. Specific recommendations concerning Bedford's domestic water supply needs are presented herein. These recommendations are a result of engineering and economic analysis as well as discussions with the Town's residents, WWDC, and others. Bedford residents have indicated a tremendous positive interest in this project as indicated by their 132 vs. 11 vote to form a water district.

**LEVEL II
RECOMMENDATIONS AND CONCLUSIONS**

The existing Bedford Community pipeline is not adequate to supply the town's future or present domestic water needs. The pipeline system, both distribution and transmission, is generally undersized and is reaching the end of its useful life. There is a significant health risk due to low pressures and the high potential of surface contamination of the Big Spring collection system. It is our opinion that the renovation and enlargement of this system is essential to providing the town of Bedford with an adequate supply of clean, safe, drinking water.

The reader should be aware that the purpose of this Level II Study is to define and clarify the project needs as they relate to WWDC funding participation. Therefore, the recommendations and conclusions of this report are limited to water supply and transmission. Problems directly related to the distribution system are not addressed herein.

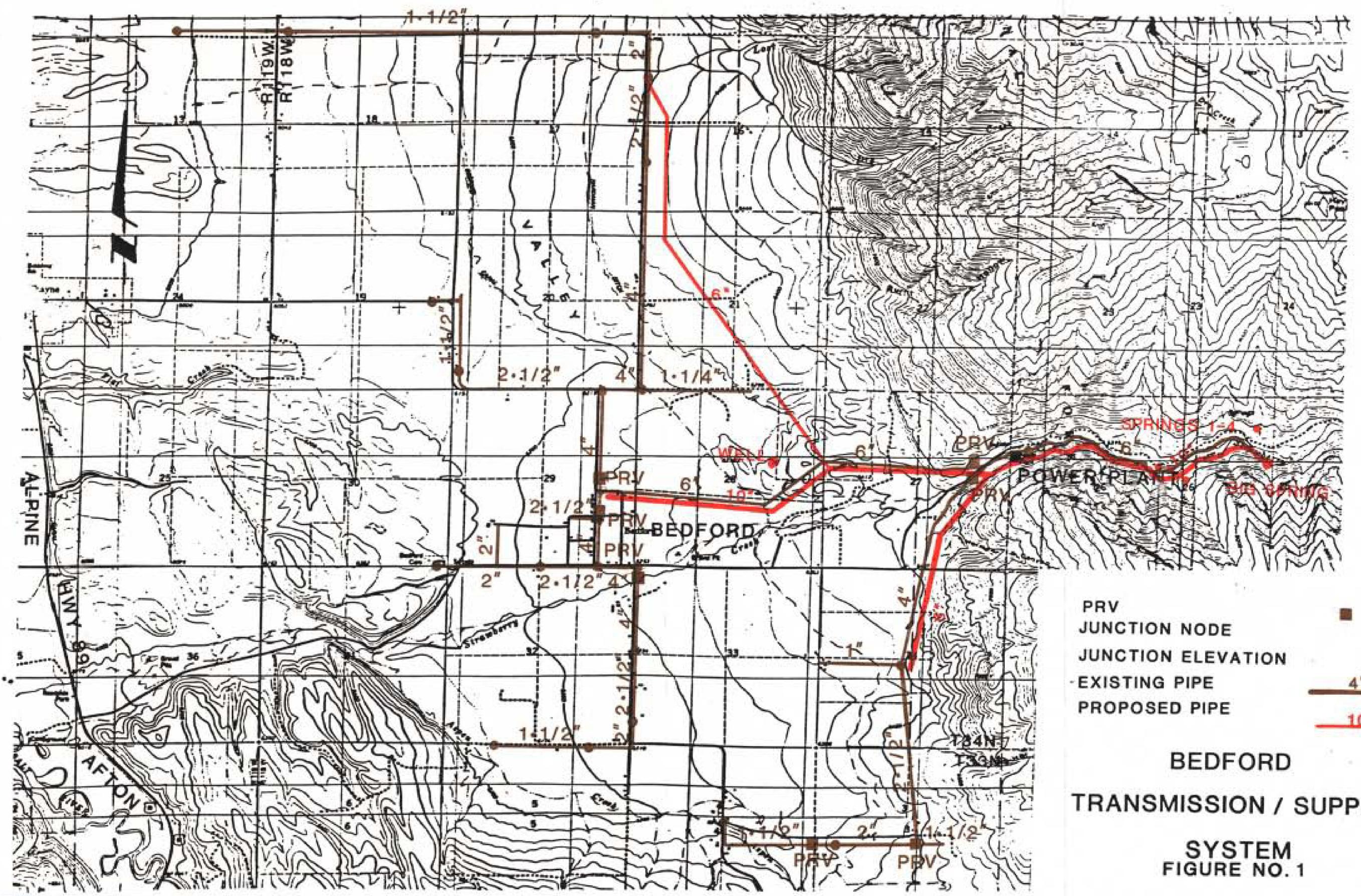
WATER NEEDS

It has been determined that a 40-year population projection should be used for long-term planning of transmission/supply facilities. This approach makes good economic sense given the estimated economic life of these facilities of at least 40 years, and the overall cost savings when compared to upgrading the system prior to that time. Based on a 40-year projected growth and estimated water usage practices, it is our recommendation that the Bedford Water and Sewer District be provided with a domestic/irrigation supply of at least 780 gpm (1.74 cfs) (with peaking). Additional allowance should be made for at least minimal fire flows if fire storage is not otherwise provided.

It should be noted that the Bedford Water and Sewer District consists of over 3600 acres within Star Valley. With the right economic climate, this acreage and proximity represents a potential for growth far in excess of the 3% population projection presented herein. It may be prudent to subjectively consider this possibility when sizing transmission/supply facilities.

WATER RIGHTS

The Bedford Pipeline Company currently enjoys a 0.61 cfs, 1945 adjudicated right to Big Spring (see Figure 1). Collected flow data indicates that this spring is capable of supplying all of the communities needs during typical summer months. Based on our



PRV
 JUNCTION NODE
 JUNCTION ELEVATION
 EXISTING PIPE 4"
 PROPOSED PIPE 10"

 BEDFORD
 TRANSMISSION / SUPPLY

 SYSTEM
 FIGURE NO. 1

observations of Big Spring, we recommend that the district file a 1988 enlargement to approximately 2.0 cfs. This approach will not guarantee a senior legal supply at all times but should effectively provide for the bulk of the community's domestic needs.

Additionally, it is recommended that 1988 domestic rights should be filed on other springs in the canyon. This approach will help firm up the town's winter supply at minimal cost and without impact to the power company. Spring #1 appears to be the most promising and cost effective of these springs. Based on observed capacity, a 0.7 cfs right would be appropriate. It is also recommended that the town file a 1988 right for a groundwater well which would virtually guarantee the town's legal domestic supply.

SOURCE DEVELOPMENT

As indicated above, there are three recommended water sources. These sources are recommended on the basis of economy, water quality, and impact to other water users.

1. Big Springs - The present collection box is undersized and deteriorated. This facility should be entirely reconstructed to accommodate the proposed flows. Reconstruction of this facility is also necessary to effectively protect the town's supply from surface contamination.
2. Spring #1 - The cost of developing this spring is an excellent value when capacity is considered. Spring #1 can help firm-up the town's winter supply with minimal long-term cost.

Although development of Springs #2 and #3 would be beneficial, they do not appear to offer the same relative value when compared with Spring #1. Development of these two springs is a budgetary decision.

The logistics of Spring #4 and its possible interaction with other springs make development of this spring impractical. It is recommended that Spring #4 not be developed.

3. Groundwater Well - We consider the construction of a groundwater well to be essential in guaranteeing the town's legal year-round water supply. The well would be intended for use as a back-up source during periods of regulation or other flow interruptions.

The isolation of the well from the springs provides excellent insurance in the event of avalanche, earthquake, or other catastrophic events in the canyon. As an added

benefit, a well could be placed in operation prior to construction of the new transmission line and spring(s). This would allow construction and future line maintenance to occur without substantial impact to water users.

There is little question that the recommendations herein will enhance the town's water quality if implemented. It is generally agreed that the high long-term costs associated with water treatment would be a substantial burden on the community. We anticipate that water treatment, other than disinfection, will not be required with the recommended alternatives.

TRANSMISSION PIPELINE

It is our recommendation that a 10-inch transmission pipeline be constructed from the canyon into town, with 6-inch transmission feeder lines to the north and south. This configuration is shown on Figure 1. This line sizing would be adequate to meet long-term peak demands without adversely affecting required system pressures. The 10-inch line, when compared to the next smallest (8-inch) size represents additional cost of approximately \$60,000. The difference in capacity of the two lines (1270 gpm vs. 715 gpm) however, is substantial. This larger line size has the added benefit of providing a 500 gpm fire flow without the added cost of a storage tank. (Approximately \$200,000.) Preliminary analysis of Bedford's water system indicates the need to divide the district into separate pressure zones. These zones will alleviate the pressure problems currently being experienced. The 6-inch feeder lines to the north and south are essential to the proper operation of the system and represent the minimal line size for transmission.

PROJECT ECONOMICS

Budget, of course, is always an overriding design constraint. The project must not only be constructed within budget, but it must be designed such that water users (and WWDC) obtain the maximum benefit for money spent. For this project, the project budget may be measured in terms of affordability to the water users.

We believe that the recommendations made in this report are both affordable and cost effective. Estimated project construction costs are summarized in Table 1. Based on this estimate, it appears that the typical monthly user fee would be approximately \$12.00 per connection for this project. This cost is conservatively based on 120 connections. Actual monthly costs may be significantly less if and/or when more than 120 homes utilize the system, or if the district chooses to implement a hook-up fee.

TABLE 1

ESTIMATED CONSTRUCTION COSTS
RECOMMENDED PROJECT

	<u>TOTAL EST. COST</u>
10" TRANSMISSION LINE:	\$ 429,000
6" TRANSMISSION LINE: (South)	\$ 87,400
6" TRANSMISSION LINE: (North)	\$ 184,350
BIG SPRING RECONSTRUCTION:	\$ 43,900
SPRING NO. 1 DEVELOPMENT:	\$ 20,000
GROUNDWATER WELL (400 gpm)	\$ 50,000
TOTAL ESTIMATED CONSTRUCTION COST:	\$ 814,650
10% Construction Engineering:	<u>81,450</u>
15% Contingency:	<u>134,400</u>
TOTAL ESTIMATED PROJECT COST:	\$1,030,500
2/3 WWDC Participation:	\$ 687,000
1/3 District participation:	\$ 343,500
USER COST PER CONNECTION: (120 Connections, 40-year, 4% loan)	\$12.05/MONTH

PROJECT SPECIFICS

EXISTING CONDITIONS

The existing transmission system consists of approximately 20,000 feet of 6-inch CIP and 5000 feet of 4-inch CIP extending from Big Spring to the townsite (see Figure 1). The estimated capacity of the line based on a minimum acceptable pressure of 100 psi at the point of distribution is only 330 gpm. It is quite apparent that the size of the existing transmission line is not adequate for present or future demand.

Utilizing current demand (as measured in the field), it was found that most of the system's pressure reducing valves are not able to maintain their set design pressures. Portions of the system, particularly on the north side, experience low and/or vacuum pressures. This fact, confirmed by discussions with the residents, represents a significant health risk to the water users.

Presently, the pipeline is supplied entirely by the Big Spring in Strawberry Canyon. Big Spring has traditionally been able to meet all of the demands imposed by the system. It should be noted, however that the Big Spring 1945 adjudicated water right only allows for .61 cfs (274 gpm), which is significantly less than the 400± gpm currently being used.

Another concern of the Big Spring's collection system is its close proximity to the canyon road and its open construction. Surface water contamination (evident in water samples) represents another substantial health risk to water users.

POTENTIAL WATER SOURCES

A primary goal of the Level II Study was to investigate and take steps to legally obtain additional sources of domestic water as required to guarantee the Town of Bedford with a realistic and adequate supply. Prudent planning indicates that a long-term design be based on the anticipated life of the proposed facilities. The useful life of the transmission/supply system is estimated to be at least 40 years. A 40-year population projection has been used for planning in the Level II Study.

With a present population of approximately 284 and a 3% growth rate, the 40 year population projection is 1230. Using a realistic demand, this population will require a peak supply of approximately 780gpm.

Bedford has many options for acquiring additional needed water, both physically and legally. In general, these options have been

examined with respect to feasibility, relative cost, practicality, potential impact to other water users, etc. The more promising alternatives are listed below:

1. File a 1988 enlargement on Big Spring
2. File 1988 water rights on other springs, (Springs 1 - 4)
3. Groundwater
4. Use Town of Bedford 1923 water right, (North Canal)
5. Purchase of condemnation of senior water rights
6. Improve the Town's water rights priority through abandonment of more senior rights

In evaluating these alternatives, input was received from the State Engineer's Office, WWDC staff, and the residents of Bedford. It has been determined that options 4, 5, and 6 are not realistic. Option 4 was determined to be impractical because the 1923 right is not senior enough to insure a legal supply. In addition, the 1923 right is presently being used and would require a consensus of water users to relinquish it. It is felt that options 5 and 6 would likely result in expensive negotiations and/or litigation involving many parties. It should also be noted that WWDC cannot be party to water rights acquisition through the power of eminent domain as per Wyoming State Statute 41-2-116. In general, options 1, 2 and 3 are more promising alternatives. They will provide additional supply at a reasonable expense. These alternatives were discussed in the conclusions and recommendations section.

WATER QUALITY

We believe that the existing Bedford pipeline system represents a significant health risk to the community. Low pressures and vacuum pressures on parts of the system represent a high risk of contamination. Due to the location and construction of the Big Spring collection facility, there also appears to be a high risk of surface water contamination of the source water. These are significant concerns that must be addressed as part of this project.

Potential sources have been monitored over the last 2 years. It appears that Big Spring and Springs 1, 2, and 3 can be developed to provide safe drinking water. Of course, developed springs must be periodically monitored and stand-by disinfection provided in accordance with current EPA standards. Water can be used directly from Strawberry Creek if fully treated. However, full treatment is felt to be cost prohibitive.