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INTRODUCTION
INTRODUCTION

Background

Around the turn of the century the Teapot Dome Oil Field was discovered in central Wyoming, approximately forty miles north of Casper. This discovery developed into the Salt Creek Field, one of the largest light oil producing fields in the United States. Two towns grew during the boom that came with development of the field, Edgerton and Midwest. Midwest was a company town, built and owned by the Midwest Refining Company, while Edgerton became the non-company town. Midwest developed only those commercial establishments that the oil company operated, while many commercial establishments opened in Edgerton. Midwest remained basically a residential development over the years, while Edgerton developed with both residential and commercial uses.

During the boom there was a grid pattern of wooden oil derricks as far as the eye could see around the towns, and many thousands of people living and working in the area. Potable water was scarce and the oil company developed a well on the North Platte River, forty miles to the south, and constructed a water pipeline from the well to Midwest to provide public water to the town of Midwest. The well and pipeline were constructed in the early 1920s, after pipeline technology had been developed well enough to pipe the oil from Midwest to the refinery at Casper.

- Existing Systems -

The existing water supply and distribution system for the towns of Edgerton and Midwest are currently separate systems as they have always been. In the last few years the two towns have perceived the necessity to unite their efforts in order to resolve their water problems.

Edgerton has obtained, as its only source over the years, water from a series of wells in the area, having minor success over the long term in providing a marginal water supply for its residents. Edgerton is faced with continued water shortages during the summer months and their treatment system consists of chlorination only. During those periods of high usage the Edgerton well water becomes rusty in color and its quality, for potable usage, is greatly reduced. Edgerton’s distribution system was upgraded prior to their streets being improved. Around the time their distribution system was upgraded they acquired thirty-three percent (33%) of the storage capacity of the north water storage tank. Edgerton, while it now has ample storage, is still plagued with water quality and an insufficient water supply. Edgerton may utilize their 33% storage capacity in the jointly owned tank to the extent that what they are capable of pumping into the tank they may withdraw from the tank.
Midwest has continued to depend on its sole source of potable water the well at the North Platte River. The Midwest Refining Company constructed a non-potable water system for Midwest, which was utilized for irrigation, toilets, and other non-consumptive uses. However, this system was eventually phased out.

Amoco Oil took over operation of the Salt Creek Field and owned Midwest for many years. Amoco slowly sold the houses in Midwest to its people there and ultimately turned the town over to the people. In 1975, the Town of Midwest incorporated as a municipality and took over responsibility for the water system, sewer system streets and all other public facilities that had been previously maintained by Amoco.

Midwest, as was the case with Edgerton, is faced with water shortage during the summer months. However, Midwest's predicament is different from Edgerton's in the fact that Midwest has sufficient water rights from the North Platte River but is unable to convey these waters to Midwest, due to the inadequacy of the existing pipeline, in sufficient amounts to avert the shortages. Midwest is faced with a problem of conveyance from its source to its point of usage as well as being able to realize its full rights from its existing well. The well's current production is roughly 180 gpm (.40 cfs) and its North Platte River appropriation is 283 gpm (0.63 cfs). In order for the Town to realize the benefit of their appropriation they will have to construct new wells, revise their pumping facility and upgrade the existing pipeline.

Midwest's major problem has been and continues to be the forty (40) plus miles of supply line from the North Platte River. The pipeline is comprised of eight (8) and six (6) inch diameter steel pipe. The pipeline must cross the summit of Twenty Mile Hill, located nineteen (19) miles north of Casper and approximately 750 feet higher than the North Platte River and 980 higher than the Town of Midwest. These differences in elevation impose pressures in excess of 420 psi on the pipeline. The pipeline is nearly seventy (70) years old and passes through a variety of soil types from highly corrosive soils to sand dunes, each creating its own type of problems. While the steel line did, at one time, have an adequate cathodic protection system, that system has now been determined to be inactive which is tending to accelerate the deterioration of the pipeline. The state of the pipeline in conjunction with the pressures to which it is subject, as one would surmise, has and is plaguing the Town with numerous repairs, loss of water and ultimately a water shortage and drain on the Town's budget.

The Town of Midwest has two steel tanks approximately six (6) miles south of the Town which it utilizes to store raw untreated water from the pipeline. The total storage capacity of these tanks is 4.3 million gallons. This volume of storage is not required, however, it has proven to be a blessing and an asset for the Town. The valving at the raw water storage tanks is such that the water may be diverted into the tank and feed to the treatment plant in Midwest. During the winter months or those periods where freezing may occur the Town must pump water around the clock to prevent freezing of the pipeline. The excess water beyond winter usage is spilled out of the raw water tanks and wasted, which is cheaper than repair, maintenance and thawing of the pipeline.
The main pump station on the North Platte River is a plunger pump driven by a 75 horsepower motor. This pump is a high pressure, low volume pump and, as with the pipeline, has many years of service associated with it, making parts difficult to obtain.

Both the Town's well and the booster pump station consist of one pump at each location. If there is a problem with either pump the system must shut down until repair parts or a new pump is located and installed. This is why the dual raw water storage tanks are important in the current operating system.

In order to start or shut down the pumps at the river or adjust flow in the pipeline, it is currently necessary for the operator in Midwest to travel to the well or pump station on the river in Casper to do so.

Repair cost for the pipe supply line from the North Platte River to Midwest is currently costing the Town in excess of $50,000 per year and an average of one pipeline break every two weeks. Each time the pumps are shut down for repairs and restarted the potential for an additional rupture occurs due to surges within the pipeline.

In short, it is imperative for both towns to secure not only an adequate water source, but also to construct wells, pumps and supply lines sufficient to assure them a continuous water supply in order for them to remain in existence.

- Prospects for the Future -

Midwest does not have the population base or assessed valuation as a town, which could financially operate and maintain the forty mile pipeline from the North Platte. The line itself, being approximately 70 years old, is in constant need of repair and requires a full time maintenance person. The technology of oil production has changed over the years and the original boom population has stabilized at around one thousand people in the area. The population has remained at this level for many years. The Salt Creek Field continues to produce oil through secondary and tertiary recovery methods, currently water flooding. The future of the field is good, with Amoco's CO2 recovery project in the works, it appears the field will continue to produce oil for a viable market for many years to come.

The lifeline for the communities has become the water line from the North Platte River. Much effort, time and monies have been put into developing adequate potable water sources in the Midwest area over the years. None has been found, and no proposals were economically feasible. It would appear the only viable project is to maintain the water line and expand the existing water source from the North Platte River. The problem is not one of convenience, it is one of survival.
Previous Studies and Projects

The Wyoming Legislature, during the 1986 session, authorized the Wyoming Water Development Commission (WWDC) to investigate and evaluate potential water sources for the towns of Edgerton and Midwest, Wyoming. The investigation was conducted by the consulting firms of Trihydro Corporation and Banner Associates, Inc. with the report, Water Supply Project for the Towns of Edgerton and Midwest being submitted in March, 1988. The Trihydro/Banner report utilized several reports which had been prepared for the towns prior to that study which included:


The Trihydro/Banner report derived the population projection from the 1984, Black & Veatch study, as well as the water demands for each community. Based on those projections the requirement for surface or ground water supplies were derived and the investigation for a source was conducted.

We have utilized all the data gleaned from the previous reports and upon the recommendation of the WWDC staff have utilized the population projection derived by the Department of Administration and Fiscal Control (DAFC) and by sliding those projections forward ten (10) years, without adjustments, to the year 2040. The water demand projects for both towns were confirmed and the average day consumption rate, gallons per capita per day (gpcpd), of 150 gpcpd, for Edgerton and 200 gpcpd for Midwest were used in preparation of this report.

Project Authorization

The 1988 session of the Wyoming Legislature (W.S. 41-2-114) authorized the Wyoming Water Development Commission to evaluate the proposal to convey water from the North Platte River near Casper to the Edgerton/Midwest area. The project proposal included conceptual design of a new pipeline, pumping stations, and review of various water treatment plans. The WWDC, under contract No. 9-00819 authorized Worthington, Lenhart, Carpenter and Johnson, Inc. (WLC&J) to proceed with the Level III Edgerton/Midwest Water Supply Project. WLC&J subcontracted the source and water treatment portions of the project to Western Water Consultants of Laramie, Wyoming, and the economic analysis review to Western Research Corporation of Laramie, Wyoming.
- Project Description and Scope -

This project is scoped to alleviate the excessive maintenance and continued failures along the existing water supply pipeline from the North Platte River to the treatment plant in Midwest. The project also included work items directed at identifying a long-term solution to the water supply problems of the towns of Edgerton and Midwest.

The items identified under the Scope of Service are listed below. A detailed description of work performed under each item will be presented in the "Project Tasks" section of this report.

1. Coordination with Natrona County Regional Water System
2. Identification of a Long-Range Source of Water
3. Identification of a Service Area
4. Identification and Evaluation of Treatment Options
5. Ability to Pay/Benefit-Cost Ratio/Financing Options
6. Right-of-Way
7. Preparation of Preliminary Cost Estimates
8. Selection of Preferred Alternative
9. Preparation of Conceptual Plans for the Pipeline
10. Preparation of Operating Plan for the Pipeline
11. Permitting
12. Land Acquisition
13. Reports
14. Meetings
PROJECT TASKS
Task 1 - Coordination with Natrona County Regional Water System

The Wyoming Water Development Commission agreed to fund, under the sponsorship of the Natrona County Regional Water System Study Committee, a project to determine the feasibility of combining the many diverse water groups within the Casper area into a single regional water system. This project was awarded to James M. Montgomery, Consulting Engineers, Inc. of Laramie, Wyoming.

The Towns of Midwest and Edgerton are participating members of the Natrona County Regional Water Study group. Both the Edgerton/Midwest Water Supply and the Natrona County Regional Water System projects have a common interest in the goals and recommendations of the other. Therefore, the WWDC felt coordination between the two projects was necessary in order that information pertinent to the projects could be shared.

Worthington, Lenhart, Carpenter and Johnson, Inc. (WLC&J) met with engineers from J. M. Montgomery on two occasions and visited by phone on another. The first meeting was on July 20, 1988, in the WLC&J office. The schedule of each project was discussed. The Edgerton/Midwest schedule required that a significant amount of work be done quickly and be essentially completed by November 1, 1988. The Regional Water schedule is a long term (two year) study with only preliminary data to be gathered through November 1, 1988. The different requirements of the two projects did not seem to allow for any significant exchange of information. However, all data generated as part of the Edgerton/Midwest Project would be available to the Regional Water Project through the draft and final reports.

A second brief conversation was held by phone on October 19, 1988, with Montgomery engineers in Laramie. WLC&J updated their schedule for completion of the draft report around November 10, 1988, and the final report in December 1988.

The second meeting was held in the WLC&J office on October 27, 1988, with Montgomery. WLC&J discussed their project in response to general questions about the source, treatment and pipeline. The schedule for the reports was unchanged from the 10/19/88 phone conversation. The Montgomery engineer indicated he would like to obtain copies of the reports and would go through the WWDC to obtain them when they became available.

The coordination task of this project was minimal due to the extreme timing difference between the projects. Hopefully, the results of the Edgerton/Midwest Water Supply Project will be of use to the Natrona County Regional Water Supply Project as they progress through the development phases.
Task 2 – Identification of Long-Range Sources of Water

- Background -

The Town of Midwest has an adjudicated surface water appropriation from the North Platte River for 0.63 cfs, Permit Number 16525 with a priority of October 11, 1922. A 12-foot diameter caisson was dug into the north (left) bank of the North Platte River and a five foot section of the caisson was perforated with 2-inch diameter holes. It is understood that a feeder line was installed under the river, but a line is not indicated on the water right application map. The site was visited on October 13, 1988 and at that time, the water level in the caisson was only about half way up the perforated section. Water level measurements were not made.

The pump in use is a Gould 8 JHC DWT, 4 stage, 1740RPM, 10HP for 21-foot suction head. The pump is designed to discharge 200 gpm (0.44 cfs). The superintendent indicated that the pump operates continuously. The water is discharged into a gravity flow 12-inch cast-iron pipe which carries the water to a booster pump for pumping to Midwest. The booster pump has a capacity of about 180 gpm.

The existing pump does not have the capacity to discharge the amount allocated by the water right. Also, because it has not been tested recently, there is no assurance that the caisson can produce 280 gpm (0.63 cfs) much less the increased demands associated with including Edgerton and/or population growth through the years, even with a larger pump.

If the pump and caisson could discharge 0.63 cfs, continuously, the average annual demand of the two towns could be met. However, this operation scheme assumes that there is storage available to hold water pumped in excess of demand for release when demand is greater than 0.63 cfs. Such storage is not available. [Note: The existing raw water storage tanks hold 4,300,000 gallons. Required storage to hold excess water above demand would be 456 acre-feet (annual flow of 0.63 cfs), less 229 acre-feet (annual water demand from Table 3) equals 227 acre-feet or 73,963,000 gallons.] Thus, there is a need for more water. Reasonable alternative sources of additional water are:

1. Purchase of Treated Water from Casper;
2. Purchase of Stage III Water;
3. Purchase of Seminoe Reservoir enlargement water;
4. Development of Split Rock Syncline ground water;
5. Purchase of Middle Fork Reservoir Water;
6. 1988 water right out of North Platte River;
7. Purchase of surplus Stage II Water;
8. Purchase of Deer Creek Reservoir Storage; or

Each of these alternative sources were considered and are discussed below.
- Amount Required -

The volume of additional water required to satisfy the current and future needs of Edgerton and Midwest was estimated using DAFC population growth estimates and records of water use by Edgerton and Midwest for 1987-88 water year and by Casper and Laramie for the past few years. A reasonable daily demand curve for each month was developed using daily records from Laramie. Daily percentages were applied to the monthly demand curves for Casper and Midwest to estimate the average daily demand by Midwest and Edgerton. The sum of the amounts the average daily demand exceeded the current water right (0.63 cfs) is assumed to be the demand from a new source. Table 1 presents the results of these computations. There is no additional demand above the 0.63 cfs during the winter months of October through April. The demand occurs during the months of May through September, and totals 62 acre-feet by the year 2040. Thus, the Towns of Edgerton and Midwest would be well advised to arrange for a source to supply 62 acre-feet per year. In addition, the peak daily demand of 1.45 cfs, or 0.82 cfs over the existing water right, if applied for 6 hours per day for one month, might require about 12 acre-feet per year. Thus, by the year 2040 the towns will need an additional source of about 75 acre-feet per year. Incremental demands are shown on Table 1.

- Source Options -

1. Purchase of Treated Water from Casper

A meeting was held with the Director of the City of Casper Board of Public Utilities to discuss the possibility of the Towns receiving water directly from the City of Casper. Generally, Casper is not opposed to the concept, however, they can distribute only "surplus" water outside the City limits and that would require the passage of an ordinance by the Casper City Council. Because of the uncertainty of supply and time delays, this option was not considered further.

2. Purchase of Stage III Water

The Water Development Commission is currently considering a plan to divert additional water from the Little Snake River Basin to the North Platte River Basin through a high elevation diversion known as Stage III. This plan is still in the initial phases, and the likelihood of its completion is not great within the near future. Because of the uncertainty of supply and time delays, this option was not considered further.

3. Purchase of Seminole Reservoir Enlargement Water

The U.S. Bureau of Reclamation is currently investigating the potential for enlarging Seminole Dam and Reservoir. The Wyoming Water Development Commission has provided partial support for the study. According to a preliminary study prepared by Western Water Consultants, the enlargement could result in about 10,000 acre-feet of water per year available for use in the North Platte River Basin. The
# Table 1

**Demand for New Source of Water for the Towns of Edgerton-Midwest**

*All values in acre-feet*

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investigation is underway, and it will be several years before it will be known whether the plan is feasible. Because of the uncertainty of supply and time delays, this option was not considered further.

4. Development of Split Rock Syncline Ground Water

The State of Wyoming has investigated the potential of a well field along Sweetwater River above Pathfinder Dam. The legal availability and economics of obtaining water from this source are unknown. Because of the uncertainty of supply and time delays, this option was not considered further.

5. Purchase of Middle Fork Reservoir Water

This option was investigated by Banner and Associates (1988) and it was determined that the costs of this option were greater than obtaining a supply from the North Platte River. Because of the economics as well as the uncertainty of when the Middle Fork Reservoir might be built, this option was not considered further.

6. 1988 Water Right Out of the North Platte River

The North Platte River is a fully appropriate stream in Wyoming and a 1988 priority would be subject to regulation in practically every year. However, regulation has not been called for, and the likelihood that it will be is not great. Also, the amount of water to be diverted is small in relation to the flow, so it is not probable that other appropriators would call for regulation on just a 1988 right. It would be prudent for the Towns to have a water right filing even if another source is available.

Therefore, it is recommended that the Town of Edgerton file with the State Engineer's Office an application for a permit to appropriate surface water from the North Platte River. The diversion should be by a well or wells on the bank of the river on property now controlled by the Town of Midwest. Preliminary investigation indicates that one or two 16-inch diameter wells about 30 to 35 feet deep properly constructed and developed could serve as the point of diversion. The application should be for 0.82 cfs, the difference in the maximum daily demand for the year 2040 as computed herein, and the 0.63 cfs now covered by the 1922 right. This application has been prepared and submitted to the State Engineer's Office and awaits their review and approval.

7. Purchase of Surplus Stage II Water

The City of Cheyenne Stage II Water Project which diverts water from the Little Snake River Basin to the North Platte River Basin has developed more water than will be required by the city until about the year 2011. The City of Cheyenne and the Water Development Commission have entered into an agreement whereby the WWDC can market the surplus Stage II water. A letter of interest on behalf of the Towns of Edgerton and Midwest has been submitted to WWDC. WWDC has authority to sell Stage II surplus water for $125 per acre-foot with supply
guaranteed to the year 2011. It is possible that a lesser price might be renegotiated with the City of Cheyenne. A purchase of the variable amounts of water by years shown on Table 1 from surplus Stage II water would assure a source through the year 2010.

The delivery point for this water is Seminoe Reservoir. It is estimated that the State will impose a 10 percent loss in transporting the water from Seminoe Dam to Casper. Thus, an additional amount must be purchased.

8. Purchase of Deer Creek Reservoir Storage

The Water Development Commission plans to construct Deer Creek Reservoir southeast of Casper as a State Water Project. Water will be available for purchase from the Commission at an estimated cost of $100 per acre foot. The lawsuit filed by Nebraska casts some doubt about when the project will be constructed, however, by the time Stage II surplus water is needed for Cheyenne, the Deer Creek Project should be on line. The amounts of water per five year period are shown on Table 1. The State Engineer has indicated that a 10 percent loss will be assessed from Deer Creek Reservoir to the mouth of Deer Creek, so the amounts of water to be purchased from Deer Creek Reservoir is the same as the amounts purchased from Surplus Stage II. There might be some salvage on the North Platte River from Casper to the mouth of Deer Creek, however, this is speculative.

At this time, it appears that the entire yield of Deer Creek Reservoir will not be sold for some years so after Deer Creek Reservoir comes on line, the Towns may want to re-evaluate their position and purchase Deer Creek water prior to the expiration of their contract for Stage II surplus.

The Water Development Commission also indicated that Deer Creek Water could be purchased either as yield or as space in the reservoir. It is recommended that the Towns purchase space. This would allow them to control their own destiny more closely.

9. Purchase of Agricultural Water Rights

An article in the Casper Star Tribune in October 1988 indicated that Mills-Wardwell Water Districts were negotiating to purchase agricultural water rights from a ranch near Douglas, Wyoming. The agricultural right has a 1904 priority date which would assure a supply every year. The transfer must be approved by the Wyoming Board of Control. The Mills-Wardwell application transfer will determine the conditions under which such a transfer might take place. If the transfer is accomplished with little difficulty and if the availability of water from Stage II or Deer Creek Reservoir becomes speculative, Edgerton and Midwest might pursue this option.
- Summary -

In summary, nine options for providing an additional source of water for the Towns of Edgerton and Midwest were considered. It is recommended that the Towns:

(1) file for a 1988 water right from the North Platte River;

(2) enter into negotiations with the City of Cheyenne to purchase surplus Stage II water; and

(3) retain for later consideration the purchase of storage space in Deer Creek Reservoir.
Task 3 - Identification of Service Area

(Note: The following extensive write up of the service area is intended to determine the feasibility of servicing intervening users. Much of the information is also pertinent in establishing design requirements for pipeline sizing, storage and water treatment.)

Service Areas to Consider:

1. Midwest and Edgerton Only
2. Midwest, Edgerton and intervening subdivisions.

For any intervening subdivisions the cost to the landowners for both water and the distribution systems required will be considered in the determination of service.

The potential for development along the line is minimal, even if the public water were free.

If water is treated at Casper, the potential is greater for providing domestic service. If the water is pumped raw to Midwest, then some type of treatment at the point of use would be required in order to have any domestic taps along the pipeline.

- Service to Edgerton and Midwest Only -

Water service to Edgerton and Midwest only would provide a service area of a current population of 1072, Edgerton 476, and Midwest 596. DAFC extrapolated projections and Black and Veatch projections for growth of these two communities are listed below.

<table>
<thead>
<tr>
<th>Year</th>
<th>Edgerton</th>
<th>Midwest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DAFC (1)</td>
<td>Black &amp; Veatch</td>
</tr>
<tr>
<td>1990</td>
<td>510</td>
<td>510</td>
</tr>
<tr>
<td>1995</td>
<td>476</td>
<td>568</td>
</tr>
<tr>
<td>2000</td>
<td>482</td>
<td>931</td>
</tr>
<tr>
<td>2005</td>
<td>528</td>
<td>704</td>
</tr>
<tr>
<td>2010</td>
<td>574</td>
<td>781</td>
</tr>
<tr>
<td>2015</td>
<td>620</td>
<td>870</td>
</tr>
<tr>
<td>2020</td>
<td>666</td>
<td>966</td>
</tr>
<tr>
<td>2025</td>
<td>712</td>
<td>1,080</td>
</tr>
<tr>
<td>2030</td>
<td>758</td>
<td>1,201</td>
</tr>
<tr>
<td>2035</td>
<td>804</td>
<td>1,340</td>
</tr>
<tr>
<td>2040</td>
<td>850</td>
<td>1,493</td>
</tr>
</tbody>
</table>

(1) DAFC projections were extrapolated beginning with year 2000 in accordance with recommendations by DAFC personnel.

(2) HNTB projection period did not extend beyond the year 2004.
In calculating the annual water demand for the two communities in the Level I study, Banner used the Black and Veatch projections to provide a conservative estimate. In discussions with the WWDC staff and from general knowledge of the economy of the Edgerton-Midwest area, there is little foreseeable cause for growth. The Salt Creek Field and related oil production activities are the only reason for being for the two communities, and their existence depends on the continued production of the Salt Creek Field. It is the general consensus that production will extend for at least another thirty years, but without any significant increase in current levels of activity. Thus, there is little indication that significant growth of population will occur between now and 2040, and the more reasonable projections to use for the benefit of the project are those of DAFC. The total combined population for the two towns is projected to be 1918 by DAFC's projections in 2040, Edgerton 850, Midwest 1068.

Water use is projected from historical data, verified by Western Water Consultants, at 200 gallons per capita per day for Midwest and 150 for Edgerton.

### TABLE 3
Average Annual Water Demand Projections

<table>
<thead>
<tr>
<th>Year</th>
<th>Edgerton (1) Ac-Ft/Yr</th>
<th>Midwest (2) Ac-Ft/Yr</th>
<th>Combined Ac-Ft/Yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>85.7</td>
<td>143.2</td>
<td>228.9</td>
</tr>
<tr>
<td>1995</td>
<td>80.0</td>
<td>133.6</td>
<td>213.6</td>
</tr>
<tr>
<td>2000</td>
<td>81.0</td>
<td>135.4</td>
<td>216.4</td>
</tr>
<tr>
<td>2005</td>
<td>88.7</td>
<td>148.4</td>
<td>237.1</td>
</tr>
<tr>
<td>2010</td>
<td>96.5</td>
<td>161.3</td>
<td>257.8</td>
</tr>
<tr>
<td>2015</td>
<td>104.2</td>
<td>174.3</td>
<td>278.5</td>
</tr>
<tr>
<td>2020</td>
<td>111.9</td>
<td>187.3</td>
<td>299.2</td>
</tr>
<tr>
<td>2025</td>
<td>119.6</td>
<td>200.3</td>
<td>319.9</td>
</tr>
<tr>
<td>2030</td>
<td>127.4</td>
<td>213.3</td>
<td>340.7</td>
</tr>
<tr>
<td>2035</td>
<td>135.1</td>
<td>226.3</td>
<td>361.4</td>
</tr>
<tr>
<td>2040</td>
<td>142.8</td>
<td>239.3</td>
<td>382.1</td>
</tr>
</tbody>
</table>

(1) Edgerton average daily per capita use is 150 gpcpd
(2) Midwest average daily per capita use is 200 gpcpd

Peak Daily Water Demand

DEQ requires water supply systems to be able to supply the estimated peak day consumption for the given design year. Peak usage was calculated by Black and Veatch to be 413 gpcpd for Edgerton and 550 gpcpd for Midwest. These rates were multiplied by the DAFC population projections in the table below to obtain the peak daily water demand for each community and the combined total.
## TABLE 4
Peak Daily Water Demand Projections

<table>
<thead>
<tr>
<th>Year</th>
<th>Edgerton(1) Gal/day</th>
<th>Midwest(2) Gal/day</th>
<th>Combined Gal/day</th>
<th>gpm</th>
<th>cfs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>210,630</td>
<td>351,450</td>
<td>562,080</td>
<td>390</td>
<td>.87</td>
</tr>
<tr>
<td>1995</td>
<td>196,175</td>
<td>327,800</td>
<td>523,975</td>
<td>364</td>
<td>.81</td>
</tr>
<tr>
<td>2000</td>
<td>199,066</td>
<td>332,200</td>
<td>531,266</td>
<td>369</td>
<td>.82</td>
</tr>
<tr>
<td>2005</td>
<td>218,064</td>
<td>364,100</td>
<td>582,164</td>
<td>404</td>
<td>.90</td>
</tr>
<tr>
<td>2010</td>
<td>237,062</td>
<td>396,000</td>
<td>633,062</td>
<td>440</td>
<td>.98</td>
</tr>
<tr>
<td>2015</td>
<td>256,060</td>
<td>427,900</td>
<td>683,960</td>
<td>475</td>
<td>1.06</td>
</tr>
<tr>
<td>2020</td>
<td>275,058</td>
<td>459,800</td>
<td>734,858</td>
<td>516</td>
<td>1.15</td>
</tr>
<tr>
<td>2025</td>
<td>294,056</td>
<td>491,700</td>
<td>785,756</td>
<td>545</td>
<td>1.21</td>
</tr>
<tr>
<td>2030</td>
<td>313,054</td>
<td>523,600</td>
<td>836,654</td>
<td>581</td>
<td>1.29</td>
</tr>
<tr>
<td>2035</td>
<td>332,052</td>
<td>555,500</td>
<td>887,552</td>
<td>616</td>
<td>1.37</td>
</tr>
<tr>
<td>2040</td>
<td>351,050</td>
<td>587,400</td>
<td>938,450</td>
<td>652</td>
<td>1.45</td>
</tr>
</tbody>
</table>

(1) Edgerton peak daily per capita use is 413 gpcpd.

(2) Midwest peak daily per capita use is 550 gpcpd.

### Treated Water Storage Requirements

Water storage requirements include operational, emergency, and fire flow storage. **Operational storage** is based on a rate of 25% of the peak day demand, 938,450 gallons, and is projected to be 234,612 gallons for the combined communities for the year 2040.

**Emergency storage** is provided to ensure adequate water supply during shut down of the supply system. The Insurance Services Office requires that a system have a capability to supply peak day demand plus fire flow at a residual pressure of 20 psi. Emergency storage is equal to the projected peak day demand, calculated to be 938,450 gallons for the year 2040.

**Fire storage** is that required for fire flow based on ISO regulations. Banner calculated fire flow requirements using the 1980 Fire Suppression rating schedule. Fire flows increase incrementally over time, with 1500 gallons per minute for two hours required through 1999, 2500 gpm for three hours from 2000 to 2019, and 3000 gpm for three hours from 2020 through
Thus fire storage for 2030 would be 3,000 gallons per minute for three hours, 3,000 x 180 = 540,000 gallons.

The following table presents the projected combined water demands for Edgerton and Midwest for the planning period.

**TABLE 5**
Projected Treated Water Storage Requirements, In Gallons, For Edgerton and Midwest Combined

<table>
<thead>
<tr>
<th>Year</th>
<th>Operational Storage</th>
<th>Emergency Storage</th>
<th>Fire Storage</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>140,520</td>
<td>562,080</td>
<td>180,000</td>
<td>882,600</td>
</tr>
<tr>
<td>1995</td>
<td>139,993</td>
<td>523,975</td>
<td>180,000</td>
<td>834,968</td>
</tr>
<tr>
<td>2000</td>
<td>132,816</td>
<td>531,266</td>
<td>180,000</td>
<td>844,072</td>
</tr>
<tr>
<td>2005</td>
<td>143,541</td>
<td>582,164</td>
<td>180,000</td>
<td>907,705</td>
</tr>
<tr>
<td>2010</td>
<td>158,265</td>
<td>633,062</td>
<td>300,000</td>
<td>1,091,327</td>
</tr>
<tr>
<td>2015</td>
<td>170,990</td>
<td>683,960</td>
<td>300,000</td>
<td>1,154,950</td>
</tr>
<tr>
<td>2020</td>
<td>183,714</td>
<td>734,858</td>
<td>300,000</td>
<td>1,218,572</td>
</tr>
<tr>
<td>2025</td>
<td>196,439</td>
<td>785,756</td>
<td>300,000</td>
<td>1,282,195</td>
</tr>
<tr>
<td>2030</td>
<td>209,163</td>
<td>836,654</td>
<td>540,000</td>
<td>1,585,817</td>
</tr>
<tr>
<td>2035</td>
<td>221,888</td>
<td>887,552</td>
<td>540,000</td>
<td>1,649,440</td>
</tr>
<tr>
<td>2040</td>
<td>234,612</td>
<td>938,450</td>
<td>540,000</td>
<td>1,713,060</td>
</tr>
</tbody>
</table>

- Service to Edgerton-Midwest and the Intervening Areas Along the Midwest Pipeline Route -

After review of the growth potential of the intervening area along the Midwest pipeline route, it was determined that the basic growth potential is minimal. There are three taps on the existing line, two for ranch houses and one for AMOCO Production near Casper. The land along the pipeline route is rangeland, not suited for development, and has marginal access for development. The potential for new individual taps on the line is minimal, particularly if the price of water is significant, as agricultural uses cannot support domestic rates.

The major development potential exists in three locations, Bar Nunn, Homa Hills, and Antelope Hills. Bar Nunn is served water, however, by the Wardwell Water and Sewer District, which is a partner in the Mills-Wardwell Joint Powers Water Board, which jointly provides water to Mills and Wardwell from its treatment plant along the North Platte River in Mills. Water supply capacities of the Mills-Wardwell were designed for a population much greater than is currently being served, as both Mills and Wardwell, including Bar Nunn, have lost significant population. The operating capacity of the treatment plant may be a factor in the amount of water which can be provided, but the design capacity is adequate for many years of projected growth. Mills-Wardwell provides water at a rate of $.70 per 1000 gallons, and the rate seems to be fairly stable. With water being provided at this very competitive rate, and tap fees being comparable to
others in the area, it is not reasonable to expect any economic benefits to Bar Nunn or the Wardwell District in acquiring water from Midwest. There may be benefits in an emergency cross connect between the two systems, but the cross connection would most likely be made much closer to the North Platte River than at Bar Nunn.

Hama Hills is a 126 lot development of ten acre sites, single family with commercial mixed land use. There are currently eighty or less dwelling units in the area. Antelope Hills is a 297 lot development with lots ranging from four to forty acres in size. Currently about fifty of the lots are developed, with somewhat fewer being occupied.

The Natrona County Planner has provided a letter stating the potential for development in this area is minimal stating that the Natrona County Land Use Plan indicates ultimate land use along the Midwest pipeline route is to be agricultural, the existing developments in the area are marginal, and that there have been discussions with some major landowners concerning vacating portions of the subdivisions.

- Water Demand Projections -

Water demand potential will be projected utilizing the same methodology as for Edgerton and Midwest, with Antelope Hills and Hama Hills as the primary areas of development, and a small population being added to these two to account for any individual services that may tap. It is important to note that projecting population based on existing platted lots is tentative, as many of the existing lots could be resubdivided into lots as small as five acres by mere submission of a replat to the County. This is highly unlikely, but the potential is there to more than double the zoning capacity of these two developments quickly. This potential is much more likely than the instance were the County would approve new subdivisions along the pipeline route. The existing subdivisions are "grandfathered", they were built before the Land Use Plan restricted development in the area to agricultural uses.

Total development of Hama Hills, 126 lots, at a 1980 U.S. Census density of 2.5 persons per dwelling and zoning allowing one dwelling per lot, is 325. Total development of the 297 lots in Antelope Hills would generate a population of 754. To this total of 1079 will be added 21 persons, to account for miscellaneous taps that may occur and rounding the projection off at 1100 for ease of calculation. The total projected population along the pipeline route will be 1,100 by the year 2040.

Using the conservative water use rate of 200 gallons per capita per day, as used for Midwest, the total water demand per year was calculated:

1100 population x 365 days x 200 gallons = 80,300,000 gallons per year or 246.448 acre feet per year.

Peak demand was calculated again using the conservative number of 550 gallons per capita per day as for Midwest:

1100 population x 550 gpcpd = 605,000 gallons per day
Treated Water Storage Requirements

Operational storage required is 25% of the peak day demand:

\[ 0.25 \times 605,000 \text{ gallons peak demand} = 151,250 \text{ gallons} \]

Emergency storage required equals the peak day demand or 605,000 gallons.

Fire storage required is 3,000 gallons per minute for three hours as projected for the year 2040 (less for earlier years).

\[ 160 \text{ minutes} \times 3,000 \text{ gallons} = 540,000 \text{ gallons} \]

<table>
<thead>
<tr>
<th>Operational</th>
<th>Emergency</th>
<th>Fire</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>151,250</td>
<td>605,000</td>
<td>540,000</td>
<td>1,296,250</td>
</tr>
</tbody>
</table>

As the two subject areas are located ten miles apart, storage for each would be a necessity, and a cost to each separately as part of any distribution system. With 68% of the population Antelope Hills would be required to provide 68% of 1,296,250 gallons or 881,450 gallons of storage. Homa Hills would be required to provide 32% or 414,800 gallons of storage.

- Summary -

The peak day water demand for the intervening area would be nearly equal to that of Edgerton-Midwest for the year 2040. If development occurs as in this scenario, the total water required would be 2.39 cfs, with Edgerton and Midwest requiring 58% or 1.45 cfs and the intervening area requiring 42% or .9361 cfs.

The cost to the system of serving the intervening area would be in pipeline sizing and in treatment capacity up front, with a recapture in the future sale of water, while the local entities of Antelope and Homa Hills would be required to provide their own distribution systems and storage.

- Recommendation of Service Area -

The best, most efficient project overall is to delineate a service area including only Edgerton and Midwest, excluding intervening areas along the pipeline. This recommendation is based on the following reasoning:

*The potential for any further development along the Midwest waterline out side of the Casper Growth Area is minimal.

*The location of the land is marginal, and access is poor.

*There are over two thousand platted but unbuilt urban lots annexed to Casper. These would handle all foreseeable growth in the urban area over many years.
*There are over one thousand platted but unbuilt rural lots (large lots, private water and sewer systems) located closer to Casper than the lots along the Midwest pipeline, which would handle foreseeable rural growth.

*Any local acquisition of public water would require creation of an assessment district (Improvement and Services District) to finance any distribution system. There are no owners' associations in either subdivision, no organization to maintain even the roads. Forming such a district is pretty much out of the question as land values will not support the cost of assessment for public water systems.

*The individual lot cost for a distribution system for a five acre lot, with a 400 foot frontage would be half of $6,000 for an eight inch water line, or $3,000. In this instance, $3,000 is more than the value of many of the lots. Also, a supply line from the Midwest line to Homa Hills would traverse almost one and a half mile of land not within the subdivision.
Task 4 - Identification and Evaluation of Treatment Options

Treatment for Turbidity Removal

Several treatment options for the Edgerton-Midwest water supply were investigated. Certain options were determined to be either unfeasible, or unavailable within the time constraints of the current project schedule. These rejected options included the elimination of filtration facilities; treatment of the water at the Casper Board of Public Utilities (BPU) facility; and the provision of the entire water supply by a regional water utility. Options for treatment facilities constructed to serve only the Edgerton-Midwest pipeline are discussed in a separate section.

Elimination of Filtration

The use of water from wells along the North Platte River, without filtration, was determined unfeasible. EPA's proposed Surface Water Treatment Regulations (SWTR), which are expected to be adopted with little modification, require filtration to remove turbidity for virtually all public water supplies which use surface water. Even though the existing Midwest water supply is pumped from a well, it is considered a surface water source, and does not meet the stringent conditions which have been proposed in order for the filtration requirement to be exempted. The proposed SWTR defines "surface water" to include water withdrawn from wells which are influenced by nearby surface waters. Data on raw water from the existing well and pipeline, although very limited, indicate that alluvial water along the North Platte at Casper is indeed strongly influenced by the river. Information from BPU personnel confirmed that, although the BPU currently uses alluvial well water without filtration, the water levels and water quality in the wells are influenced by river conditions. For this reason it was determined that water filtration will be a required part of the Edgerton-Midwest water supply.

- Treatment by the Casper BPU -

As stated in a previous report (Banner, 1987), the BPU may sell only surplus water to users outside Casper, and BPU management does not believe they currently have surplus water for sale to Edgerton-Midwest. However, the BPU was contacted concerning the availability of treatment services. Discussions were principally based on the premise that water would be withdrawn from the river and treated at the existing BPU facilities, but the water rights would be held by Edgerton-Midwest. Water would be delivered to the Edgerton-Midwest pump station from an appropriate point in the Casper water distribution system.
Discussions with BPU personnel concerning the provision of treatment services by that organization revealed no major objections to the concept. However, BPU did point out several hurdles that would have to be overcome. Foremost among these was the growing filtration capacity required by the City of Casper. On three separate occasions during June 1988 BPU supplied a total water demand of 35 million gallons per day (MGD). Total supply capacity of the system is about 38 MGD, and there is some question whether Casper would authorize the use of BPU facilities for treatment of water for non-Casper users. Taking into account the time required for passage of an authorizing ordinance by the Casper City Council, provision of additional filtration capacity would probably take more time than available prior to completion of a new Edgerton-Midwest water supply pipeline.

Additional issues pointed out in the discussions were the need to negotiate an equitable and appropriate fee schedule for treatment services, and the possible need for improvements to the BPU distribution system to accommodate delivery to the Edgerton-Midwest pump station. For all of these reasons, the BPU was determined to be an unfeasible supplier of treatment for an immediate Edgerton-Midwest water project.

- Regional Water Supply -

There is presently a separate, WWDC-funded project to explore the concept of an independent regional water agency to provide treated water to a large number of the municipalities, districts and other organizations now engaged in such activities in the Casper area. Little is known about the organization of such an agency at this time, and it has been estimated that it will be at least five years before it could be established. It is therefore not possible for a regional facility to provide either a total water supply or treatment services to Edgerton-Midwest within the next year or two.

Options for Dedicated Treatment for Edgerton-Midwest

As described in the previous section, no viable options for treatment of water for the Edgerton-Midwest water system exist for the short term, other than treatment by the entities themselves. Therefore, the towns must include new treatment capability for the water which will be delivered by the new pipeline. Three conceptual filtration options were considered for the system. Names given to these conceptual filtration options were Existing Treatment, Conventional Treatment, and Slow Sand Filtration. Additional conceptual options to be considered in system design were:

1) the use of a treatment facility at the North Platte River rather than the northern end of the pipeline; and

2) inclusion of sufficient additional treatment capacity to allow delivery of water to potential users along the pipeline route to Edgerton-Midwest.
The specific details, advantages and disadvantage of all of these options are discussed below.

- Existing Treatment -

Background

The Town of Midwest currently provides filtration for the water which it receives from the existing pipeline. The filters are of the pressure type, i.e., the raw water is piped to the filters at a pressure above atmospheric, and water from the bottom of the filters is sent to the distribution pipelines without additional pumping.

There are three skid-mounted, vertical, parallel pressure filters, each of which is five feet in diameter. The filters are of the dual media type, containing a layer of sized anthracite particles above a layer of finer sand particles. Maximum capacity of the existing filters is estimated to be 295 gallons per minute (gpm), based on a filtration rate of 5 gpm per square foot of filter area. The filters are backwashed on a scheduled basis, using filtered water from the Midwest water distribution system. Backwash is routed to the Midwest sewer system, and is not recycled. Historical maximum filtration rates have been only about 180 gpm, due to the limited supply available from the existing pipeline. The plant treats water to the current standard of 1 Turbidity Unit (TU) consistently and without difficulty. Turbidity of the raw water from the pipeline ranges as high as 10 TU, depending on the time of year.

The existing Midwest filters will not provide the capacity required by the combined Edgerton-Midwest populations when increased flow becomes available from a new pipeline. The filters also would not meet the proposed SWTR in important ways. The EPA guidance accompanying the proposed regulations makes it clear that two additional features would be considered essential for the existing filtration system to comply with the requirements for rapid rate filters. These two features are surface wash and chemical addition.

Surface wash describes the use of high pressure water sprays to wash the top of the filter surface at the beginning of the backwash cycle. This washing action helps agitate the surface, where most of the filtered contaminants are located, improving the efficiency of the backwash action. Surface wash also helps prevent the formation of "mudballs", agglomerations of contaminants which, if not broken up, can grow and eventually interfere with safe filter operation.

Chemicals ordinarily added for water filtration are inorganic metal salts (e.g. alum) to flocculate small contaminant particles into larger ones; pH additives (e.g. soda ash) to correct the pH; and organic polyelectrolytes, to assist flocculation. EPA states that chemical addition is particularly needed for direct rapid rate filters (i.e. the type used at Midwest) where the influent turbidity is relatively low, as it is at Midwest.
Treatment Concept

The existing filters would be retained, and additional filters would be added. All filters would be provided with surface wash, and all other proposed SWTR standards would be met. A chemical addition system would be installed, complete with storage area, chemical makeup tanks and mixers, chemical proportioning pumps, and an in-line chemical mixer. A moderate degree of plant automation would also be installed.

Advantages

Existing Treatment should have the lowest initial construction cost of any viable filtration option. If future treatment is located at the Edgerton-Midwest end of the pipeline, Existing Treatment is the only option which does not require the construction of a clearwell and pumps to bring treated water up to delivery pressure. This filtration method has provided Midwest with satisfactory water quality for several years. The Midwest facility operators are familiar with this form of treatment. If treatment by the BPU or a regional system becomes desirable in the future, this option involves the least amount of equipment which would be taken out of service at that time. Due to the relatively small size of the filters, addition of new filters could be performed in phases.

Disadvantages

There is a practical limit on the number of additional pressure filters which can be added to a system, due to the complexities which arise in controlling the flow rate to each filter.

Installation of new pressure filters on public water supplies is presently prohibited by a section of the Wyoming Water Quality Regulations (WDEQ, 1985). However, another section of the same regulation allows the use of "processes not in compliance with these regulations...provided that the facility, when constructed, can operate meeting the purpose of these regulations".

There are three factors which favor state approval of use of pressure filters for the Edgerton-Midwest water system. First, the system has operated well for several years with this type of system. Second, the raw water quality is relatively good. Finally, EPA has proposed to allow the use of pressure filters in the proposed SWTR.

The future use of pressure filters has been discussed with personnel at the Wyoming Water Quality Division (WQD). While the agency has no regulatory authority to approve treatment schemes until actual construction plans and specifications have been prepared, it is probable that a pressure filter design acceptable to the WQD can be prepared.
- Conventional Treatment -

Background

Conventional treatment is the term used to describe treatment incorporating rapid gravity (as opposed to pressure) filtration, preceded by chemical addition, flocculation, and clarification. These processes are those provided at most major municipal water treatment facilities, and this type of treatment has the capability to treat water of virtually any raw turbidity to the best quality which can be attained using standard treatment technology.

Treatment Concept

A skid-mounted pre-packaged treatment facility would be trucked to the treatment location and installed. A concrete clearwell would be constructed with pumps for backwash and high pressure delivery to the water system. If the plant is located at the North Platte River, the delivery pumps would discharge directly to the new pipeline. If the new plant is located at Edgerton-Midwest, separate service pumps would be required.

Advantages

Conventional Treatment provides the best possible water quality, if properly operated.

Disadvantages

This is the most expensive option to construct, by a significant margin. There would be significant additional pumping expenses if this option is located at Edgerton-Midwest.

- Slow Sand Filtration -

Background

This system employs filters with a much slower rate of filtration than the filters described in the Existing and Conventional options. Whereas those systems have filtration rates of about 5 gpm per square foot, slow sand filtration operates at about 0.1 gpm per square foot. This necessarily requires much larger filters. Slow sand filters use finer sand than rapid sand filters, and rely on biological organisms as well as physical filter to remove contaminants from the water.
Treatment Concept

The filters would be large open concrete basins filled with sand, and equipped with underdrain systems. The Slow Sand filters would not be equipped with chemical addition or a backwash system. The top of the filter sand would be scraped off as necessary to maintain filter efficiency and capacity. Filter sand would be replaced after one-half of the original sand depth had been scraped off.

A concrete clearwell (smaller than that required for Conventional Treatment) would be constructed with pumps for high pressure delivery to the system. If the plant is located at the North Platte, the delivery pumps would discharge directly to the new pipeline. If the new plant is located at Edgerton-Midwest, separate service pumps would be required.

Advantages

Slow Sand Filtration would probably have the lowest operational manpower requirement of any filtration option. The WQD regulations provide allowable design standards for this option.

Disadvantages

Initial construction costs would be somewhat higher than those of the Existing Treatment option. There would be significant additional pumping expenses if this option is located at Edgerton-Midwest. Operational manpower requirements would be heavily concentrated at those times when filter sand requires scraping and/or replacement.

- Plant Location and Service Area Options -

Three options for plant location were originally considered:

- the southern end of the pipeline, near the North Platte River;
- the northern end of the pipeline, in the Edgerton-Midwest area; and
- near the existing Midwest raw water storage tanks, on a hill about 6 miles south of the towns.

Consideration of the intermediate treatment location at the raw water storage tanks was abandoned due to the certainty of access problems during the winter months and the lack of any clear advantage to the site.

Location of treatment at the existing Midwest treatment plant location was considered, but the use of a different location at Edgerton-Midwest was also considered. A new location was considered because there is a fundamental problem, concerning the disinfection (chlorination) system, with the existing Midwest treatment system.
The proposed SWTR (and good sanitary engineering practice) require chemical disinfection (ordinarily chlorination) capable of removing pathogenic microorganisms and viruses following filtration of surface water. Disinfection efficiency is dependent on the contact time of the chlorine in the water, after chlorination and before the water is used. Standard required contact time for surface water is 2 hours, although the proposed SWTR has a sliding scale based on chlorine concentration, temperature, and water pH.

The Midwest treatment system currently provides virtually no contact time following chlorination. Water leaving the existing filter system is chlorinated and flows directly into the town's water distribution system. The first household using water from the system is less than 100 yards away.

The only practical location to provide contact time for the Edgerton-Midwest water system is at the treated water storage tank used by the towns, if treatment is provided at Edgerton-Midwest. Use of the tank, however, would require the treated water to be delivered to the tank directly from the treatment facility. If the existing Midwest treatment location is used, a new pipeline, without any service taps, will have to be constructed from that location to the finished water storage tank. A new treatment location, between Edgerton and Midwest near the junction of highways 387 and 259, would greatly shorten the length of new treated water pipeline needed. For this reason, and for other reasons related to the construction of the pipeline, a new treatment location was considered to be as valid as the existing Midwest treatment location.

Another option considered was provision of water treatment capacity for potential future users along the pipeline route between the North Platte and Edgerton-Midwest. It was recognized that such users could be served either by a treatment plant located at the North Platte, or by independent facilities owned and operated by the users along the pipeline. Further discussion of potential future users is in the Identification of Service Area section.
Task 5 - Economic Analysis

This section is divided into three components: an analysis of the ability-to-pay of the affected communities; a review of viable financing options; and a description of the costs and benefits of the project to Edgerton, Midwest and the State of Wyoming.

- Ability-to-Pay -

"Ability-to-Pay" is a broad concept, often having different meanings. In this report, we use ability-to-pay to refer to the financial burden that can reasonably be assumed by local communities to pay for their water system. The intent of this ability-to-pay analysis is to analyze the costs of a new water supply system for Edgerton and Midwest and assess its implications for local water rates. In the System Costs Section, we estimate the costs of the proposed new system for Edgerton and Midwest, assuming two financing options each for the pipeline system and for the treatment plant. In the Comparison of Monthly Water Costs per Household Section, we provide a summary of estimated monthly household water costs for Edgerton and Midwest and for 21 other Wyoming communities with populations between 300 and 1,000 people.

System Costs

The costs of the final configuration proposed for the Edgerton/Midwest Water Supply Project are depicted in Table 6. The total capital cost of the pipeline system is estimated to be $9,519,606. The estimated capital cost for the treatment plant is $402,570. An estimate of the total annual cost for the pipeline system and the treatment system for the years 1990 and 2040, assuming that capital costs are amortized over 50 years at 7.9 percent interest, is provided in Table 6.

As Table 6 shows, the total annual cost in 1990 for the pipeline system would be $813,096 and $67,530 for the treatment plant. These costs sum to a total annual cost of $880,626 per year for the initial delivery requirement of 773 million gallons annually.

Estimates of the cost of the water system operating at full capacity by the year 2040 are contained in the far right column of Table 6. The total annual cost for the pipeline system by 2040 would be $829,773 and total annual cost for the treatment plant would be $67,530 for a total annual cost of $897,303.

1 The 7.9 percent interest rate represents the opportunity cost of WWDC funds invested by the Wyoming State Treasurer as of August, 1988.
<table>
<thead>
<tr>
<th>Item</th>
<th>Initial Operation (1990)</th>
<th>Full Capacity Operation (2040)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pipeline System</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annualized Capital Costs</td>
<td>$769,227(1)</td>
<td>$769,227(1)</td>
</tr>
<tr>
<td>Annual Pumping Costs</td>
<td>24,600</td>
<td>38,668</td>
</tr>
<tr>
<td>Annual Water Purchases</td>
<td>4,269</td>
<td>6,878</td>
</tr>
<tr>
<td>Annual O &amp; M Costs</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td>Annual Costs</td>
<td>$813,096</td>
<td>$829,773</td>
</tr>
<tr>
<td><strong>Treatment Plant</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annualized Capital Costs</td>
<td>$32,530(2)</td>
<td>$32,530</td>
</tr>
<tr>
<td>Annual O &amp; M Costs</td>
<td>35,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Annual Costs</td>
<td>$67,530</td>
<td>$67,530</td>
</tr>
<tr>
<td><strong>Total Annual Costs</strong></td>
<td>$880,626</td>
<td>$897,303</td>
</tr>
<tr>
<td>Annual Water Delivered (1,000 gallons)</td>
<td>77,287</td>
<td>124,500</td>
</tr>
<tr>
<td>Cost Per 1,000 Gallons</td>
<td>$11.39</td>
<td>$7.21</td>
</tr>
</tbody>
</table>

(1) Represents capital costs of $9,519,606 amortized over 50 years at 7.9 percent interest.

(2) Represents capital costs of $402,570 amortized over 50 years at 7.9 percent interest.
As shown in the table, the annual number of gallons of water delivered under initial operating conditions, 1990, would be about 77.3 million gallons of water and 124.5 million gallons by 2040. The cost per 1,000 gallons of water would be $11.39 in 1990 and $7.21 per 1,000 gallons of water in 2040 (costs are in 1988 dollars).

Two options are evaluated for financing both the pipeline system and the treatment system. The two options for the pipeline are: 1) a 67 percent WWDC grant and a 33 percent WWDC loan to be repaid over 50 years at 4 percent interest; and 2) a 75 percent WWDC grant and a 25 percent WWDC loan also to be repaid over 50 years at 4 percent.

Financing for the treatment plant was considered separately because the WWDC does not finance such facilities. The two options considered for the water treatment plant are: 1) a 100 percent legislative loan at 4 percent for 50 years; and 2) a 50 percent Farm Loan Board (FLB) grant and a 50 percent FLB loan at 8.5 percent for 30 years. By coincidence, the annual loan repayment amount for each of these two options is $18,740 for the first option and $18,730 for the second option. Therefore, to simplify this analysis and decision process, we have assumed that the annual loan repayment cost for the treatment plant will be $18,740 per year for both options.

The annual costs associated with the first option for financing the pipeline, i.e., a 67 percent WWDC grant with a 33 percent WWDC loan are summarized in Table 7. As the table indicates, the annual cost for the pipeline system would be $190,105, the annual cost for the treatment plant would be $53,740 for a total annual cost of $243,845 starting in 1990. The local cost per 1,000 gallons would be $3.16 with the state subsidy being $8.23 per 1,000 gallons. At full capacity operation by the year 2040, the total annual cost for the pipeline system would be $206,782 and the total cost for the treatment plant would be $53,740 for a total annual cost of $260,522. The local cost per 1,000 gallons would be $2.09 with the state subsidy under this option being $5.12 for 1,000 gallons.

The costs for the second option, i.e., a 75 percent WWDC grant with a 25 percent WWDC loan to be repaid over 50 years at 4 percent, are summarized in Table 8. The annual cost for the pipeline system in 1990 would be $154,654 and the cost for the treatment plant would be $53,740 for a total annual cost of $208,394. Under this financing option, the local cost per 1,000 gallons of water would be $2.70 leaving a state subsidy of $8.23 per 1,000 gallons. By the year 2040, the annual cost for the pipeline system would be $171,331 and a treatment plant cost of $53,740 for a total annual cost of $225,071. Under this option the local cost per 1,000 gallons would be $1.81 with the state subsidy being $5.40.
Table 7

Local Costs of Edgerton-Midwest Pipeline System and Treatment System Assuming a 67 Percent WWDC Grant, 33 Percent WWDC Loan (50 Years @ 4 Percent), for the Pipeline System (1988 Dollars)

<table>
<thead>
<tr>
<th>Item</th>
<th>Initial Operation (1990)</th>
<th>Full Capacity Operation (2040)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pipeline System</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Loan Payment</td>
<td>$146,236(^{(1)})</td>
<td>$146,236(^{(1)})</td>
</tr>
<tr>
<td>Annual Pumping Costs</td>
<td>24,600</td>
<td>38,668</td>
</tr>
<tr>
<td>Annual Water Purchases</td>
<td>4,269</td>
<td>6,878</td>
</tr>
<tr>
<td>Annual O &amp; M Costs</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td>Annual Costs</td>
<td>$190,105</td>
<td>$206,782</td>
</tr>
<tr>
<td><strong>Treatment Plant</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Loan Payment</td>
<td>$18,740</td>
<td>$18,740</td>
</tr>
<tr>
<td>Annual O &amp; M Costs</td>
<td>35,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Annual Costs</td>
<td>$53,740</td>
<td>$53,740</td>
</tr>
<tr>
<td><strong>Total Annual Costs</strong></td>
<td>$243,845</td>
<td>$260,522</td>
</tr>
<tr>
<td>Annual Water Delivered (1,000 gallons)</td>
<td>77,287</td>
<td>124,500</td>
</tr>
<tr>
<td>Local Cost Per 1,000 Gallons</td>
<td>$3.16</td>
<td>$2.09</td>
</tr>
<tr>
<td>State Subsidy Per 1,000 Gallons</td>
<td>$8.23</td>
<td>$5.12</td>
</tr>
</tbody>
</table>

\(^{(1)}\) Represents capital costs of $3,141,470 amortized over 50 years at 4 percent interest.
Table 8

Local Costs of Edgerton-Midwest Pipeline System
75 Percent WWDC Grant, 25 Percent WWDC Loan
(50 Years @ 4 Percent, for the Pipeline System)
(1988 Dollars)

<table>
<thead>
<tr>
<th>Item</th>
<th>Initial Operation (1990)</th>
<th>Full Capacity Operation (2040)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pipeline System</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Loan Payment</td>
<td>$110,785(^{(1)})</td>
<td>$110,785(^{(1)})</td>
</tr>
<tr>
<td>Annual Pumping Costs</td>
<td>24,600</td>
<td>38,668</td>
</tr>
<tr>
<td>Annual Water Purchases</td>
<td>4,269</td>
<td>6,878</td>
</tr>
<tr>
<td>Annual O &amp; M Costs</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td>Annual Costs</td>
<td>$154,654</td>
<td>$171,331</td>
</tr>
<tr>
<td><strong>Treatment Plant</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Loan Payment</td>
<td>$ 18,740</td>
<td>$ 18,740</td>
</tr>
<tr>
<td>Annual O &amp; M Costs</td>
<td>35,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Annual Costs</td>
<td>$ 53,740</td>
<td>$ 53,740</td>
</tr>
<tr>
<td><strong>Total Annual Costs</strong></td>
<td>$208,394</td>
<td>$225,071</td>
</tr>
<tr>
<td>Annual Water Delivered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1,000 gallons)</td>
<td>77,287</td>
<td>124,500</td>
</tr>
<tr>
<td><strong>Local Cost Per 1,000 Gallons</strong></td>
<td>$ 2.70</td>
<td>$ 1.81</td>
</tr>
<tr>
<td><strong>State Subsidy Per 1,000 Gallons</strong></td>
<td>$ 8.69</td>
<td>$ 5.40</td>
</tr>
</tbody>
</table>

\(^{(1)}\) Represents capital costs of $2,379,902 amortized over 50 years at 4 percent interest.
Comparisons of average monthly household water costs between Edgerton/Midwest and 20 other similar communities ranging in population size from 300 to 1,000 people are provided in Table 9. In some of these towns the "local burden" assumed for their water systems are captured in their water rates, i.e., revenue from water fees are the total source for repayment of all local debt incurred for the water system and for operation and maintenance costs. In other communities the water utility is also supported by general fund revenues. Communities using general fund monies in addition to water user rates are indicated in the last column of Table 9.

As shown in Table 9, the water rates in Edgerton and Midwest before the new system are equal to or greater than the rates in all but five of the other 21 communities. Table 9 is based on the assumption that average household consumption is 15,000 gallons/month. In many towns average monthly household consumption is lower than this—the 15,000 gallon assumption was made so a standardized comparison of the cost of water between towns could be made.

To estimate the amount of revenues Edgerton/Midwest would have to pay towards retirement of the debts on the pipeline and the treatment system, the net difference in operating expenses between the old water system and the proposed new water system was calculated. The results are depicted in Table 10. Both Edgerton and Midwest are currently allocating all of their water user fees as well as additional monies from their general fund to maintenance of their present water systems. Thus, the comparison of net differences in cost of the two water systems provides an estimate of any revenue surplus or deficit which would result from the new system and which could be applied toward retirement of capital debt.

As shown in Table 10, the costs for operation and maintenance of the major components of the old system exceed the projected cost of operation and maintenance of the new system by $9,300 annually. The table shows that at current water user rates and general fund appropriation levels, Edgerton/Midwest will have $9,300 in annual surplus revenue to contribute to retirement of the capital debt of the new system.

To evaluate the effects of raising water user rates to retire the capital debt, we estimated the net revenue that would be available by increasing present user rates from 10 percent up to 50 percent. To calculate the effect of a percentage increase in water user rates, present revenue was calculated as the actual amount received by the two towns during the past calendar year which was $84,000. The current number of users in both towns is approximately 350, so the average monthly user fee in 1987 was $20/month.

To estimate the effects of different percentage rate increases, total annual revenue ($84,000) was multiplied by the percentage increase and the beginning surplus of $9,331 was added, yielding the net values shown in Table 11. As the table shows, a rate increase of 10 percent would leave a
Table 9

Residential Water Rates and Estimated Monthly Water Bills - Selected Wyoming Towns
With Populations from 300 to 1,000

<table>
<thead>
<tr>
<th>Town</th>
<th>Rate Per 1,000 Gallons(^{(1)})</th>
<th>Estimated Monthly Household Water Costs(^{(1)})</th>
<th>General Fund Subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edgerton</td>
<td>$1.35</td>
<td>$20.25(^{(2)})</td>
<td>Yes</td>
</tr>
<tr>
<td>Midwest</td>
<td>1.40</td>
<td>19.17</td>
<td>Yes</td>
</tr>
<tr>
<td>Baggs</td>
<td>0.93</td>
<td>14.00</td>
<td>Yes</td>
</tr>
<tr>
<td>Big Piney</td>
<td>1.11</td>
<td>16.60</td>
<td>No</td>
</tr>
<tr>
<td>Byron</td>
<td>0.93</td>
<td>14.00</td>
<td>No</td>
</tr>
<tr>
<td>Dayton</td>
<td>1.06</td>
<td>15.90</td>
<td>No</td>
</tr>
<tr>
<td>East Thermopolis</td>
<td>1.62</td>
<td>24.25</td>
<td>Yes</td>
</tr>
<tr>
<td>Elk Mountain</td>
<td>0.85</td>
<td>12.75</td>
<td>No</td>
</tr>
<tr>
<td>Encampment</td>
<td>0.67</td>
<td>10.00</td>
<td>No</td>
</tr>
<tr>
<td>Glendo</td>
<td>1.52</td>
<td>22.80</td>
<td>No</td>
</tr>
<tr>
<td>Labarge</td>
<td>0.79</td>
<td>11.78</td>
<td>No</td>
</tr>
<tr>
<td>Lingle</td>
<td>0.50</td>
<td>7.50</td>
<td>Yes</td>
</tr>
<tr>
<td>Marbleton</td>
<td>1.18</td>
<td>17.65</td>
<td>Yes</td>
</tr>
<tr>
<td>Medicine Bow</td>
<td>0.87</td>
<td>13.00</td>
<td>No</td>
</tr>
<tr>
<td>Meeteetse</td>
<td>1.48</td>
<td>22.20</td>
<td>Yes</td>
</tr>
<tr>
<td>Ranchester</td>
<td>1.30</td>
<td>19.55</td>
<td>No</td>
</tr>
<tr>
<td>Rock River</td>
<td>0.43</td>
<td>6.50</td>
<td>Yes</td>
</tr>
<tr>
<td>Rolling Hills</td>
<td>1.60</td>
<td>24.00</td>
<td>Yes</td>
</tr>
<tr>
<td>Shoshoni</td>
<td>0.87</td>
<td>13.00</td>
<td>No</td>
</tr>
<tr>
<td>Sinclair</td>
<td>1.67</td>
<td>25.00</td>
<td>No(^{(2)})</td>
</tr>
<tr>
<td>Superior</td>
<td>1.00</td>
<td>15.00</td>
<td>Yes</td>
</tr>
<tr>
<td>Wamsutter</td>
<td>0.90</td>
<td>13.50</td>
<td>No</td>
</tr>
</tbody>
</table>

\(^{(1)}\) Based upon current water utility rates as reported by the Wyoming Association of Municipalities. Computations assume average household consumption of 15,000 gallons monthly. Different consumption rates would result in somewhat different cost estimates.

\(^{(2)}\) New rates passed in 1988 were used for the Edgerton estimate.
### Table 10

**Net Change in Operating Expenses Between Old Water System and New Water System, Midwest and Edgerton**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost of Old System</th>
<th>Cost of New System (1990)</th>
<th>Net Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Pumping Costs</td>
<td>$28,200(1)</td>
<td>$24,600</td>
<td>$3,600</td>
</tr>
<tr>
<td>Water Treatment, O &amp; M</td>
<td>NA(2)</td>
<td>35,000</td>
<td>&lt;35,000&gt;</td>
</tr>
<tr>
<td>Pipeline Operation and Maintenance; Water Treatment and Maintenance</td>
<td>60,000(3)</td>
<td>15,000</td>
<td>45,000</td>
</tr>
<tr>
<td>Water Purchase</td>
<td>-0-</td>
<td>4,300</td>
<td>&lt;4,300&gt;</td>
</tr>
<tr>
<td><strong>Subtotals</strong></td>
<td><strong>$88,200</strong></td>
<td><strong>$78,900</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Net Surplus (Deficit)</strong></td>
<td></td>
<td></td>
<td><strong>$9,300</strong></td>
</tr>
</tbody>
</table>

(1) Average annual pumping costs were estimated at $18,500 for Midwest and $9,700 for Edgerton.

(2) Current water treatment O & M costs are included in the $60,000 figure for pipeline operation and maintenance.

(3) O & M costs for Midwest were estimated at $55,000 per year, and Edgerton, $5,000 per year.
net surplus of $17,700. A rate increase of 20 percent would provide a surplus of $26,100, an increase of 30 percent would yield $34,500, 40 percent $42,900, and 50 percent $51,300.

The fourth column in Table 11 shows the percentage of the pipeline and treatment plant capital costs which could be assumed locally with each of the rate increases, assuming capital costs were repaid over 50 years at 4 percent interest. As the table indicates, these percentages range from 3.8 percent for a 10 percent rate increase to 11.1 percent for a 50 percent rate increase. At a 20 percent rate increase, the average monthly household water charge for Edgerton and Midwest would be exceeded by only three other communities as shown in Table 9. At a 30 percent rate increase, the two communities would have the highest average monthly household water charge of any towns of similar population size in the state.

- Financing Options Available to Sponsors -

Financing options which theoretically could apply to the Edgerton/Midwest Water Supply Project are summarized in Appendix C. Unfortunately, many of these options are not feasible for this project given the present economic conditions at the state and federal levels, and the limited revenue generating ability of Edgerton and Midwest. The following options were identified as the most likely options for paying the local burden of the project.

Because of the small number of water users in Edgerton and Midwest and, therefore, the small amount which can be raised by increasing water rates, this analysis assumes a 75 percent WDCC grant and a 25 percent WDCC loan as the basis for calculating the local capital cost burden for the pipeline. An annual payment of $18,740 was assumed for retiring the capital cost of the treatment plant. The annual loan payment under this option which would need to be raised by Edgerton and Midwest would be $110,785 plus $18,740 or $129,525. Revenue sources which could be used to raise this amount are the following.

- Increase Local Water User Rates

As shown in Table 11, raising water rates by 20 percent would result in $26,100 being available to retire capital debt. This rate increase would provide only about 20 percent of the annual debt reduction payment of $129,525.

To pay the entire annual payment, the average monthly water user rate would have to be $49.62. This is calculated as the O & M costs, $78,900 (Table 10), plus the annual capital debt reduction of $129,525, divided by the number of users, 350 ($208,425/350/12 = $49.62).
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Annual Amount Available for Debt Reduction</th>
<th>Percentage of Capital Costs Assumed Locally</th>
<th>Monthly Household Water Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No Change in Water Rates</td>
<td>$9,300</td>
<td>2.0</td>
<td>$19.71</td>
</tr>
<tr>
<td>2</td>
<td>10 Percent Rate Increase</td>
<td>17,700</td>
<td>3.8</td>
<td>21.68</td>
</tr>
<tr>
<td>3</td>
<td>20 Percent Rate Increase</td>
<td>26,100</td>
<td>5.9</td>
<td>23.65</td>
</tr>
<tr>
<td>4</td>
<td>30 Percent Rate Increase</td>
<td>34,500</td>
<td>7.5</td>
<td>25.62</td>
</tr>
<tr>
<td>5</td>
<td>40 Percent Rate Increase</td>
<td>42,900</td>
<td>9.3</td>
<td>27.59</td>
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<tr>
<td>6</td>
<td>50 Percent Rate Increase</td>
<td>51,300</td>
<td>11.1</td>
<td>29.56</td>
</tr>
<tr>
<td>7</td>
<td>235 Percent Rate Increase</td>
<td>115,500</td>
<td>25</td>
<td>46.28</td>
</tr>
<tr>
<td>8</td>
<td>280 Percent Rate Increase</td>
<td>152,400</td>
<td>33</td>
<td>55.08</td>
</tr>
</tbody>
</table>

(1) Deficit from Table 10, this is difference between operating costs of old system and operating costs of new system.

(2) Percentage of pipeline costs ($9,519,606) and treatment plant costs ($402,570) that could be assumed locally assuming both are financed over 50 years at 4 percent interest.

(3) Assumes average household consumption rate of 15,000 gallons monthly. Current rates for both towns averaged to estimate monthly household cost.
Home Administration (FmHA) Rural Water and Waste Disposal
Grants and Loan Program

Grants are available to cities, districts and non-profit cooperatives with populations of 10,000 people or less, and are limited to 75 percent of project development costs. Assuming Edgerton/Midwest could get a grant for 75 percent of their 25 percent loan from WWDC, the two towns would then only have to finance $594,976 with the WWDC. Their annual debt reduction payment then would be only $27,696, which could be funded by raising water user rates by 22 percent. (More information is forthcoming on this program.)

Community Development Block Grant

Grants for water projects can be made from HUD's Community Development Block Grant (CDBG) program. In Wyoming, these grants are administered by the Economic Development and Stabilization Board (EDSB).

These funds have already been allocated for 1988. The next funding cycle will be in the spring or summer of 1989. The EDS Board is funding water projects again; but the board has set a limit of $250,000 per project. This program should have between $750,000 and $1,000,000 for water projects in 1989. The applicant must demonstrate that 51 percent of the project's beneficiaries fall into low or moderate income categories.

General Obligation Bonds

In 1979, Midwest issued General Obligation Bonds in the amount of $550,000 to pay for improvements to their water distribution system. They currently own $330,000 on these bonds. If this debt were retires as part of the project financing, then Midwest and Edgerton could issue new general obligation bonds to pay part of their loan cost. Edgerton and Midwest have a combined assessed value of $9,878,936.

Towns in Wyoming are unlimited in the amount of general obligation bonds they can issue to pay for water improvements. Thus, the two towns combined could issue general obligation bonds to pay the full annual payment of $129,525. This would require an annual mill levy of about 13 mills. For the average homeowner in the two towns, this would mean an additional monthly charge of about $3.25. This calculation assumes that the money could still be borrowed from the WWDC account over 50 years at 4 percent interest. A legal opinion may be needed to determine if bonds can be used in this manner.
One Percent Capital Facilities Sales and Use Tax

Theoretically, Edgerton/Midwest could access the One Percent Capital Facilities Sales and Use Tax (CFS&U Tax) to pay their loans. The two towns receive about $115,000 per year from their share of the CFS&U Tax. Thus, they could dedicate their share of the CFS&U Tax to amortizing the loans, but it would take 50 years to retire the loans. On the other hand, Natrona County receives about $6,500,000 from this tax. If Natrona County were to dedicate 20 percent of this tax to the Edgerton/Midwest water project, it would take less than two years to retire the loans ($6,500,000 x 20 percent = $1,300,000 per year).

Joint Powers Agreement

Towns in Wyoming cannot be part of a water district. But a water district formed in the county surrounding the two towns, but excluding them, could be formed. Then Edgerton and Midwest and the county water district could join together under a joint powers agreement to finance the project. Formation of the water district requires the approval of a majority of qualified electors in the district. Once formed, the district may borrow money, issue bonds and set the rates for services it provides, and it may levy an ad valorem tax of up to eight mills on the property within the district.

A water district may issue general obligation bonds up to 6 percent of its assessed valuation. The towns are unlimited in the amount of general obligation bonds they may issue for water improvements. Therefore, the three entities could join together under a joint powers agreement and utilize ad valorem taxes to pay for the project. At 8 mills, the assessed valuation covered by the joint powers agreement would need to be about $16,190,600.

Legislative Grant

The legislature could authorize a grant to Edgerton/Midwest to pay for all the costs of the project, except that share which the towns could pay through a reasonable increase in water user rates. With a 20 percent increase, Edgerton/Midwest could pay 5.9 percent of total project costs if their share were financed over 50 years at 4 percent interest. At a 30 percent water rate increase they could pay for 7.5 percent of the total project costs. At these levels of rate increases, water rates for the two towns would place them in the upper 5 percent for towns between 300 and 900 population size in the state.
- Benefit Cost Analysis -

Conceptually, the benefits attributable to new municipal water supplies are measured by the willingness-to-pay of local residents for that water. Two recent studies indicate that local willingness-to-pay for treated municipal water lies in the range of $400 to $500 per acre-foot. The Edgerton/Midwest pipeline system will deliver an average of 237.2 acre-feet of treated water to the two communities under initial operating conditions, and up to 382.1 acre-feet annually when the system is operating at full capacity. Assuming a $450 per acre-foot annual benefit for treated water yields annual benefit estimates for the pipeline system and treatment plant of $106,740 under initial operating conditions, and $171,945 if the system is operating at full capacity.

To compare these benefit estimates with system costs, annualized cost estimates were developed using an "inflation free" discount rate. Western Research Corporation estimates that the appropriate inflation free discount rate for a benefit-cost evaluation of the project is approximately 3.7 percent. Annual project cost estimates using a 3.7 percent discount rate are depicted in Table 12.

The results in Table 12 show that the annual economic costs of the water system will be approximately $517,000 under initial operating conditions, and approximately $534,000 when the system is operated at full capacity. Comparing these annual cost figures with project benefits yields benefit-cost ratios of 0.21 under initial operating conditions, and 0.32 if the system is operated at full capacity.

The data in Table 12 indicate that, because of the high costs of the Edgerton/Midwest pipeline system, the project cannot be justified solely on the basis of local user benefits. This conclusion is consistent with the financial analysis in Section 3.0, which indicates that residents of the two communities simply cannot afford to pay the full cost of the new system.

The relevant question, then, is whether there are additional benefits to the state as a whole in providing a reliable source of treated municipal water to the communities of Edgerton and Midwest. Although there undoubtedly are benefits to the state from preserving the existence of small rural communities through the provision of municipal water supplies, these benefits are difficult to quantify. For example, without a reliable municipal water supply, future growth prospects for the two communities are limited, and their ability to attract new industry of any type in the future would be severely hampered. Thus, it could be argued that the future economic well-being of the state as a whole is tied to the viability of its local communities.

The ultimate question is whether the provision of a viable municipal water supply to the two communities is worth approximately $350,000 to $400,000 annually to the state over the next 50 years. That question must ultimately be answered by the Wyoming Legislature.
Table 12

Edgerton-Midwest Pipeline Economic Costs
(3.7 Percent Discount Rate)

<table>
<thead>
<tr>
<th>Item</th>
<th>Initial Operation (1990)</th>
<th>Full Capacity Operation (2040)</th>
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</thead>
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<tr>
<td><strong>Pipeline System</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annualized Capital Costs</td>
<td>$420,607(1)</td>
<td>$420,607(1)</td>
</tr>
<tr>
<td>Annual Pumping Costs</td>
<td>24,600</td>
<td>38,668</td>
</tr>
<tr>
<td>Annual Water Purchases</td>
<td>4,269</td>
<td>6,878</td>
</tr>
<tr>
<td>Annual O &amp; M Costs</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td></td>
<td>$464,476</td>
<td>$481,153</td>
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<tr>
<td><strong>Treatment Plant</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annualized Capital Costs</td>
<td>$17,787(2)</td>
<td>$17,787</td>
</tr>
<tr>
<td>Annual O &amp; M Costs</td>
<td>35,000</td>
<td>35,000</td>
</tr>
<tr>
<td></td>
<td>$52,787</td>
<td>$52,787</td>
</tr>
<tr>
<td><strong>Total Annual Costs</strong></td>
<td>$517,263</td>
<td>$533,940</td>
</tr>
<tr>
<td>Annual Water Delivered (acre-feet)</td>
<td>237.2</td>
<td>382.1</td>
</tr>
<tr>
<td>Annual Benefits</td>
<td>$106,740(3)</td>
<td>$171,945(3)</td>
</tr>
<tr>
<td>Benefit-Cost Ratio</td>
<td>0.21</td>
<td>0.32</td>
</tr>
</tbody>
</table>

(1) Represents capital costs of $9,519,606 amortized over 50 years at a 3.7 percent discount rate.

(2) Represents capital costs of $402,570 amortized over 50 years at a 3.7 percent discount rate.

(3) Based upon an assumed local benefit of $450 per acre-foot annually.
Task 6 - Right-of-Way

The requirements of this task are to review the documentation of the existing pipeline right-of-way and determine if additional work is necessary to secure the right-of-way for a new pipeline.

WLC&J first researched land ownership along the pipeline route. Next, we reviewed the Memorandum of Title for the Town and Water Pipeline Mills to Midwest as prepared for AMOCO by David F. Dick of Buffalo, Wyoming in 1975. This document was provided to Midwest for purposes of the Town incorporation, and is property of the Town. It was provided to us by Eric Distad, Midwest Attorney. The introduction to the document states:

"The following report was prepared for Amoco Production Department, Casper, Wyoming and it is the intention herein to submit enough material without rendering any type of legal decision. Prints of pertinent documents, of abstract quality, have been furnished to assist the examining attorney. Said instruments are so noted on the Memorandum of Title by a red line under the book and page. In addition, the types of instruments are segregated by spacers and the type, book and page of each instrument are so noted on the lower right hand margin of each document".

We have randomly sampled and reviewed the recordings at the County Clerk's Office and found no differences between their records and the Memorandum of Title.

The pipeline crosses a variety of land ownerships, and there are a variety of easement and right-of-way agreements for the line. These were completed in the 1920s and 1930s. In reviewing right-of-way on a section by section basis we found that the agreements primarily call for the land owner to allow construction of oil and gas pipelines within a particular half section, with an undifferentiated right-of-way width. The lines can be constructed, maintained, with access guaranteed and with the pipeline company responsible for surface damage. Only one of the agreements in the forty plus miles of the line refers specifically to a water line. And, the primary document of the right-of-way, 52ACL 364-366, which covers twenty-five plus miles of the line is only a map of several pipeline locations. It has no text which includes grantor/grantee rights. There is also no documentation of an easement, purchase, or right-of-way for the storage tanks in Section 25, T39, R79W.

The prevailing history of pipelines over the years is an undifferentiated easement or right-of-way that is established wherever the pipeline is located. Constructing a new pipeline adjacent to the existing pipeline in the same undifferentiated right-of-way is a viable approach to a new pipeline. Mr. Distad explained that the Water Development Commission
funded the one mile new section of line which was built adjacent to the existing line near Ormsby Road. However, because of the age of the agreements for easement and right-of-way, because the Memorandum of Title makes no interpretation, and because the easement agreements vary so greatly from section to section, we recommend WWDC legal staff or other counsel with expertise in this area clarify the legal status of the existing right-of-way concerning installation of a new line adjacent to the existing line.

There will be areas where new right-of-way will be required, specifically at locations where a new line would not follow the exact route of the existing line for engineering reasons. To protect the State's, Midwest's and Edgerton's investment in this line, a new right-of-way agreement should be executed with each landowner along the route. We feel the State can possibly acquire such agreements at no additional cost to the project. If the project proceeds without the State's ability to demonstrate clear legal right-of-way, construction could be halted by legal action of any particular landowner. The majority of the landowners would be receptive to a new pipeline built in the same location with minimal surface damage and with revegetation. They must be advised, however, of the project at the proper time such that right-of-way can be worked out satisfactorily.

Recommendations

1. Further legal interpretation of the existing right-of-way is needed.

2. The most effective proposal is to construct any new line adjacent to the existing line, under the easement and right-of-way agreements for the existing line.

3. A new agreement for this line in particular should be executed with each landowner, clarifying right-of-way, access, maintenance and other particulars.

- Land Ownership -

The Midwest water supply line was built in the early 1920s, by Stanolind Oil, connecting the water supply well on the North Platte River at Mills to the treatment plant at the Town of Midwest, some forty miles north. Two oil pipelines were constructed by the oil company at the same time, in close proximity to the water supply line, and at some locations on each side of it. Easements/rights-of-way were obtained for the pipelines across the forty mile route across what was primarily land used for grazing.

Over the years the land adjacent to the pipeline has changed ownership. Today, there are over sixty separate landowners whose property is adjacent to the pipeline or crossed by the pipeline. The relationship between Midwest and the landowners concerning operation of the pipeline is
critical. Each landowner has different expectations and concerns about the obligations they have with the Town in relation to the pipeline. Some have no concerns, some would like to obtain water from the line, others would like to generate some revenue from the pipeline, and most are concerned with minimizing access to their land, as vandalism, open gates, and destruction of the range are very real problems.

A listing of the affected landowners is included as Appendix B. A land ownership map is at the end of the report. A summary of the land ownership patterns along the pipeline route beginning at the Town of Midwest, and running south to the pump station and well:

Township 40 North, Range 79 West. The pipeline proceeds south along the Gas Plant Road across the Salt Creek onto BLM land in Section 25, leased by Terra Resources. The next section south, 36, is a State section leased by Amoco Production. Continuing due south the pipeline crosses Sections 1, 12, 13, 24 and into the northeast corner of Section 24 to the water storage tanks. Land in these sections is owned by the BLM and leased to Terra Resources.

Township 40 North, Range 78 West. The pipeline bends southeast across Sections 30 and 31, crossing BLM and land currently owned by Patrick J. Begley, which is part of a ranching operation. The land will soon be back under the ownership of Laverne J. Davis. The pipeline crosses BLM and Teapot Ranch Company lands in the south half of Section 31.

Township 38 North, Range 78 West. The pipeline crosses Met Farm (Metropolitan Life Insurance Company) and State lands leased to the Teapot Ranch Company in Sections 6 and 7.

Township 38 North, Range 79 West. The pipeline crosses Teapot lands and State lands leased to Teapot in Sections 12, 13, 14, 23, 26, and 35 and property of Met Farm and Ranch Properties in Section 26.

Township 37 North, Range 79 West. The pipeline proceeds south across Met Farm owned and State lease property in Sections 2, 11, 14, 23, 26, and 35, and crosses one forty acre tract of Amoco Production in Section 23.

Township 36, Range 79 West. The pipeline crosses Met Farm and BLM land in Section 3, and Met Farm lease in Section 10. In Sections 10, 15, 22, and 27, the pipeline crosses private lands in two large lot Natrona County subdivisions, Antelope Hills Estates No. 2 and No. 3. Approximately eight different lot owners are affected in these two developments. A right-of-way for the pipeline was surveyed and dedicated on the plats of these two developments by Worthington Lenhart. The pipeline crosses BLM land in Sections 27, 33, and 34, and across Lawson E. Middaugh rangeland in Section 33.

Township 35 North, Range 79 West. The pipeline crosses B.B. Brooks property through Sections 4, 9, 21, and 28, Forgey Ranch Company and B.B. Brooks leased lands in Section 16, Met Farm, B.B. Brooks, and Justin Young lands in Section 33.
Township 34 North, Range 79 West. The pipeline crosses B.B. Brooks and Young lands in Section 4, Capshaw lands in Section 9, and across a vacated subdivision, Englewood No. 3, in Section 16. There are approximately six landowners within Englewood No. 3, who own scattered vacated lots. There is no development in Englewood No. 3. Southward into Section 21 the pipeline crosses lands owned by John Buckingham, Orsina J. Lapaseotes, and Grey Mak Pipe, with Grey Mak Pipe having their pipeyard along the route of the line. The pipeline crosses Westburne Drilling in Section 28, and runs between properties of seven individuals, mostly ten and twenty acre tracts, in Section 29. The pipeline crosses property of Harry Farrar, the City of Casper, Interstate Highway 25, and property of Amoco Oil in Section 32. There is no development in this section adjacent to the pipeline, except for I-25.

Township 33 North, Range 79 West. The pipeline runs south across Section 5 on Amoco Oil property, across the Burlington Northern Railroad main line, and across First Street Extension, also the West Yellowstone Highway, to the pump station along the North Platte River, in Section 8. The pipeline runs west from the pump station along West Yellowstone and beneath West Yellowstone, then turns along the North Platte, crossing Pepper Tank, VanHorn, the Chicago and North Western main line, Mills and WOTCO properties, Wyoming Boulevard, R.E. Whitaker and Mills properties to the well on the North Platte in Section 7.

- Survey Permission -

WLC&J determined from the Natrona County Assessor's records, that there are 65 land owners along the route of the Midwest waterline. Refer to Appendix B for these owners. Of these owners, forty were determined to be crossed by the Midwest waterline. A survey permission form was sent to each of these. A sample survey permission form is attached. All owners contacted executed the form except nine. Theses are: Metropolitan Farm and Ranch Properties - verbal permission from home office and contact with local manager, Lee Martinez; Justin Young - no response; Westburne Drilling - letter returned, no address; Harry Farrar - no response; Sigmon Properties - verbal; James Wilkinson - no response; Antelope Hills No. 2 - verbal; William Lee - no response.

Lessees of state land were contacted, also. The land owners located along the waterline from Mills to the pump station were not contacted as no survey work was completed in this area.

The survey permission forms will be retained in the project file.

- Surveying -

Prior to survey crews conducting any onsite surveying an ownership map was prepared for the area along the assumed route and we requested and obtained written consent to enter upon the property for the purpose of establishing the actual pipeline route and profile. Upon receipt of these consent forms
and because of the early response of the Bureau of Land Management the survey commenced, progressing from Midwest toward Casper.

During the route survey periodic ties were made to section corners which would facilitate the process of establishing a record description along the pipeline. The descriptive centerline will allow the project sponsors to obtain a recorded easement and access along the pipeline from both public and private landowners, thus reducing the possibility of future legal action to acquire access and/or easements.

A field survey along the existing pipeline route was conducted from the existing treatment plant in Midwest to the pump station at the North Platte River near First Street in Casper. Stationing was established on a water valve entering the Midwest Water Treatment Plant at 176+64.43. At the time the field survey was conducted it was assumed the new water transmission line would follow the existing water supply line the entire distance from Casper to the existing treatment facility. The water supply line was located through the utilization of existing pipeline markers, a Metrotech Model 810 Line Tracer, assistance from Midwest personnel and landowners and from actual observation of repair trenches throughout the length of the line along with areas of exposed pipe. Locating the segment of pipeline from the south storage tanks to the existing treatment facility was an extremely difficult task due to the numerous oil, gas and crude oil product lines which parallel and cross the original water supply line.

From the south tanks to Casper the task of locating the original water line became less arduous, even though there are lines which parallel the water line as well as many lines which cross its route. After establishing the existing pipeline's alignment, the profile was determined and surface features recorded to allow for design of the new pipe size and pumping requirements.

During the preliminary conceptual design it became apparent there would be better routing from the south tanks to the new treatment plant location other than along the existing route. This observation was brought to the attention of Midwest, Edgerton and WnDC, and approval was given to acquire an aerial topographic survey along the WnDC right-of-way from the south tanks to the proposed new treatment plant location. This aerial survey was made by Horizons, Inc. from Rapid City, South Dakota. They provided aerial contour mapping on mylar plan sheets from which the conceptual design for the alternate route between the storage tanks and Midwest was done. (See Conceptual Design Plans.)
Task 7 - Preliminary Cost Estimates

Upon completion of the Task 4 - Treatment Options Evaluations, five options (instead of three as originally scoped) were selected by the Sponsors and WWDC for preparation of preliminary cost estimates.

Comparative costs were prepared for the five alternative designs. These costs should not be construed as the total cost for construction for each alternative. Costs which would be common to all alternatives were not included in these cost estimates. It was felt only those costs which were variable would be needed for comparison.

These cost alternatives were presented to the Project Sponsor and WWDC at an evening meeting in the Midwest Town Hall on September 29, 1988, and are included in Appendix "D". A selection of the preferred alternative was made at that meeting and WLC&J was directed to proceed with development and final costing of the preferred alternative.

A brief description of the five alternatives is as follows:

Alternative 1A

Alternative 1A provides for treatment at the North Platte River, rather than at Edgerton-Midwest. Treatment capacity is 1.45 cfs, i.e., sufficient only for Edgerton-Midwest users. Users along the pipeline route cannot be served, since treatment capacity for them is not provided at the North Platte, and untreated water will not be transported through the pipeline. Conventional Treatment is used.

Alternative 1B

Alternative 1B would provide the highest level of service in both treatment and pipeline capacity. Water treatment for potential users along the pipeline route would be provided under this alternative. The treatment option is Conventional Treatment, and the treatment location is the North Platte River. The pipeline and treatment capacities are assumed to be 2.38 cubic feet per second (cfs) as discussed in the Identification of Service Area section.

Alternative 2

Alternative 2 would provide the level of treatment most comparable to that currently provided to Midwest, but with increased capacity. Treatment facilities are at Edgerton-Midwest. The pipeline could be designed to serve users along the pipeline route, but those users would have to provide their own treatment facilities. Existing Treatment, with a capacity of 1.45 cfs, is used. This is the only alternative which provides phased construction of the treatment facilities.
Alternative 3A

Alternative 3A is similar to Alternative 2, but the treatment facilities have a greater flexibility, capability, and cost. Conventional Treatment with a capacity of 1.45 cfs, located at Edgerton-Midwest, is used.

Alternative 3B

Alternative 3B is also similar to alternative 2, but uses different treatment with different operational requirements and similar construction costs. Slow Sand Filtration with a capacity of 1.45 cfs, located at Edgerton-Midwest, is used.
Task 8 - Selection of Preferred Alternative

- Treatment -

At the September 29, 1988, meeting, the project sponsors and WWDC selected Alternative 2 as the preferred treatment alternative for the Edgerton-Midwest water system. A conceptual schematic and layout arrangement of the selected treatment alternative is shown on Figure 2. This alternative was selected primarily because it represents the simplest and least costly initial construction, and will meet the needs of Edgerton-Midwest for the foreseeable future. Alternative 2 also has the following advantages:

1. It retains the greatest flexibility for the towns in obtaining different treatment service (i.e., a Casper regional plant) in the future.

2. It does not result in installation of all treatment facilities at this time. Two of the new filters required will not be installed until 2010.

3. The towns will not have the responsibility of owning and operating a treatment plant located near Casper, 40 miles away.

4. The limited resources of Edgerton-Midwest will not have to bear the burden of maintaining water treatment capacity for potential future users along the pipeline route, though the pipeline will have the capability to carry raw water to treatment facilities serving those areas.

The filtration plant will be located in an insulated metal building, at a new site between the junction of highways 387 and 259 and the existing treated water storage tank. The required building size is estimated to be 60 feet by 35 feet (2,100 square feet). The new pipeline will parallel the existing transmission line to the treated water storage tank between Edgerton and Midwest.

The three existing, skid-mounted Midwest water treatment filters will be moved from their existing location to the new site. These filters are 5 feet in diameter, and the existing filter media is in excellent condition according to the plant operator. The filters will be modified to provide surface wash of the filter media at the beginning of backwash cycles. The existing Midwest chlorination equipment will also be moved and utilized on the treated waterline in the new plant.

Three additional filters will be installed to help serve present and future needs until about the year 2010. They will be very similar in design to the existing filters, employing the same generalvalving arrangement and the same filter media. They will be six feet in diameter rather than five
CONCEPTUAL LAYOUT OF PREFERRED TREATMENT ALTERNATIVE
EDGERTON - MIDWEST WATER SUPPLY
feet, and will thus be operated and backwashed at different rates than the relocated filters. In accordance with WQD requirements, the system will supply the maximum daily demand if the largest filter is out of service. Estimates indicate that additional treatment capability will be required about the year 2010. Two additional filters would be installed at that time.

Chemical addition equipment will be provided to add alum, soda ash and an organic polyelectrolyte to the raw water. An in-line static mixer will be used to provide rapid mixing of the chemicals into the raw water.

Backwashing of each individual filter will be initiated by high turbidity in the effluent from that filter. Interlocks will be provided to prevent the backwashing of more than one filter at a time, though any filter producing unacceptably turbid water will be shut down to await backwashing if necessary. Water for backwash and surface wash of the filters will be from the pipeline to the treated water storage tank. Spent wash water will be wasted to the Midwest municipal sewer system. A sewer line to the new plant location will be constructed to accommodate this. Filtered water from a newly backwashed filter will also be wasted to the sewer for a few minutes after backwashing, in accordance with the SWTR guidance.

An automatic control system will be used to provide for automatic backwashing in the absence of the operator. The control valves for filter influent, effluent, backwash, surface wash, backwash-to-waste and filter-to-waste will all be of the on-off type, pneumatically or electrically actuated. Flow rate control valves will be separate from the on-off valves, and be of the self-regulating type.

Costs for the new treatment facility and sanitary sewer, including engineering fees and contingencies, are estimated to be $360,050. Additional costs for the two extra filters, to be installed in 2010, are estimated to be $42,520 in 1988 dollars. (See Treatment Cost Summary, Table 13) Detailed costs are shown in Appendix "E".

- Pipeline -

The pipeline alternative selected was to install two booster pump stations as opposed to the single pump location at the North Platte River. The dual pump station allowed the utilization of PVC piping rather than ductile iron or steel pipe as it was possible to reduce the amount of pressure developed in the system. In utilizing PVC pipe it was possible to avoid the need for cathodic protection which without continued maintenance fails and accelerates the deterioration of the ductile iron or steel pipe. The installation of PVC is less expensive than that of the ductile iron or steel pipe due to the reduction in weight per joint. The pump selection was made to allow all pumps and motors in the two pump stations to be the same size and horsepower. This allows the operator to avoid stocking numerous parts in order to assure minimal shutdown while maintaining a small inventory of spare parts. The sequence of pump installation allow
for the greatest flexibility in future pumping requirements while maintaining a constant pressure on the system.

The reduction in pipeline size from the summit of Twenty-Mile Hill on to Edgerton/Midwest can be accomplished because, from this point on to the treated water storage tank, the system no longer relies on the pumps for pressure but becomes a gravity system and it is necessary to install pressure regulating and pressure sustaining valves to avoid excess pressures in the pipeline.

Upon delivering water to the raw water storage tanks it was determined the most economical route to the new treatment facility would no longer be the existing route but a new route along and adjacent to Highway 259 to the treatment facility. This new route avoids the need to excavate in the recently, newly constructed streets of Midwest in order to convey treated water to the treated water storage tank. In order to continue in the existing easement the construction would prove too difficult due to the existence of several oil production and gas lines which parallel the existing water line. The new route may not reduce the number of pipeline crossings required, however, it will not be necessary to contend with parallel lines.

Upon leaving the treatment facility it is necessary to install a new pipeline to the storage facility for treated water prior to the treated water being introduced into the distribution system thus obtaining the required retention time from chlorination to usage.

The potential usage of those along the pipeline route is reduced from that of the existing system as the amount of pumping time will be reduced. Any draining of the pipeline, when the pumps are shut down, could cause water hammer and pressure surges when the pumps are started. Should it be necessary to provide water for agricultural purpose only, it would be necessary for the owner to install or provide means to store water when the pumps are in operation. We would recommend that this type of usage be discouraged.

The pipeline costs are summarized in Table 14. The detailed cost breakdown for the pipeline is shown in Appendix "E".
### TABLE 13

**EDGERTON/MIDWEST TREATMENT**

**SUMMARY OF COSTS**

October 21, 1988

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
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</thead>
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<tr>
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<td>10% Design Engineering</td>
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<td>Building for Wells</td>
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<td>Station #2 @ Midway</td>
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<td>Piping</td>
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<tr>
<td>12&quot; PVC CL 200</td>
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<tr>
<td>(100,253 ft.@$25.60/ft)</td>
<td>$2,573,388.00</td>
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<tr>
<td>2. Section #2 Twenty Mile Hill to Raw Storage</td>
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<tr>
<td>10&quot; PVC CL 200</td>
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<tr>
<td>(78,640 ft.@$20.00/ft)</td>
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<td>Purchase Right-of-Way</td>
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<td><strong>TOTAL</strong></td>
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The conceptual plan and profile sheets which will be utilized in the final report were generated from field data collected by our surveyors along the existing pipeline route. The plan profile sheets are drawn at a scale of one inch equal to five hundred feet horizontal (1"=500') and one inch equal to fifty feet vertically (1"=50'). This scale generated a large number of plan-profile sheets, however, it was determined necessary in order to develop readable plans which could be used in the final design and subsequently for construction. (A reduced profile is included in the report as Figure 3.) The route proposed from the raw water storage facilities to the proposed treatment plant was flown and an aerial topographic contour map was generated at a scale of one inch equal to one hundred feet horizontal (1"=100') and one inch equal to fifty feet vertical (1"=50') with two foot contour intervals. This will allow for preparation of the proposed profile and conceptual design and, as before, be suitable for subsequent construction drawings.

From the treatment plant to the jointly owned treated water storage tank, the supply line would parallel the existing supply line from Midwest. Once in place the existing Midwest supply line would be used as the distribution line for the Town of Midwest and the distribution line to Edgerton will remain unchanged.

Conversations and meetings were held with the Wyoming Highway Department about utilizing their right-of-way for installing the new water line from the raw water storage to the new treatment plant location. Consent was given verbally with the understanding if the highway were to be improved, this is anticipated within five years, the relocation of the water line would be at the expense of the Joint Powers Board. Conversations were held with the Bureau of Land Management about utilizing the area adjacent to the Highway Departments right-of-way. They verbally agreed to allow an easement for the cost of preparing and filing the necessary paperwork only. It was determined the logical selection of routing would be to install the line adjacent to the highway right-of-way, on BLM land, thereby avoiding any future expenses for relocation.

The conceptual design for the pump stations is shown in Figures 4 and 5. Both of these pump stations will operate identically. Pump Station No. 1 will be installed in the existing brick structure with minor modification. The 12" supply line from the wells will be brought into the lower portion of the building and a manifold constructed which will connect to the vertical casing which enclose the pump bowls. The water is then pumped into a second manifold which is part of the 12" pipeline to pump station Number 2. The pump motors, header and electrical controls would be mounted above the lower level of the existing building thereby reducing the possibility of flood damage should flooding occur. The manifold system would be designed to allow for the insertion of the future pump as the demand would required. The initial pump installation will consist of two pumps per station which would alternate pumping with one pump capable of
PIPELINE PROFILE
FROM
PUMP STATION NO. 1 TO
TREATED WATER STORAGE
FIGURE 3
NOTE: Pumping and piping layout is intended to fit into the existing building without major modifications.

A) Check Valve
B) Pump Control Valve
C) Gate Valve
D) Surge Anticipator Valve
FIGURE 5

PUMP STATION NO. 2 - LAYOUT DETAIL

SECTION A-A

PLAN VIEW

SCALE: 1" = 4'

Check Valve
Pump Control Valve
Gate Valve
Surge Anticipator Valve

ELECTRIC CONTROLS
pumping 300 gpm. As the need arises the pumps could both run for a total flow of 520 gpm which would approximate the demand anticipated in the year 2020. It will then require the addition of a third pump at each of the stations which would allow the three pumps to produce a flow of 650 gpm or the maximum required.

The pump stations, wells, and treatment plant will be connected by telemetry to allow for startup and shutdown as well as monitoring of the wells and pump stations from the treatment plant reducing the number of trips to Casper.
Task 10 - Preparation of Operating Plan

- Diversion From the North Platte River -

The existing location of the Midwest well on the North Platte River is the most practical location to provide future water diversion facilities from the river for the new pipeline. The Mills and Casper BPU diversion facilities and wells are located a very short distance upstream, and a location downstream is considered unwise, due to the historical oil refining and waste management activities which occurred below the confluence with Casper Creek. All other property in the immediate vicinity is either privately owned, or is already being used for water diversion purposes.

The continuous capacity of the existing well is not well defined. It is also a single unit without any backup facility, which violates WQD regulations for new facilities. The conceptual design therefore includes the installation of two new alluvial wells at the site of the existing well.

The new wells will be located far enough apart to prevent their mutual interference. The exact capacities of the wells will not be known until they are drilled, completed, developed and tested. However, information available concerning the BPU and Mills wells indicates that the wells would each produce between 400 and 1,000 gallons per minute. With production rates of this magnitude, the wells should easily provide the average daily design demand with the well of greater capacity out of service, as required by the WQD regulations. It is anticipated that the well pumps will be sized so that one well will produce raw water at the capacity of the pipeline pumping stations. The second well will serve as a standby. Figure 6 shows the conceptual design of the wells.

- Pump Station No. 1 at River -

New pumps and piping would be installed in the existing pump house, which could allow for the continued operation of the existing plunger pump until such time as the new pumps were operational. The initial installation would consist of two pumps, each capable of providing 300+ gpm flow through the pipeline. These pumps would operate alternately until such time as demand would require both pumps to run concurrently and provide a flow of 530 ± gpm. The maximum flow rate for which there will be water rights is 652 gpm in the year 2040. This will require the installation of a third pump of the same size and capacity as the original two pumps in operation. The pumps would be controlled by telemetry from the treatment plant and would be dependent upon the flow available from the wells.
GROUND SURFACE

2'

10'

20'

30'

32'

CEMENT SURFACE SEAL

BENTONITE SEAL

16" DIAMETER, 0.375" WALL, LOW CARBON API STEEL CASING

GRAVEL PACK

16" DIAMETER, 0.040" SLOT, LOW CARBON API STEEL WELL SCREEN

PUMP, PIPING AND WELL HEAD ARE NOT SHOWN

NORTH PLATTE RIVER CONCEPTUAL ALLUVIAL WELL DESIGN EDGERTON - MIDWEST WATER SUPPLY

FIGURE 6
Pump Station No. 2 would be located along the pipeline at a position where the pressure from Pump Station No. 1 drops to a predetermined amount that allows for sufficient net positive suction head of Pump Station No. 2. The pump configuration would duplicate that of Pump Station No. 1 and would operate in the same mode as Station No. 1 (see Figures 4 and 5). The telemetry would again be controlled from the treatment plant and the pump operation would be dependent upon the flow from Pump Station No. 1. Pump Station No. 2 will elevate the water over Twenty-Mile Hill and it will then become a gravity flow to the south tanks (raw water storage tanks). The piping from Pump Station No. 1 at the North Platte River through Pump Station No. 2 and to the crest of Twenty-Mile Hill was determined to be twelve inches in diameter.

The location of Pump Station No. 2 was determined by pressures at Pump Station No. 1 and the pressure required to boost the water over the summit of Twenty-Mile Hill. This location will require power to be extended from the closest available source which is approximately 6 miles to the south. The power required for efficient operation of the pump is a three phase 460 volt source. A discussion was held and cost estimates were obtained from Pacific Power and Lights Casper office.

Pipeline

The existing pipeline from the wells to Pump Station No. 1 is a twelve-inch cast iron line. This section of pipe has presented no problems to the operation of the system and therefore will be left undisturbed.

The pipeline from Pump Station No. 1 to Twenty Mile Hill will be new twelve-inch PVC (CL200 or CL150) to replace the existing 6" or 8" steel line.

The gravity line from Twenty Mile Hill on to the south tanks will be reduced to a ten-inch diameter line. It will be necessary to install pressure reducing and pressure sustaining valves in this portion of the pipeline as the static pressure will reach 355 psi, far in excess of the 150 psi allowable in the pipeline. These valves will not require any telemetry connection to the pump station nor the treatment plant. The line from the south tanks to the treatment plant and from the treatment to the north storage tank will also be a 10" gravity line.

Storage

The Midwest system uses two raw water storage tanks six miles south of Midwest. In order to utilize these tanks as storage for raw water they were reviewed for adequacy. The northerly most tank of the two has a wooden top. At one time, while the entire Midwest water system was still owned and operated by the Oil Company, treated water was stored in this tank, thus requiring a covered facility to prevent contamination of the stored water. It is assumed that the existing storage tanks are
structurally sound and it will be necessary only to drain, clean, sandblast and paint them, both inside and outside to inhibit deterioration of the tanks. It was assumed both tanks would be covered for future use, however, this is not a requirement of the Environmental Protection Agency, as the water will not be treated prior to being stored in either of these tanks.

Altitude control valves would be installed at the south tanks (Figure 7) in order for the operator to determine the amount of stored water available for treatment without pumping. The flows from the south tanks to the treatment plant and thence on to the north tank will be via gravity flow. The static pressure at the proposed treatment plant location would be approximately 186 psi and at the north tanks operating level approximately 86 psi which will be sufficient to operate the treatment filters.

Control of the overall system will be based on the level in the treated water (north) storage tank, which will be sensed by a pressure transducer in the treatment plant building. When this level falls below a preset control level, the inlet valves to the filtration plant will open. Water to the plant will be supplied from, and consequently drain, the raw water storage tanks. When the level in the raw water tanks falls below a preset control level, the telemetry system will start the supply wells and pump stations.

- Treatment -

Operation of the filtration plant will be at a constant rate. This is dictated by the nature of the overall system, i.e., the delivery capacity of the pipeline from the North Platte is the limiting capacity of the system. The primary purpose of the raw water (south) storage tanks is to provide emergency storage against the failure of the supply wells, the pump stations, or the southern portion of the pipeline. Therefore those tanks will remain nearly full at all time, and fluctuate only enough to provide control of the wells and pump stations, and avoid freezing during the winter months. Subsequently the treatment plant will operate at essentially the same times and rates as the wells, pump stations and pipeline.

Each filter in the treatment plant will be equipped with a flow control valve to prevent unsafe overloading of the filters, and the overall plant will have an inlet pressure reduction valve to prevent overpressuring of the filter tanks. The chemical addition system will use adjustable rate chemical feed pumps, to allow the chemical addition rate to adjust to backwashing of filters and other changes in plant production rate.

In-line turbidimeters will be plumbed to automatically monitor the outflow from individual filters, and will do this on a rotating basis. Each filter will be monitored for a period of time, then the turbidimeter will switch to monitor a different filter. Rising turbidity in the outflow from a filter will cause automatic initiation of the backwash cycle for that filter. The total plant outflow will also be monitored for turbidity. Manual controls will be provided for the operator to override the various automatic features of the plant whenever necessary.
A - ALTITUDE VALVE. Work with telemetry and has a check feature.
B - FLOW CONTROL VALVE. Work with telemetry.
C - 10" GATE VALVE.

SOUTH STORAGE TANKS CONNECTION DETAIL
NO SCALE
The treatment plant will normally operate unattended, but operator attention will still be necessary. Daily visits by a plant operator will ordinarily be required to prepare chemical solutions, check and calibrate the turbidimeters and other instruments, make any needed adjustments in filter feed and backwash rates, record the plant's production and water quality parameters, and perform routine equipment maintenance and repairs. Specific details of the automatic operation of the plant are provided in Preferred Alternative - Task 8.

System shutoff will occur in the reverse fashion from system startup. When the level in the treated storage tank rises above the preset shutoff level, the inlet valve to the filtration plant will close. This will cause the level in the raw storage tanks to rise above their preset shutoff level, and the telemetry system will signal the shutoff of the wells and pump stations.
Task 11 - Permitting/Environmental

The necessity to obtain permits is unavoidable on any project and this will be no exception. It will require obtaining permits or licenses from the Wyoming Highway Department to cross under their highways at several locations by boring as well as to perform excavation and trenching within their right-of-way. These areas are at Highway 20-26 (First Street) where an existing casing is already in place, the I-25 interchange just north of Casper which will require three separate borings, Highway 259, which will require two separate crossings near the raw water storage tank near Midwest, and one crossing of Highway 387 to the new treatment plant. Permits will be required from the Burlington Northern Railroad to cross under their track in Casper just north of First Street. There will also be crossings of county roads along the route, which will require permits from Natrona County Road and Bridge Department. The pipeline route crosses three of the streets or roads owned and maintained by the City of Casper. It will be necessary to work with the City and obtain permits for the construction at these crossings.

The pipeline will not traverse any navigable streams or rivers throughout its course. However, the construction of new wells at the North Platte River will require a permit from the State Engineer's Office, a Nationwide 404 Permit from the Corps of Engineers and possibly a permit from the Wyoming Game and Fish Department.

The pipeline, treatment, pumping, wells, and storage facilities will all require the necessary submittals, reviews and permits from the Wyoming Department of Environmental Quality. These permits will be obtained early in the design phase of the project as we have held discussion with the DEQ on the requirements for treatment during this preliminary phase of design.

The Bureau of Land Management (BLM) requires that any project crossing federally controlled lands must conduct an historical and archaeological study to establish the effects of the project on said lands. This study would be conducted under BLM Policy 8143 - Procedures for the Avoidance and/or Mitigation of Effects on Cultural Resources.

Briefly, this study would consist of the following procedures:
1. Determination of field inventory needs.
2. Non-federal land affected by BLM ROW grants.
3. Private landowners consent.
4. Guidelines for evaluating archaeological sites for eligibility to the National Register of Historic Places.
5. Eligibility/noneligibility - Archaeological sites.
7. Historic site documentation.
8. Eligibility/noneligibility - Historical sites.
9. Impact zones for sites other than trails and those sites which are generally ineligible for the National Register of Historic Places.
10. Guidelines for the evaluation and protection of Historic Wagon Trails.
The BLM would administer the study under their Policy 8143, but would not necessarily conduct the study themselves. This would most likely be done under contract to private consulting archaeologists permitted to conduct such studies by the BLM. The cost to conduct the study and prepare the report would be the responsibility of the Edgerton/Midwest Water Supply Project. It is estimated that the cost for this study would be approximately $20,000. The study must be made prior to the BLM issuing any permits for the project and should be made during the final design phase, subsequent to any construction activity.

The above permits have been identified, but none have been applied for or acquired. Only upon completion of final design drawings will the information needed to obtain the necessary permits be available for submittal with the permit applications. This should take place during the design phase of the project.
Task 12 - Land Acquisition

The requirements for right-of-way, easements, and the necessity to acquire additional lands are addressed separately, commencing at the Edgerton/Midwest area and running back to the wells along the North Platte River.

At Midwest, the Conceptual Design proposal relocates the Midwest Water Treatment Facility from its existing location to the east side of Midwest along the junction of Highway 259 and Highway 387. The land in this area is owned by the BLM. Current uses include the baseball field and golf course, both recreation leases from the BLM.

The BLM earlier has stated that there will be a policy implemented for selling rather than leasing lands, and that the sale price would be somewhere around $500 per acre. The proposed treatment facility would require less than one acre of land.

The pipeline route from the raw water storage tank south of Midwest to the treatment facility and thence to the treated water storage tank, traverse through BLM property. In discussions with them, the BLM would provide an easement for the pipeline with the only cost being that necessary for the paperwork and filing fees.

The recommendation would be to acquire title to the land necessary for the treatment facility and obtain an easement for construction of the pipeline.

The status of the rights-of-way or easements along the existing pipeline are covered under Task 6 of this report. There will be a need to purchase a 2500 square foot parcel of land from a private land owner to construct Pump Station No. 2. It will also require negotiations with private land owners to obtain an easement for construction of a power line to the pump station along with obtaining access to the facility.

The recommendation would be to purchase the land required for the pump station and to obtain easements for the power line and access route to the pump station.

The Midwest well is located in the Town of Mills. The well is south of Wyoming Boulevard at Fourth Street, adjacent to the North Platte River. The Mills Construction Company granted to the Midwest Refining Company an easement on a 17,500 square foot parcel to dig, operate and maintain the well. The location of the well matches closely the easement description.

The easement was granted in 1922, and the land retained by the Mills Construction Company, which later donated over twenty acres of land in this area to Natrona County and the City of Casper. In 1981, the Natrona county Historic Society quit claimed a parcel, which includes the Midwest well, to
the City of Casper. This was part of a land trade which cleaned up acreage requirements for Casper's Fort Caspar National Register (Historic) District. The Midwest well is not in an historic district. It is, however, on land shown by the County Assessor to be owned (quit claim) by Casper. Casper is most likely receptive to a trade, sale, or lease of the land. It would be best for Midwest to have control of the land rather than an easement. Mills owns the land adjacent to the Midwest well on the west and east, and would be cooperative in this matter.

The recommendation would be to purchase, lease, or gain control in some manner the land the Midwest well is located on such that maintenance activities and future improvements are secure. Enough land should be acquired to allow for projected needs.
Task 13 - Reports

During the course of the project, Progress Reports were submitted on a monthly basis. These reports sent to the WWDC and sponsors briefly outlined project activities for the past month.

Following completion of the project team's investigations into the various tasks of the project, the Draft Report was prepared. This report (10 copies) was submitted in conjunction with the presentation to the WWDC members at their meeting on November 10, 1988.

Upon review of the Draft Report by the WWDC staff and the sponsors, the Final Report was completed incorporating comments and changes generated during the reviewing process. The Final Report (25 copies) was submitted during early December, 1988.

An Executive Summary (50 copies) briefly describing the finding of the project was provided to the WWDC along with the Final Report again during early December, 1988.
Task 14 - Meetings

- Scoping Meeting -

A scoping/negotiation meeting was held May 25, 1988, at the office of WLC&J with Evan Green, WWDC, and the Sponsors, Mayor Maxine Patterson, Edgerton and Mayor Cedar Chaffin, Midwest and the Consultant, Doran Boston and Terry Titus. The purpose, scope and schedule was discussed so that all parties understood the extent of the project.

- Miscellaneous Meetings -

A meeting was held August 5, 1988, at the WLC&J office with WWDC, the Sponsors, and the Consultant to present the finding of the Treatment Options. Five (5) treatment alternatives were selected for preparation of preliminary cost estimates. (See Appendix "G" for meeting summary.)

A meeting was held September 29, 1988, at the Midwest Town Hall with WWDC, the Sponsors, and the Consultant to present the Preliminary Cost Comparisons for the five (5) treatment alternatives. From the five alternatives, a preferred alternative was selected for final costing. (See Appendix "G" for meeting summary.)

A meeting was held October 19, 1988, in Edgerton with WWDC (Mike Purcell and Evan Green), the Sponsors (Mayor Maxine Patterson and other town representatives from Edgerton and Mayor Cedar Chaffin and other town representatives from Midwest) and the Consultant (Doran Boston and Terry Titus with WLC&J) to present final costing for the preferred alternative. Following some discussion, costs for several other items were requested to be added to the final costing. A revised final cost was prepared and submitted to WWDC and the sponsor on October 21, 1988.

A meeting was held November 1, 1988, at the Midwest Town Hall with the Mayor and Council of Midwest, their attorney and engineer and the Consultant (Doran Boston and Terry Titus) to present a detailed explanation of the revised final costs.

- Results Presentation -

The presentation of the results of the project was made on November 10, 1988, in Cheyenne to the WWDC members. The results along with the WWDC staff recommendations and the Sponsors support were presented to solicit backing of the project from the members of the WWDC for funding through the State Legislature.

[Note: As a result of the meeting on November 10, 1988, in which funding for this project was not recommended, no public hearing was conducted to present the report findings to the general public.]
CONCLUSIONS/RECOMMENDATIONS
CONCLUSIONS/RECOMMENDATIONS

The conclusions/recommendations section is presented to allow quick access to concise information concerning the findings of this report. Only the most pertinent information is listed here while more detailed information will be found in the text of the report.

- Conclusions -

1. Based on previous studies, current and past repair efforts by Midwest and WLC&J's investigation of the existing pipeline, it is obvious that the pipeline had exceeded its service life.

2. The existing pipeline will continue to deteriorate and present increased financial demands upon Midwest to repair and maintain the system for adequate delivery of the needed water.

3. All components of the delivery system from the well at the N. Platte River to the treatment plant in Midwest should be upgraded to a service life of 50 years.

4. The upgrading of the entire system should be such that water for both Midwest and Edgerton can be pumped, conveyed, stored and treated.

5. The likelihood of providing water to users between Casper and Midwest is very limited.

6. The economics of the project dictate that the Towns receive substantial subsidies from the WWDC, Wyoming State Legislature and other funding agencies in order for the project to be viably affordable to the communities.

7. The existing pipeline right-of-way documents appear to leave some question as to the validity of the right-of-way. Without legal interpretation of the right-of-way documents, the determination as to the need to secure right-of-way for the waterline can not be made.

- Recommendations -

1. The existing pipeline should be replaced along its entire length with a new pipeline.

2. Two new wells should be drilled along the North Platte River to allow adequate diversion of water for the immediate needs of Edgerton and Midwest.

3. A long-term water source should be acquired for future needs of the Towns through Cheyenne Stage II and/or the Deer Creek Reservoir projects.
4. Two new booster pump stations should be constructed, one at the North Platte River and one north of Homa Hills to pump the water over Twenty-Mile Hill to the existing storage tanks, six miles south of Midwest.

5. The existing storage tanks south of Midwest should be rehabilitated.

6. A new treatment facility should be constructed in a new location near the WHD intersection in Midwest.

7. The pipeline from the south storage tanks to Midwest should be relocated to run along the WHD right-of-way, thereby providing a direct route to the relocated treatment facility.

8. No consideration should be given to designing the system to service intervening users between Casper and Midwest.

9. The Towns of Edgerton and Midwest should request maximum financial support from the WWDC and the Wyoming State Legislature, and the Towns should diligently pursue additional funding through other sources identified in the economic analysis section of the Conceptual Design Report.

10. The existing right-of-way for the pipeline should be thoroughly investigated through the legal channels prior to commencing final design of the project.

[NOTE: Other more specific recommendations may be found in the Long-Range Sources of Water, Right-of-way, Service Area and Land Acquisition sections of the report.]
APPENDICES
APPENDIX "A"

LETTER FROM NATRONA COUNTY PLANNER
Thank you for the opportunity to comment on the Edgerton-Midwest water study. I also wish to commend the Wyoming Water Development Commission for funding this study.

In your July 26 letter you posed five questions. My responses appear in the same order as the questions.

1. Homa Hills and the three Antelope Hills Subdivisions are the only subdivision that I am aware of located north of Bar Nunn and south of the towns.

Homa Hills and Antelope Hills were platted before the County adopted county-wide zoning and we were, therefore, unable to prevent them. We have since zoned the subdivisions in a manner which would prevent an increase in density over one residential unit per platted lot. In recent years we have been approached by the owners of large groups of lots in Antelope Hills to consider vacating portions of the subdivisions. Consequently, I expect the growth potential to be very limited.

2. Any group of landowners in the unincorporated areas of Wyoming has the legal right to petition for the formation of an Improvement & Services District. However, I doubt that it is likely that these subdivisions would pursue this or a Water District. If you look at the roads in these subdivisions you will see that they are poorly maintained. On previous occasions we have suggested the owners form an Improvement & Services District to maintain these roads. It has never happened. In addition, I doubt that because of the low density and large distances between structures the cost would be prohibitive for a water system even if the people were inclined to organize and assess themselves.
364. The County Land Use Plan designates the area from Bar Nunn to Midwest as Agricultural. The mere presence of a water line would not be sufficient cause to alter this designation. Years of experience both in and out of Wyoming demonstrate the inefficiencies of strip development. The cost of providing services such as schools, fire stations, and sheriff protection is increased by low-density strip development. Land use and aesthetic impacts of strip development along a water line or highway corridor are counterproductive to the long term economic viability of a community and are not consistent with sound land use planning.

Again, thanks for the opportunity comment. I would be happy to answer any questions or discuss other issues related to the water line study.

Very truly yours,

Max L. Torbert,
County Planning Director

cc: Mr. Frank Ellis, Board of County Commissioners Chairman
Mrs. Bev Hebbert, Natrona County Planning & Zoning Commission Chairman
APPENDIX "B"

LAND OWNERSHIP LIST

ACCESS PERMIT FORM
Landowners Along Midwest Pipeline Route
June 13, 1988

North to South

<table>
<thead>
<tr>
<th>OWNER</th>
<th>LAND IN</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>SECTION</td>
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<tr>
<td>1. Bureau of Land Management</td>
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<tr>
<td>Attn: Don Ray</td>
<td>24,25</td>
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<tr>
<td>Casper District</td>
<td>1,12,13,34,25</td>
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<tr>
<td>1701 East &quot;E&quot; Street</td>
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<tr>
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<td>6,7</td>
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<td>1,12,26</td>
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<td></td>
<td>3,27,33,34</td>
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<td>2. State of Wyoming</td>
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<td>State Land Office</td>
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<td>Herschler Building</td>
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<td>3. Town of Edgerton</td>
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<td>4. Town of Midwest</td>
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<td>5. VI Sheep Company</td>
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<td>c/o Bill Tobin</td>
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<td>6. Patrick J. Begley</td>
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<td>2651 Belmont Road</td>
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<td>7. Property in Town of Lavoye</td>
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<td>8. Ray M. Franks</td>
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<td>1550 Garden Creek Road</td>
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<td>9. Myrtle F. Brophy</td>
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B-1
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<td>11. Teapot Ranch Company</td>
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<td>Salt Creek Route</td>
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<td>12. Met Farm and Ranch Properties</td>
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<td>13. Skyline Ranches</td>
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<td>Paradise Valley, Az. 85253</td>
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<td>14. J.L. Wiloth</td>
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<td>2911 Pioneer</td>
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<td>Cheyenne, Wy. 82001</td>
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<td>15. Amoco Production</td>
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<tr>
<td>Jerry Locke</td>
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<td>16. Burke Sheep Company</td>
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<td>1032 S. Durbin</td>
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<td>21. B.B. Brooks Company</td>
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<td>22. Arthur Lee Scott</td>
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<td>Route 2, Box 181</td>
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<tr>
<td>Aurora, NE 68818</td>
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<td>23. Justin Irvin Young</td>
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<td>37 Mayhew</td>
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<td>24. H.E. Stuckenhoff</td>
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<td>25. Capshaw Properties</td>
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<td>26. Englewood No. 3</td>
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<td>Vacated subdivision</td>
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<td>27. Richard Ray Atkins</td>
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<td>3711 Hawthorne</td>
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<td>28. Albert Kind</td>
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<td>5117 Cornell</td>
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<td>El Paso, Tx. 79924</td>
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<tr>
<td>29. Mrs Harvey Daigle</td>
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<tr>
<td>Box 272</td>
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<td>Mills, Wy. 82644</td>
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<td>30. H.M. Brouilette</td>
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<td>273 N. Pennsylvania</td>
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<td>31. Bob Rufenacht</td>
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<td>Chuck Davis, City Planner</td>
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<td>200 N. David</td>
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<td>33. Amoco Oil</td>
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<td>34. Antelope Hills</td>
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<td>John L. Buckingham</td>
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<td>Orsina K. Lapaseotes</td>
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<td>14799 Jefferson St. Aurora, Co. 80014</td>
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<td>Grey Mak Pipe</td>
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<td>Merlin E. Carpenter</td>
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<td>Paul Lowham</td>
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<td>1090 Stafford Casper, Wy. 82609</td>
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<td>Westburne Drilling</td>
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<tr>
<td>1660 Lincoln St., #2500 Denver, Co. 80264</td>
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<tr>
<td>IRI International</td>
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<td>P.O. Box 1101 Pampa, Tx. 79065</td>
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<tr>
<td>University of Wyoming Foundation</td>
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<tr>
<td>Box 3963 University Station Laramie, Wy. 82071</td>
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<td>Harry W. Farrar</td>
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<tr>
<td>455 Pineview Place Casper, Wy. 82609</td>
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<tr>
<td>Emma Nightwine</td>
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<td>Bette J. Gottfried</td>
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<td>7079 Salt Creek Rt., Box 1 Casper, Wy. 82601</td>
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<tr>
<td>Pacific Power</td>
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<td>920 S.W. 6th Ave. Portland, Or. 97204</td>
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<td>Sigman Properties</td>
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<tr>
<td>48. W.N. Barnhart 1744 Lynwood Place Casper, Wy. 82604</td>
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<td>49. Ralph Northrup Route 2 Casper, Wy. 82601</td>
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<tr>
<td>50. Jeanette Stoneking No address</td>
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<tr>
<td>51. Herbert Harvey 6316 Waterway Drive Falls Church, VA. 22024</td>
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<tr>
<td>52. H.L. Richardson Box 9092 Casper, Wy. 82602</td>
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<td>53. WOTCO Box 260 Casper, Wy. 82602</td>
<td>7 33/79</td>
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<td>54. Town of Mills Box 789 Mills, Wy. 82644</td>
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<td>55. R.E. Whitaker Box 638 Mills, Wy. 82644</td>
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<td>56. Pepper Tank Co. Box 1468 Casper, Wy. 82602</td>
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<td>57. Walter F. VanHorn Box 250 Mills, Wy. 82644</td>
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<tr>
<td>58. C &amp; NW Transportation Company Casper, Wy. 82602</td>
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<tr>
<td>59. Burlington Northern, Inc. 770 Main St. 2680 Continental Plaza Fort Worth, Tx. 76102</td>
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<tr>
<td>60. Villa M. Irvine Estate Lot 2 Antelope Hills Estates No.3 200 Conroy Building 141 South Center Casper, Wy. 82601</td>
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<td>Owner</td>
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<tr>
<td>61. James Wilkinson</td>
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<tr>
<td>62. Van Irvine</td>
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<tr>
<td>7036 N. 47th Paradise Valley, Az 85253</td>
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<td>64. William Lee</td>
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<td>1749 S. Mitchell</td>
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<tr>
<td>65. James H. Richardson</td>
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<tr>
<td>Box 1902</td>
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<td>Mills, Wy. 82644</td>
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</table>
LAND OWNER ACCESS CONSENT FORM  
EDGERTON-MIDWEST WATER SUPPLY PROJECT

Access Requested by:
State of Wyoming, Water Development Commission and  
Worthington, Lenhart, Carpenter & Johnson, Inc.

Owner ________________________________
Address ______________________________________

I, ______________________________________, the undersigned, as the owner of record or as lessee occupying the land and property described as follows: ______________________________________

or their authorized agent, do hereby grant to the WYOMING WATER DEVELOPMENT COMMISSION and WORTHINGTON, LENHART, CARPENTER & JOHNSON, INC., their employees and subcontractors, the right to enter upon the above described land and property for the purpose of gathering information to aid in establishing the alignment of the existing Midwest Water Pipeline. I understand that I will not be held liable for injury to personnel of the WYOMING WATER DEVELOPMENT COMMISSION, WORTHINGTON, LENHART, CARPENTER & JOHNSON, INC. or their subcontractors during the required field investigations.

I further understand that a reasonable attempt will be made to contact me forty-eight (48) hours prior to anticipated entry. However, this consent shall be effective for the length of time necessary to complete the conceptual design of the EDGERTON-MIDWEST WATER SUPPLY PROJECT, but in any event shall expire no later than November 30, 1988.

Special conditions for entry - ______________________________________

Telephone no.(s) where our field personnel may contact you:

Owner - ______________________________________ Date
Lessee - ______________________________________ Date
Authorized agent - ______________________________________ Date
Authorized agent - ______________________________________ Date

B-7
APPENDIX "C"

FINANCING ALTERNATIVES
3.0 FINANCING ALTERNATIVES AVAILABLE TO SPONSORS FOR BOTH THE LOCAL AND SUBSIDIZED SHARES

This section describes potential financing alternatives that may be applicable to the Edgerton/Midwest Water Supply Project. Sources of revenue for this type of project include federal, state and local sources. Federal and state programs consist of combination grant/loan programs.

3.1 FEDERAL SOURCES

Federal sources of funding are diminishing rapidly and many programs, which in the past provided money for local improvements for water resource projects, are no longer available. Of the several programs discussed, HUD's Community Development block Grants appear to be the most viable at present. The current administration's budget program calls for either drastic reduction or total elimination of the water supply grant programs of the Farmer's Home Administration, the Economic Development Administration, and the Soil Conservation Service.

FmHA administers rural water and waste disposal grants and loan programs. These can be used for installation, repair, improvement and expansion of rural water systems. Improvements can include source, treatment, transmission, and distribution facilities. Grants are available to cities, districts, and non-profit cooperatives with populations of 10,000 people or less, and are limited to 75 percent of the project development costs. FmHA funds are generally available upon completion of the project only. Interim commercial financing is generally required for the actual implementation of the project. Grants are considered only when debt service per household exceeds one percent of the area’s median household income.

The loan program typically purchases bonds and allows terms of up to 40 years on either general obligation (G.O.) bonds or revenue bonds. However, FmHA encourages terms of 20 to 25 years, as the expected useful life of the improvement generally governs the repayment terms. The loan program offers three different rates of financing which change quarterly:
o Poverty Rate - As of October 1, 1988; 5.0 percent. This rate is offered if the median family income in the 1980 census is below $10,000 per year.

o Intermediate Rate - As of October 1, 1988; 6.375 percent. This rate is offered if the 1980 median family income is 85 percent or less of the state’s nonmetropolitan median household income. Currently, the Wyoming non-metropolitan median household income is $16,414 per year.

o Market Rate - As of October 1, 1988; 7.750 percent. This rate is applicable to all others who are eligible for the program.

Recipients must certify that other credit is not available at reasonable rates and terms. Thus, the municipality or other entity must certify that it cannot sell its bonds on the municipal market. If other credit is not available at reasonable rates and terms, then FmHA agrees to purchase the bonds. FmHA will purchase either G.O. or revenue bonds; therefore, authorizations are required in either case.

Farm Credit System - Banks for Cooperatives

This program was established under the Farm Credit Act of 1933. Under its programs, loans are available to cooperatives of all types, including those providing rural utility services of any nature. The rates and terms of the
loans vary and are based on the duration of the loan and the
cost of borrowing incurred by the bank. Interest rates
depend upon the discount rate set by the Federal Reserve
Bank for its member institutions. Currently this rate is
approximately 8.5 percent. This program would potentially
be applicable to any rural water districts that wish to
participate in the Edgerton/Midwest Water Supply Project.

U.S. Department of Housing and Urban Development (HUD)

HUD's Community Development Block Grant (CDBG) program
consists of two primary components. Entitlement grants are
applicable only to large metropolitan areas. The part of
the program covering small population bases (less than
50,000 people) is operated totally by the individual states.
This program is called the Small Cities Program and is an
active, well-funded system for distribution of federal funds
to local communities. As the title of the program implies,
the purpose of the HUD CDBG program is to distribute grants
rather than loan funds.

The primary criterion is that the proposed project create
permanent jobs. Secondarily, water and wastewater projects
are eligible as economic improvements. The maximum grant
amount is $750,000, and most average about $350,000.
3.2 STATE OF WYOMING SOURCES

The State of Wyoming provides water resource development funds from a variety of sources. These funds are distributed primarily through the actions of the Wyoming Water Development Commission and the Legislature, the State Farm Loan Board, and the Economic Development and Stabilization Board (EDSB). A short description of each of the associated funding accounts is provided in the following sections.

Wyoming Water Development Account I:

This Account is funded by a 1.5 percent Severance Tax on the total mineral valuation of coal extracted in the state and is used to fund water development projects completed and in use after 1970. Any new or proposed water development project for agricultural, residential, or industrial use is potentially eligible for funds from this account. They include projects sponsored and approved by municipalities, counties, water districts, individuals, and irrigation districts. This is considered to be a major revenue source for water development projects, which can include funding for wells, dams, water storage projects, and main line water distribution lines.

Generally, it has been the policy of the Commission not to recommend funding from this Account for water treatment
plant construction. The Legislature can approve funding from this Account for water treatment plant construction and recently, the Legislature approved a 4 percent loan for water treatment plant construction for the Shoshoni pipeline project.

In the past, grant/low interest loan funding combinations have been 75 percent grant/25 percent loan (4 percent) (to be repaid within 50 years). Under new policy guidelines adopted in October of 1987, the grant/loan mix for approved projects will change to 67 percent/33 percent, requiring greater participation in project funding by local governments or interest who will benefit from a particular water project. The new policy guidelines permit a 75 percent/25 percent grant/loan mix for hardship cases and will only affect the Wyoming Water Development Commission’s recommendations to the Wyoming legislature for project funding approval. Final approval of project funding must come from the legislature, which can approve any degree of project subsidy. Wyoming Water Development Commission guidelines must be followed when applying for funding from this account.

Wyoming Water Development Account II:

This Account was created by the legislature as a separate account within the Environmental Revenue Fund for the purpose of funding water development projects completed and
in use prior to 1970. The account was established by the legislature in 1981 and is funded pursuant to W.S. 39-6-305(g) where a Severance Tax of .167 percent of the total mineral valuation of both oil and gas extracted in the State of Wyoming is dedicated to this account. Funding from this account and from Account I is considered to be major sources of funding for raw water rehabilitation projects. Wyoming Water Development application requirements and restrictions would apply.

To obtain funding from Account II, an application must follow guidelines established by the Wyoming Water Development Commission. In applying for funds for new water development projects, generally funding will come from Account I, while projects which improve an existing storage facility or water conveyance system or provide a more efficient means of using existing water supplies would be considered a rehabilitation project and funding would come from Account II.

1. Water Rehabilitation Projects: Rehabilitation projects are those projects that will improve an existing municipal raw water supply system or an existing agricultural storage facility or conveyance system. A project of this type should increase dam safety, decrease system operation and maintenance costs, or provide a more efficient means of utilizing existing raw water supplies.
A prospective applicant for funds should schedule a meeting with Wyoming Water Development Commission representatives and follow the same Level I-III guidelines as outlined in the previous section for new water development projects.

Eligible projects may be funded by the Wyoming Water Development Commission (WWDC) to a maximum of 50% grant and 50% loan. Any loans approved can be as low as 4.0% and must be retired over a period approximately equivalent to the economic life of the improvements, or shorter. The project sponsor must have formed a legal entity or board so that user fees can be levied or assessments made to generate revenues to retire the loan obligation.

The WWDC will screen all applicants on their ability to pay and financial conditions. If the entity can support more than a 50% loan, the grant funding percentage may be lowered, or the applicant may be referred to another State or Federal agency for funding or advised to finance the project through a local financing alternative.

State General Fund

The Legislature, at its discretion, can also approve and fund projects by making a direct appropriation from the Wyoming General Fund.
Funds can be transferred by the Legislature from the State's General Fund to the Wyoming Water Development Account I to provide increased funding in this account to fund water development projects as recommended and approved by the WWDC and approved by the Wyoming Legislature.

Permanent Land Fund

This account is funded by royalties, leases, and grazing fees received from lands deeded to the State of Wyoming by the Federal Government (e.g., school sections, etc.). Eleven accounts make up the fund, one of which, the Common School Account, is available for water resources projects. Funds from the Common School Account are used as a source for the Joint Powers Act (JPA) Program.

Wyoming Statutes 9-1-129 through 9-1-136 (1974) created the JPA. The JPA authorizes public entities to band together for the performance of any function that individual communities are authorized to perform, except the implementation of municipally-owned electrical power generating facilities. The Farm Loan Board is authorized to loan up to an aggregate amount of $100 million (from the Permanent Land Fund) to JPA Boards. The Farm Loan Board administers the program with advice from EDSB, Department of Environmental Quality (DEQ), and private consultants. The Farm Loan Board sets the loan rates at levels commensurate with commercial market rates. However, interest rates are
not to be less than 6%, nor more than 12%. Maximum repayment term for the loan is 40 years. Security for the loans is provided with liens against the revenue generating facilities of the project and revenue bonds. Loans will be made only for revenue generating facilities. Wyoming Statutes 9-7-904(g) and (h) allow for grants for portions of revenue generating facilities that cannot be financed by user fees.

Permanent Wyoming Mineral Trust Fund

The Permanent Wyoming Mineral Trust Fund was established in 1974 through the addition of Section 19, Article 15 of the Wyoming Constitution. This permanent fund of the State provides for an excise or severance tax on the privilege of servicing or extracting several minerals, of a varied percentage, on the value of the gross product extracted.

Although the composition of this fund has changed since inception, the allowed purposes of the fund have not. The proceeds from such taxes deposited in the Permanent Mineral Trust Fund remain inviolate. The monies in the fund can be invested as prescribed only by the Legislature, and all income from fund investments is deposited by the State Treasurer in the State General Fund. The Legislature specifies by law all the terms and conditions under which monies in the fund may be loaned to political subdivisions of the State from the income earned.
Pursuant to Wyoming Statutes 39-6-302(a), revenues received from the levy of a 2% excise tax on the value of the gross product extracted from uranium, trona, coal, petroleum, natural gas, or any other fossil fuel are deposited into the Permanent Mineral Trust Fund except as otherwise provided in Wyoming Statutes 39-6-305(b).

Pursuant to Wyoming Statutes 39-6-305(d), revenues collected from the levying of a 2% severance tax on coal produced (Wyoming Statutes 39-6-303) are to be administered by the Wyoming Farm Loan Board and disbursed to communities and areas impacted by mineral production pursuant to Wyoming Statutes 39-6-305(e) (see COAL TAX REVENUE GRANTS herein).

Pursuant to Wyoming Statutes 39-6-305(k)(i)(ii), revenues received from a 2% severance tax on oil and gas production pursuant to Wyoming Statutes 39-6-302(g) will be disbursed to cities and towns (3/8%) while 1/8% of the amount distributed goes to Wyoming counties. Wyoming Statutes 39-6-305(k)(iv) calls for 1/12% of those revenues to be deposited into the Permanent Mineral Trust Fund, while under Section (v) of this same Statute, an additional 1/12% will be deposited into the Wyoming Water Development Account II.

1. **Permanent Mineral Trust Fund Loan Availability:** Until 1980, no loans had been made to any political subdivision through the fund. However, since 1980, a number of loans
and appropriations have been approved but have been made through the WWDC.

The State Treasurer shall transfer revenues collected under Wyoming Statutes 39-6-302(e) to the Wyoming Water Development Account within the earmarked Revenue Fund. Any expenditures for water development projects shall be authorized by the Legislature in a separate bill. Pursuant to Wyoming Statutes 39-6-302(c), excise taxes levied upon the privilege of extracting coal except underground coal are 1-1/2% of the value of the gross product extracted. The proceeds from this tax are then deposited into the Wyoming Water Development Account I. Applicants should review guidelines for funding under Account I.

2. Coal Tax Revenue Account Grants: Pursuant to Wyoming Statutes 39-6-303, the Legislature levied an additional 2% severance tax upon the privilege of extracting or producing coal in the state based upon the value of the gross product extracted. The monies to be received under this legislation are administered by the Wyoming Farm Loan Board for grants to areas which are directly or indirectly impacted by the production of coal. Funds available from this account are used in financing public water, sewer, highway, road, or street projects. According to the legislation under Wyoming Statutes 39-6-305(e), at least 50% of all grants must be made to
finance highway, roads, or streets projects. Grants can also be made to finance water and sewer projects as well as jails and justice facilities. This additional 2% severance tax shall expire on January 1 following the year in which cumulative funds collected total $160,000,000. This tax has now been eliminated, and funding for Coal Tax Grants is expected to be unavailable after the October 1988 Farm Loan Board meeting.

The Farm Loan Board has the jurisdiction to make grants from current revenues to any city, town, county, special district, or other political subdivision of the State, or the State Highway Department. To date over 350 grants have been authorized. The State has generally required that the grant recipient finance 50% of the project cost either through a bond issue, general funds on hand, or user fees.

As with the Mineral Royalties program, this program has not had revenues to allow it to become a major funding source for water development programs. It can be used, however, by political subdivisions to finance water distribution lines, transmission lines, and water treatment facilities.
Federal Mineral Royalties

For many years, natural resources have been extracted by private entities from Federal lands within the State of Wyoming in exchange for royalty payments to the Federal Government. Since 1920, the State has been receiving a share of such Federal Mineral Royalty payments. Pursuant to Wyoming Statutes 9-4-601, all monies received by the State of Wyoming from the Secretary of the Treasury of the United States under the provisions of the Act of Congress of February 25, 1920 (41 Stat. 437, 450; USC 181, 191, as amended in 1979) shall be deposited in the Trust and Agency Fund and distributed by the State Treasurer.

A portion of the money received from these mineral royalties is distributed to cities, towns, counties, and special districts. The use of this money includes a variety of public projects such as water, sewer, storm sewer, and wastewater projects. Mineral Royalties can be pledged by municipalities and special districts along with user fees and other revenues, if available, to repay bonded indebtedness issued for water projects. Approximately $16,000,000 in Federal Mineral Royalties were distributed to Wyoming in Fiscal Year 1987.

This program fulfills a selected and limited, but important, role in water development needs for smaller projects in specific communities which include construction and
improvements of water distribution lines and water treatment plants.

1. 7.5% to Cities and Towns: Under Wyoming Statutes 9-4-601(a)(v), 7.5% of the total payment of mineral royalties received in each fiscal year is to be distributed directly to incorporated cities and towns to be used for planning, constructing, or maintaining public utilities or providing public services. Any city or town has the right to expend these revenues or pledge future revenues for payment of revenue bonds issued to provide public facilities. No city or town can pledge future revenues to the Federal Government unless that city or town obtains the written permission of the Governor. According to Federal legislation 43 USC 1747, any distribution provided to a city or town in this manner will constitute a reduction for that city or town by an amount equal to the amount of Federal mineral royalties withheld from the State by the Federal Government to repay any loan to the city or town. Pledges of this income for Revenue Bonds shall not exceed 10 years. For example, a city or town can issue Revenue Bonds for water improvements and pledge net user fees as well as their Federal Mineral Royalty receipts and other funds as a source of repayment for the bonds.

With the exception of the above provisions, the usage of this particular royalty payment is at the discretion of
the individual city or town. Therefore, the allocation of funds for water-related projects is the decision of each individual town or city government.

2. **7.50% Capital Construction Account (Government Royalty Impact Assistance Account Grants) a/k/a Mineral Royalty Grants:** The Capital Construction Account for cities, towns, counties, and special districts consists of revenues received under Wyoming Statutes 9-4-601(a)(vi) from Federal Mineral Royalties granted to the State of Wyoming and is distributed pursuant to Wyoming Statutes 9-4-604. The uses of this fund include a variety of public projects such as water, sewer, water and sewer, and occasional drainage facility and wastewater projects.

The Wyoming Farm Loan Board meets twice a year (January and July) to consider applications for Government Royalty Impact Assistance Account Grants (Mineral Royalty Grants). Generally, grant funding is only available to political subdivisions providing matching funds. Water and sewer projects receive the highest priority.

The Mineral Royalty program has been the primary source of State funding for hundreds of county and municipal construction projects. The Farm Loan Board reviews impact of the applicant, local effort in financing the project, and need for the project. Generally, the Farm Loan Board will not finance 100% of a project. Depending
upon local effort and the type of project, they will finance up to 50%. This is a source of revenue that should be incorporated in a coordinated approach to the financing of a project for small to medium sized projects. On projects exceeding $1,000,000, it is more difficult to obtain 50% matching funding and may only be possible if the applicant applies for grant funding in phases over a 12- to 18-month period.

Mineral Royalty Grants are available to county, municipal, and special district water projects, but in limited quantities. A financial advisor can assist a public agency in applying for State grant assistance.

Legislative Royalty Impact Account

Pursuant to Wyoming Statutes 9-4-601(viii), 4.3% of Government Royalty revenues received by the Government pursuant to Wyoming Statutes 9-4-601(a) will be used to retire bonds issued under Wyoming Statutes 9-4-602(h) with revenues not necessary to make current payments or to be accumulated to retire bonds no later than July 1, 1986, and all revenues received following retirement of the bonds to the school foundation program account and any unexpected balanced on July 16, 1987, will be deposited to the Legislative Royalty Impact Assistance Account. The Account also receives funding under Wyoming Statutes 9-4-601(b) which calls for the State Treasurer to ascertain and
withhold all other payments received from the Federal Government incidental to coal, oil shale, or geothermal leases of Federal land within Wyoming and shall distribute 50% of these lease payments to the Capital Construction Account under Wyoming Statutes 9-4-604 (Mineral Royalty Grant program) and 50% to the Legislative Royalty Impact Account in the Environmental Fund. The Legislature may appropriate these funds to alleviate important problems resulting from mineral development.

The Legislature has designated $22,581,000 in appropriations to various projects or programs. Included in this amount under legislative approval is a $11,000,000 grant for the Green River/Rock Springs/Sweetwater County Joint Powers Board to acquire an existing water distribution system from Pacific Power & Light Company to serve their communities. The grant was subject to the local entities acquiring matching funding from a Revenue Bond issue.

**Applicability:** It may be possible for an applicant desiring funds for a water improvement project to obtain funding from this account. The applicant or sponsor must be an area that is impacted by mineral development. Funds must be available in this account, and legislative approval is required.
Small Water Development Revolving Loan Fund

This fund was created in 1953 under Wyoming Statutes 9-3-311 and 9-3-312. It is a revolving, sinking fund that is kept fully committed, and only the annual principal payments are available for additional loans. The maximum loan amount is $100,000, financed at 4% interest, with a maximum repayment term of 40 years. Again, this is a relatively small source of funds but potentially could prove useful in providing matching funds and/or financing small local improvements that would be required for the Edgerton/Midwest Supply Project.

Coal Tax Revenue Account (Impact Tax)

This account was created in 1976 and is funded by a 2% severance tax on the production coal in the State. The tax is based on the gross proceeds of the coal production. Funds are administered by the Farm Loan Board and are available as grants to areas impacted (directly or indirectly) by the production of coal. For water projects the Farm Loan Board has the option to set requirements for water conservation, enforcement of tap fees, or the institution of water rates sufficient to finance the system’s operation and maintenance costs. Of all the funds described previously, this particular account is probably the least applicable to the Edgerton/Midwest Water Supply Project.
In summary, the State of Wyoming funds would be best accessed by direct application to the Farm Loan Board and/or the WWDC. The WWDC would, in turn, submit its recommendations to the State Legislature for direct funding via legislative action.

State Joint Powers Act Loans

The Farm Loan Board is authorized under Wyoming Statutes 16-1-109 to negotiate and make loans to one or more agencies or Joint Powers Boards presently existing, permitted, or created pursuant to Wyoming Statutes. For example, any county, city or a Joint Powers Board or Water District would be eligible for a Joint Powers Act Loan to construct water lines and water treatment facilities. The public agency involved would make an application to the Wyoming Bureau of Public Lands and would have to prove that there are sufficient net revenues available from operations to meet the annual loan obligation.

As with irrigation loans, the Farm Loan Board administers the program, setting the terms and conditions of the loans based upon the advice of outside experts. In this program, those "experts" may include the Commissioner of Public Lands and staff, independent engineers, and dEQ representatives. The Farm Loan Board sets the rates of interest charged per annum based on the commercial market for similar securities;
however, the rates cannot be lower than 6% or higher than 12% (currently 8.50%) and may not exceed a term of 40 years. Finally, the Farm Loan Board has the right to establish what it deems to be the necessary security for the loan.

Loan payments are to be made once a year on the first of December. The Farm Loan Board does not permit reinvestment of loan proceeds during the construction period. Loan proceeds are distributed when vouchers are submitted to the Farm Loan Board for consideration. The Farm Loan Board meets once a month to consider Joint Powers Act Loan applications.

Loans can only be made for facilities generating revenues only to the extent that the revenues will repay the loan and such that the loan can be considered a reasonable and prudent investment of State permanent funds. Any portion of the revenue generating facility unable to be financed by user fees may be financed with a grant (see GOVERNMENT ROYALTY IMPACT ASSISTANCE ACCOUNT GRANTS and COAL TAX GRANTS herein).

The permanent nature of the Permanent Land Fund precludes assistance to projects of any type in a form other than loans. While the fund exhibits a strong capacity for meeting potential growth in existing loan programs, it has not historically been utilized for loans to support large projects on an isolated basis.
Joint Powers Act Loan funding is appropriate for funding water distribution lines and water treatment plans where user fees can be pledged towards loan repayment.

Joint Powers Act Loans are available to all Wyoming public agencies provided there are sufficient revenues available to repay the annual loan payment.

1. Annual Debt Service on a $1,500,000 JPA Loan:

   $1,500,000 @ 8.50% @ 10 years -- $228,611/yr.
   $1,500,000 @ 8.50% @ 15 years -- $180,630/yr.
   $1,500,000 @ 8.50% @ 20 years -- $158,506/yr.

3.3 LOCAL SOURCES OF REVENUE

The following section describes some potential sources of long-term financing which may be applicable to the Edgerton/Midwest Water Supply Project. It was assumed for this review that the proposed Edgerton/Midwest Joint Powers Board would not be granted taxing authority, other than that provided indirectly by association with the participating communities. For this reason, discussion is limited to revenue generating types of financing rather than those based on the taxing authority of public entities.
Long-term capital improvements are necessarily funded by long-term financing. Due to the arbitrage regulations of the Federal Tax Code, bonds normally cannot be sold in an amount exceeding three years of the estimated capital construction budget. Repayment of this type of financing may involve system revenues, usually water rates and in some cases special assessments. The greater the number of sources of repayment, the less the cost of the long-term financing.

Revenue Bonds

Municipal bonds (i.e., those issued by a municipal corporation or those enabled to issue bonds by statute or charter) are generally of three types: fixed maturity ("term bonds"), fixed amount ("par" or "principal" bonds), and fixed interest ("coupon bonds"). The principal advantage to municipal bonds is the tax exemption allowed by the IRS on all issues for a "public purpose." Thus, the borrowers of municipal bonds do not pay Federal income taxes on the interest they receive from bonds. In addition, many states allow similar exemptions for municipal bonds bought for local projects by state residents.

Revenue bond payments are made from the returns, such as service fees and charges, generated by the project being financed. No taxes are levied or pledged as a backup. Normally, additional bonds are sold to provide further
security in the form of a "debt service reserve," usually equal to one year's requirement of principal and interest.

A variety of "creative financing" variations in the bonding industry has been developed in the last few years. These issues are primarily offshoots and/or variations of the basic revenue bond. Examples of this type of financing are provided later in this section. The following is a short description of the various subcategories of revenue bond financing that may be applicable to the Edgerton/Midwest Water Supply Project.

1. Enterprise Revenue Bonds: This is the basic form of revenue bond that would be applicable to the Edgerton/Midwest Water Supply Project. The bond interest and principal are repaid from fees and charges generated by the operation of the enterprise (such as a water system) that was financed by the bonds.

2. Lease or Lease-Purchase Revenue Bonds: This type of bond is repaid from lease payments made on projects that are financed by the bonds. Lease-purchase revenue bonds are repaid from lease payments made by the public entities to some other entity which has purchased the facilities and is leasing them back to the public agency. This type of revenue bond financing is one form of the concept of privatization.
3. **On-Behalf-of, or "63-20", Financing:** This is another version of lease-purchase financing. The term "63-20" is commonly used to refer to nonprofit corporations permitted under U.S. Treasury Ruling 63-20. A "63-20" corporation provides for the ownership of an asset, such as a water treatment plant, by a nonprofit corporation. The corporation, in turn, leases the asset to a public body. After a nonprofit corporation is formed and receives approval from the public body, the corporation then issues revenue bonds "on behalf of" the public body to construct the facility. The corporation then builds the facility and leases it back to the public entity. Lease payments are designed to just equal the cost of retiring the maturing bonds.

4. **Current Bond Market:** As would be expected for a market with as much variability and volatility as currently exists in the municipal bond market, there is a wide variation in the potential financing terms that are currently available. The "Bond Buyers Average Index of 20 Municipal Bonds" is currently at approximately a 9.3% financing rate. The Bond Buyers Index is based on G.O. bond obligations and is therefore lower than the rate that could be expected for general revenue bond issues. The interest rate difference between G.O. bond issues and revenue bonds is usually in the range of 1.0 to 1.5%.
In other areas the potential interest rate is much lower. For example, in the insured bond market a rate of 5.25% is presently available for issues of over $4 million. These particular issues are serial bonds whose interest rate increases with the age and associated growth of the revenue producing facilities. The bonds are based on a fixed formula that allows the estimation of the long-term overall cost of the financing. However, the initial rate is much lower than the average, as indicated by the present rate of 5.25%.

Another form of "creative financing" is the variable rate demand bond. Variable rate demand bonds also have a fluctuating interest rate that is tied to the prime rate for the United States. The variable rate for these bonds is usually 50 to 55% of the prime rate. Currently, variable rate bonds are being issued at interest factors of 5.4 to 5.7% for the first four to five years of the project. This is a fixed rate that allows establishment of the revenue producing facilities, which is then varied after that in association with the prime rate.

Lease Purchase

The municipal lease with option to purchase is a comparatively new form of financing for local governments and public entities. It is designed to bridge the gap between purchasing within a single fiscal year and the long-
term financing presently procured through the use of municipal bonds. A lease purchase agreement is essentially an installment sale contract.

Under an installment sale contract the governmental user of the equipment or property agrees to make payments of the purchase price plus interest, over a period of years, and has the right to purchase the property at a nominal fee at the end of the contract period. A contract usually ranges from three to seven years depending upon the expected useful life of the property. For this reason this type of option is less applicable to the Edgerton/Midwest Water Supply Project. Again, however, it may be applicable to certain portions of the project which require local only financing and/or matching funds.

One offshoot of the lease purchase agreement that may be applicable to the Edgerton/Midwest Water Supply Project is the sub-lease. Under the operation of a sub-lease, one public entity which is the owner of property or equipment can lease the property or equipment to another public entity and then sub-lease it back. This particular instrument is applicable if a shift in operations and maintenance responsibility is desirable and/or so that the property or equipment may provide some common usage to both public entities. This type of arrangement may be applicable, for instance, to the utilization of the Town of Lovell's water treatment plant.
Privatization

Privatization is a concept which is not necessarily new or innovative in the history of the U.S. for the construction of public works projects. In the early history of the country, most major public projects were the result of entrepreneurship on the parts of individual investors who then reclaimed their investment by charging tolls and/or user fees for the services provided by the project. However, the practice fell out of favor for many years with the rise in governmental participation in public works projects. It has seen a resurgence in popularity in the last couple of years because of the continuing cutback in both Federal and State sources of revenue. A description of this financing alternative is provided at this time, but the overall potential for the practice is uncertain because of potential tax law changes pending before Congress that may make the practice financially unattractive.

There are two basic forms of the privatization concept: the true lease (straight operating) or the sale-lease back. True leasing arrangements involve the acquisition or construction with private capital, of personal property or real property, and the leasing of the equipment or facilities to a public entity. The public entity simply rents the equipment or facility and has no ownership rights. The lease payment is usually set equal to the cost of paying for the equipment or facility, plus a prearranged rate of
interest. The interest rate, in turn, is based on the current rate of interest (usually the prime rate) adjusted for the risk involved in the venture.

Currently, the lessor or investor receives tax benefits if the lease is a "true lease" (i.e., one in which the lessor always holds title to the equipment or facility). The lessor may deduct depreciation expenses on the accelerated schedule against other income, under current Federal tax regulations. This tax benefit permits the lessor to reduce the rate of interest charged on the return of investment.

The primary disadvantage of the straight operating lease to the lessor is that the governmental unit does not build any equity in the property through its rental payments. If the public entity wishes to purchase the equipment or property at the end of the lease, it must pay full market value at the time of purchase.

In the sale-lease back concept a public agency sells the property or equipment to a private buyer who then leases it back to the municipality or public agency. The private corporation or individual retains ownership of the property and thus receives the tax advantage of depreciation benefits. The public entity may purchase back the property at the end of the term at full market value. The primary advantage is the receipt of the sales price which may be used to retire outstanding debt which may be invested to aid
the municipality in its lease payments, or which may be used to make improvements without issuing further debt.

In summary then, it is obvious that there are a variety of potential funding sources for the Edgerton/Midwest Water Supply Project. Financing terms vary considerably, however, as related in the above examples. For purposes of this analysis, the assumption was made that the project would potentially be funded through a combination of State and/or local resources, with varying interest rates of 4.0 to 7.5%. In addition grant loan combination ratios of 75/25% and 50/50% ranges were used.
APPENDIX "D"

DETAILED COST COMPARISON FOR FIVE ALTERNATIVES
ALTERNATIVE 1A

Existing 1.4 Million Gallon Water Storage Tank

COSTING

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>$558,900.</td>
</tr>
<tr>
<td>Pipeline</td>
<td>4,937,309.</td>
</tr>
<tr>
<td>Appurtenances</td>
<td>493,427.</td>
</tr>
<tr>
<td>Pumps</td>
<td>134,600.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$6,124,236.</strong></td>
</tr>
</tbody>
</table>

Pipeline -- Water Treatment Facility and Pump Station

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North Platte River

Water Treatment facility sized to service the Edgerton/Midwest area only.

Package Treatment Plant - Capacity 1.45 cfs

1. Treatment Unit - Microfloc Trident Model 3 x TR-210A, upgraded to include a second turbidimeter, filter to waste, and additional corrosion protection for 50-year life.  
   $357,700

2. Clearwell - concrete, 75,000 gallon capacity  
   110,500

3. Backwash Pumps - 2 x 1,400 gpm capacity suction from clearwell

4. High Pressure Surface Wash Supply - from service line with backflow prevention  
   3,350

5. Chlorinator - existing moved from previous location  
   2,000

6. Wastewater Pond - 120 x 120 x 5 feet deep, to store all wastewater from 10 days at maximum operation.  
   13,100

7. Wastewater Recycle - one pump with well screen, 50 gpm  
   26,250

D-1
8. Piping - supply, backwash and drain

9. Air, instrumentation and major electrical

31,500

11. Interior building finishing  
7,600

12. Concrete slabs and foundations  
6,900

13. Fenced Land - 0.6 acres, 800 feet of security fence  

$558,900

Alternatively to items 6 and 7, wastewater may be disposed to the Casper Board of Public Utilities sewer system. This also reduces land requirements to 3,500 square feet. The existing building may be suitable, but remodeling cost would probably equal those of a new building.

Piping for Single Pump

12" diameter ductile iron pipe from river north until pipeline pressure is less than 200 psi, 82,166 feet  
@$28.89 per foot  
$2,373,776

12" diameter PVC from end of ductile iron pipe to crest of Twenty Mile Hill, 18,358 feet  
@$23.05 per foot  
423,152

10" PVC from Twenty Mile Hill to raw water tanks south of Midwest, 78,635 feet  
@$19.06 per foot  
1,498,783

10" PVC from raw water tanks to Midwest's existing treatment facility 31,778 feet  
@$20.19 per foot  
$641,598

$4,937,309

Appurtenances

Air-vacuum valves, pressure reducing and pressure sustaining valves, blow-off and gate valves, telemetry, revegetation  
$493,427

Pumps - Dual Pumps - may be housed in the existing building each pump capable of pumping 700 gpm.  
$134,600

Alternate 1A Total Comparative Cost  
$6,124,236
TREATMENT AT RIVER WITH TREATMENT, PIPELINE, AND WATER SOURCE REQUIREMENTS SIZED TO SERVICE EDGERTON/MIDWEST AND POTENTIAL INTERVENING USERS.

Package Treatment Plant - Capacity 2.38 cfs

1. Treatment Unit - Microfloc Trident Model 4xTR-210A upgraded to include a second turbidimeter, filter to waste, and additional corrosion protection for a 50-year life $ 479,800

2. Clearwell - concrete 87,000 gallon capacity 123,300

3. Backwash Pumps -2 x 1,400 gpm capacity, suction from clearwell

4. High Pressure Surface Wash Supply - from service lines, with backflow prevention 3,350

5. Chlorinator - existing moved from previous location 2,000

6. Wastewater Pond - 150 x 150 x 6 feet deep, to store all wastewater from 10 days at maximum operation 21,800

7. Wastewater Recycle - One pump with well screen, 75 gpm

8. Piping - supply, backwash, surface wash and drain 33,650

D-3
9. Air, instrumentation and major electrical

10. Housing - steel building, 2,800 sq.ft.  
    42,000

11. Interior building finishing  
    7,500

12. Concrete slabs and foundations  
    10,150

13. Fenced Land - 0.85 acres, 950 feet of security fence  
    723,550

Alternatively to items 6 and 7, wastewater may be disposed to the Casper Board of Public Utilities sewer system. This also reduces land requirements to 3,500 sq.ft. The existing building may be suitable, but remodeling cost would probably equal those for a new building.

Piping for Single Pump

12" diameter ductile iron pipe from river north until pipeline pressure is less than 200 psi
   82,166 feet @$28.89 per foot  
   $2,373,776

12" diameter PVC from end of ductile iron pipe to crest of Twenty Mile Hill
   18,358 feet @$23.05 per foot  
   423,152

10" diameter PVC from crest of Twenty Mils Hill to raw water tanks south of Midwest
   78,635 feet @$19.06 per foot  
   1,498,783

10" diameter PVC from raw water tanks to Midwest's existing treatment facility
   31,778 feet @$20.19 per foot  
   641,598

   $4,937,309

Appurtenances

Air-vacuum valves, pressure reducing and pressure sustaining valves, blow-off and gate valves, telemetry, revegetation  
$ 493,427

Pumps - three pumps for maximum pumping  
201,900

Alternate 1B Total Comparative Cost  
$6,356,186
ALTERNATIVE 2

TREATMENT LOCATION AT MIDWEST (NEW SITE LOCATION) USING SAME TREATMENT
METHOD AS CURRENTLY EXISTS. SERVICE FOR EDGERTON/MIDWEST ONLY.

Pressure Filter Treatment - Capacity 1.45 cfs

This method must be divided into two phases, because it includes the addition of nine (9) more pressure filters over a period of 50 years. The initial improvements will cover a 20 year design period, the remainder assumed to be added at the end of that time.

Immediate Additions

1. Treatment Units - 3 skid mounted pressure filters, CWT Model ADF-720 (140 gpm instantaneous capacity each) with automatic backwash, including surface wash, and filter to waste capability. $ 47,300

2. Existing Treatment Units - Move to new location 10,000

3. Chemical Addition - Three each; 200 gallon mix tank, 1 hp tank mixer, duplex chemical metering pumps, injectors 28,600

4. Mixing - In-line mixer, 4,200

5. In-Line Turbidimeters - Two, plumbed to monitor any unit or total production 8,000

COSTING

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>$222,300</td>
</tr>
<tr>
<td>Piping</td>
<td>4,158,111</td>
</tr>
<tr>
<td>Appurtenes</td>
<td>497,197</td>
</tr>
<tr>
<td>Pumps</td>
<td>78,148</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$4,955,756</td>
</tr>
</tbody>
</table>

D-5
6. Chlorinator - Existing, moved from previous location 2,000
7. Wastewater Pond - 120 x 120 x 6 feet deep, to store all wastewater from 10 days at maximum operation 13,100
8. Wastewater Recycle - One pump with well screen, 50 gpm
9. Piping - Supply, backwash, and drain 22,300
10. Major Electrical Equipment
11. Housing - Steel building, 2100 square feet 31,500
12. Interior Building Finishing 7,600
13. Concrete Slabs & Foundations 16,200
14. Fenced Land - 0.6 acre, 800 feet of security fence

Alternatively to items 8 & 9, wastewater may be disposed to the Midwest or Edgerton sewer system. This also reduces land requirements to 3400 square feet.

INITIAL CAPITAL COST $ 190,800

Additions in the 2008

1. Treatment Units - 2 additional skid mounted pressure filters, Model ADF-720 (140 gpm instantaneous capacity each) $ 31,500

$ 222,300

Piping for Dual Pump Stations

10" diameter PVC from river to raw water storage tanks south of Midwest
179,159 feet @$19.06 per foot $3,414,771

10" diameter PVC raw water tank to location of new treatment facility by way of highway right-of-way
33,000 feet @$19.06 per foot 628,980

10" diameter PVC from new treatment facility to treated water storage tank
6,000 feet @$19.06 per foot 114,360

$4,158,111
### Appurtenances

Air-vacuum valves, pressure reducing and pressure sustaining valves, blow-off and gate valves, telemetry, revegetation  

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumps - 4 pumps for first 20 years</td>
<td>$471,974</td>
</tr>
<tr>
<td>With two additional pumps thereafter</td>
<td>$57,148</td>
</tr>
<tr>
<td>Pump House and power</td>
<td>$21,000</td>
</tr>
<tr>
<td><strong>Alternate 2 Total Comparative Cost</strong></td>
<td>$4,955,756</td>
</tr>
</tbody>
</table>
ALTERNATIVE 3A

TREATMENT LOCATION AT MIDWEST (NEW SITE) USING PACKAGE TREATMENT SIZED TO SERVICE EDGERTON/MIDWEST ONLY.

Package Treatment Plant

1. Treatment Unit - Microfloc Trident Model 3xTR-210A, upgraded to include a second turbidimeter, filter to waste, and additional corrosion protection for 50-year life.  
   $357,700

2. Clearwell - Concrete, 75,000 gallon capacity  
   130,300

3. Backwash Pumps - 2 x 1,400 gpm capacity, suction from clearwell.

4. High Pressure Surface Wash Supply - From service line, with backflow prevention  
   3,350

5. Service Pumps - 3 x 325 gpm at 80 psi (25 hp)  

COSTING

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>$579,050</td>
</tr>
<tr>
<td>Piping</td>
<td>4,158,111</td>
</tr>
<tr>
<td>Appurtenances</td>
<td>497,197</td>
</tr>
<tr>
<td>Pumps</td>
<td>78,148</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$5,312,506</strong></td>
</tr>
</tbody>
</table>
6. Chlorinator - Existing, moved from previous location  
7. Wastewater Pond - 120 x 120 x 6 feet deep, to store all wastewater from 10 days at maximum operation.  
8. Wastewater Recycle - One pump with well screen, 50 gpm  
9. Piping - Supply, backwash, surface wash and drain  
10. Air, Instrumentation and Major Electrical  
11. Housing - Steel building, 2100 square feet  
12. Interior Building Finishing  
13. Concrete Slabs & Foundations  
14. Fenced Land - 0.6 acre, 800 feet of security fence  

Alternatively to items 7 & 8, wastewater may be disposed to the Midwest or Edgerton sewer system. This also reduces land requirements to 3500 square feet. The existing building may be suitable, but remodeling costs would probably equal those for a new building.

TOTAL CAPITAL COST  

$579,050

Piping

10" diameter PVC from river to raw water storage tanks south of Midwest  
179,159 feet @$19.06 per foot  
$3,414,771

10" diameter PVC from raw water tank to treatment facility by way of highway right-of-way and thence to treated storage tank  
39,000 feet @$19.06 per foot  
$743,340

Appurtenances

Air-vacuum valves, pressure reducing and pressure sustaining valves, blow-off and gate valves, telemetry, revegetation  
$ 497,197

Pumps - 4 pumps for first 20 years  
With two additional pumps thereafter  
$28,574  
$ 57,148

Pump House and power  
$ 21,000

Alternate 3A Total Comparative Cost  
$5,312,506
ALTERNATIVE 3B

TREATMENT LOCATION AT MIDWEST - NEW SITE - USING SLOW SAND FILTERS. PIPELINE AND WATER SOURCE REQUIREMENTS SZIED TO SERVICE EDGERTON/MIDWEST ONLY.

Slow Sand Filtration Treatment - Capacity 1.45 cfs

1. Treatment Unit - 4 open concrete cells, 50 x 50 x 7 feet deep, reinforced to resist lateral ice pressure $124,800
2. Underdrains - 52 feet of 12-inch, 60 feet of 10-inch, 36 feet of 8-inch, 36 feet of 6-inch and 12 feet of 4-inch PVC pipe; 1456 feet of 2-inch and 1870 feet of 1&1/2-inch PVC screen; and 105 cubic yards of underdrain gravel 27,800
3. Initial Sand Charge - 1120 cubic yards
4. Clearwell - Concrete, 25,000 gallon capacity 32,600
5. Service Pumps - 3 x 325 gpm at 80 psi (25 hp)
6. Pump controls - Electronic, based on clearwell level 1,500
7. Chlorinator - Existing, moved from previous location 2,000

D-10
8. Piping - Supply and drain  

9. Pump & Chlorination Housing - 20 x 20 metal building over clearwell  

10. Fenced Land - 0.6 acre, 800 feet of security fence  

Piping  

10" diameter PVC from river to raw water storage tanks  
179,159 feet @$19.06 per foot  

10" diameter PVC from raw water storage to treatment facility by way of highway right-of-way and thence to treated storage tank  
39,000 feet @$19.06 per foot  

Appurtenances  

Air-vacuum valves, pressure reducing and pressure sustaining valves, blow-off and gate valves, telemetry, revegetation  

Pumps - 4 pumps for first 20 years  
With two additional pumps thereafter  

Pump House and power  

Alternate 3B Total Comparative Cost  

---

$218,500

$3,414,771

743,340

$4,158,111

$ 497,197

$ 57,148

$ 21,000

$4,951,956
APPENDIX "E"

DETAILED COST BREAKDOWN FOR PREFERRED ALTERNATIVE

- TREATMENT -

- PIPELINE -
Cost Summary for Alternative 2 - Preferred Treatment
Existing Treatment, Located at Edgerton-Midwest

This method is divided into two phases, because it includes the addition of 5 more pressure filters over a period of 50 years. The initial improvements will cover a 20 year design period, the remainder are assumed to be added at the end of that time.

Immediate Additions

1. Treatment Units - 3 skid mounted pressure filters, IWT Model ADF-720 (140 gpm instantaneous capacity each) with automatic backwash, including surface wash, and filter to waste capability $47,300
2. Existing Treatment Units - Move to new location 10,000
3. Chemical Addition - Three each; 200 gallon mix tank, 1 HP tank mixer, duplex chemical metering pumps, injectors 28,600
4. Mixing - In-line mixer 4,200
5. In-line Turbidimeters - Two, plumbed to monitor any unit or total production 8,000
6. Chlorinator - Existing, moved from previous location 2,000
7. Piping - Supply, backwash, and drain 22,300
8. Air, Instrumentation and Major Electrical 35,400
9. Housing - Steel building, 2100 square feet 31,500
10. Interior Building Finishing 7,600
11. Concrete Slabs & Foundations 16,200
12. Land - 3,500 square feet 500

A previous study had assumed that filter backwash would be recycled through a pond back to the plant. It has been decided to waste the backwash to the Midwest sewer system. Cost of extending the sewer is not shown in this estimate.

Subtotal $213,600

Contingencies, @ 15% 32,000
Design Engineering, @ 10% 21,375
Construction Engineering, @ 10% 21,375

INITIAL CAPITAL COST $288,350

Addition treatment equipment in the year 2010

1. Treatment Units - 2 additional skid mounted pressure filters, model ADF-720 (140 gpm instantaneous capacity each) $ 31,500

Contingencies, @ 15% 4,700
Design Engineering, @ 10% 3,160
Construction Engineering, @ 10% 3,160

ADDITIONAL COST IN 2010 $ 42,520

$330,870
**Sanitary Sewer**

8" from treatment location to existing sewer in "A" Street

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Unit Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot; PVC SDR35 - 1660 Lineal Feet @ $15.00/L.F.</td>
<td></td>
<td></td>
<td>$24,900</td>
</tr>
<tr>
<td>48&quot; Diameter manholes - 6 each @ $1500.00/EA.</td>
<td></td>
<td></td>
<td>9,000</td>
</tr>
<tr>
<td>Pavement patch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4&quot; asphalt plus 8&quot; base - 1200 Sq.Yd. @ $16.00/S.Y</td>
<td></td>
<td></td>
<td>19,200</td>
</tr>
</tbody>
</table>

Subtotal $53,100

15% Construction Contingency $8,000
10% Construction Engineering $5,300
10% Design Engineering $5,300

Total Sewer $71,700

TREATMENT/SEWER TOTAL $402,570
Costs of Drilling Two 32-Foot North Platte River Replacement Wells for the Edgerton-Midwest Water Supply Project

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling &amp; Mobilization (Watson Well Service)</td>
<td>$10,400</td>
</tr>
<tr>
<td>Completion, including setting the casing, installing gravel pack, installing the bentonite seal, and surface grouting</td>
<td>$600</td>
</tr>
<tr>
<td>Development, including swabbing, surging and airlift pumping</td>
<td>$1,800</td>
</tr>
<tr>
<td>Testing, including an 8-hour step test and a 36 hour constant rate test, using the WWC pump rig</td>
<td>$3,000</td>
</tr>
</tbody>
</table>

**Major material costs (per well)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 feet of 16-inch Johnson low carbon well screen, @ $100.10/ft.</td>
<td>$1,001</td>
</tr>
<tr>
<td>20 feet of 16-inch API casing (0.375-inch casing wall) for upper blank section, @ $32.50/ft.</td>
<td>$650</td>
</tr>
<tr>
<td>2 feet of 16-inch API casing (0.375-inch casing wall) for lower blank section, @ $32.50/ft.</td>
<td>$65</td>
</tr>
<tr>
<td>Bottom plate, @ $84.70</td>
<td>$85</td>
</tr>
<tr>
<td>3 weld rings, @ $108.90</td>
<td>$327</td>
</tr>
<tr>
<td>Freight, at 10%</td>
<td>$213</td>
</tr>
<tr>
<td><strong>Subtotal for two wells</strong></td>
<td>$4,680</td>
</tr>
</tbody>
</table>

**Professional Services**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling - 3 days @ 10 hr/day, $55/hr</td>
<td>$1,650</td>
</tr>
<tr>
<td>Completion - 1 day @ 10 hr/day, $55/hr</td>
<td>$550</td>
</tr>
<tr>
<td>Development - 1 day @ 10 hr/day, $55/hr</td>
<td>$550</td>
</tr>
<tr>
<td>Testing - 5 days @ 10 hr/day, $85/hr</td>
<td>$4,250</td>
</tr>
<tr>
<td>Test Analysis - 2 days @ 10 hr/day, $55/hr</td>
<td>$1,100</td>
</tr>
<tr>
<td>Reporting - 2 days @ 10 hr/day, $55/hr</td>
<td>$1,100</td>
</tr>
<tr>
<td>Clerical, Drafting &amp; Office Expense 10% of professional services</td>
<td>$920</td>
</tr>
<tr>
<td>Travel - 15 man-days @ $75/day</td>
<td>$1,125</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$11,245</td>
</tr>
</tbody>
</table>

**Total Cost** $31,725
Costing at Wells - Pumps and Piping

Two vertical turbine single-stage pumps with \( Q = 390 \) gpm each @ $8,500 each \[ \text{\$17,000} \]

Two controls for pumps @ $2,125 each \[ \text{\$4,250} \]

Control valving @ $2,500 each x 2 \[ \text{\$5,000} \]

External piping connections from wells to booster pump supply line @ $2,000 each x 2 \[ \text{\$4,000} \]

Concrete block buildings for wells and controls @ $6,000 each x 2 \[ \text{\$12,000} \]

Booster Pump Station No. 1

Vertical turbine six-stage pumps with \( Q = 300 \) gpm each @ $14,500 each x 2 \[ \text{\$29,000} \]

Electrical and Controls @ $1,500 each x 2 \[ \text{\$3,000} \]

Valving and Piping @ $3,625 each x 2 \[ \text{\$7,250} \]

Booster Pump Station No. 2

Vertical turbine six-stage pumps with \( Q = 300 \) gpm each @ $14,500 each x 2 \[ \text{\$29,000} \]

Electrical and Controls @ $1,500 each x 2 \[ \text{\$3,000} \]

Valving and Piping @ $3,625 each x 2 \[ \text{\$7,250} \]

Building @ $10,750 \[ \text{\$10,750} \]

Construct 6 miles of 3-phase powerline to Pump Station No. 2 @ $28,000 per mile \[ \text{\$168,000} \]

\[ \text{\$257,250} \]
Valving and Telemetry

Air vacuum valves at approximately 1,000 foot intervals - 218 valves @ $2,075 each  
$ 452,350

Special valving (i.e., pressure regulating, pressure sustaining) at 20% of Air Vacuum  
valving - 452,350 x .20 each  
90,470

Telemetry controls and cables assumed at  
$1.50/1.f. x 218,158  
$ 327,237

Total:  
$ 870,057

Piping

Section 1 from Booster Station #1 through  
Booster Station #2 to summit at Twenty-Mile Hill approximately 100,523 lineal feet  
12" CL 200 PVC material cost @ $17.00/1.f.  
Installation & labor cost @ $8.50/1.f.  
100,523 x $25.60  
$2,573,388

Section 2 from summit at Twenty-Mile Hill to  
raw water storage tanks approximately 78,640 lineal feet.  
10" CL 200 PVC material cost @ $12.10/1.f.  
Installation & labor cost @ $7.90/1.f.  
78,640 x $20.00  
1,572,800

Section 3 from raw water storage tanks through  
treatment plant to treated storage tank 39,000 lineal feet  
10" CL 200 PVC material cost @ $12.10/1.f.  
Installation & labor cost @ $7.90/1.f.  
39,000 x $20.00  
780,000

Restoration of Raw Water Storage Tanks

Utilizing aluminum joist with fiberglass cover  
@ $130,000 per tank x 2  
$ 260,000

Sandblast and paint tanks inside & outside  
@ $90,000 per tank x 2  
$ 440,000

Total:  
$ 700,000
Reclamation of Disturbed Land Along Pipeline Route

Pipeline route - 218,518 lineal feet of pipe
@ 100 feet of width and at a cost of .02 per square foot
\[ 218,518 \times 100 \times 0.02 \] $437,036

Highway/Road Crossings

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burlington Northern Railroad (bore)</td>
<td>$5,000</td>
</tr>
<tr>
<td>First Street (casing in place)</td>
<td>3,000</td>
</tr>
<tr>
<td>I-25 frontage ramp 2 ea. @$20,000 (bores)</td>
<td>40,000</td>
</tr>
<tr>
<td>I-25 main line crossing (major bore)</td>
<td>70,000</td>
</tr>
<tr>
<td>Events Drive (bore)</td>
<td>5,000</td>
</tr>
<tr>
<td>Amoco Road (bore)</td>
<td>5,000</td>
</tr>
<tr>
<td>Highway 259 (2 each) open cut</td>
<td>6,000</td>
</tr>
<tr>
<td>Highway 387 (bore)</td>
<td>5,000</td>
</tr>
</tbody>
</table>

$139,000

Land Acquisition

The pipeline will cross approximately 360 acres of privately owned land throughout its length. It was assumed the right-of-way width would be 100 feet. A cost of 500.00/acre was assumed as the maximum value of the right-of-way
\[ 360 \text{ acres} \times \$500/\text{acre} \] $180,000

Subtotal $7,322,786

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>15% Construction Contingency</td>
<td>$1,098,420</td>
</tr>
<tr>
<td>10% Construction Engineering</td>
<td>732,300</td>
</tr>
<tr>
<td>5% Design Engineering</td>
<td>366,100</td>
</tr>
</tbody>
</table>

PIPELINE TOTAL $9,519,606

E-6
APPENDIX "F"

MEETING SUMMARIES

AUGUST 5, 1988 MEETING

SEPTEMBER 29, 1988 MEETING
Meeting with WWDC and Sponsors to decide alternatives for costing.

Where: WLCJ office

When: August 5, 1988, 9:00 AM

In attendance: Maxine Patterson, Mayor - Town of Edgerton  
Cedar Chaffin, Mayor - Town of Midwest  
Evan Green, Project Manager - WWDC staff  
Mike Besson, Engineer for Town of Midwest  
Paul Rechard, Project Manager - WWC  
Tom Mueller, Project Engineer - WWC  
Terry Titus, Project Manager - WLCJ  
Doran Boston, Project Engineer - WLCJ  
Steve Kurtz, Planner - WLCJ

The following was presented and discussed:

The purpose of the meeting was to comply with Task 4 to present alternatives and make recommendations concerning various combinations of source/treatment/service area from which 3 alternative would be selected for costing.

A table showing the various alternatives and a brief description with advantages and disadvantages was handed out. Paul went over his letter to WWDC, Mike Purcell, requesting information on water source from Stage II and Deer Creek. Tom explained the table and went through each alternative. Discussion followed in which the alternatives involving the BPU were decided to be unusable due to the complexity of the existing BPU structure and the difficulty in modifying that structure through the BPU and the City Council. Tom went over the other alternatives with regard to cost of each.

A discussion of the service area began with a question from Cedar with Terry stating briefly that Steve had written up the service area and a copy given to all present with the recommendation that the pipe line not be sized for the intervening service area. Maxine expressed her concern for not servicing as many people as possible to keep cost for the Towns to a minimum. Steve responded by stating that he had received a letter from the County Planner, Max Torbert, that indicated growth potential between Casper and Midwest was minimal and in fact may be on the decline. A copy of this letter was given out.

Evan stated that with his recent experience with the Sheridan water project, if a group wanting water was not organized or had formed a district than they (those wanting water) would not be considered a part of the total service group. This implied that if there were no established groups between Casper and Midwest wanting water then no service would be assumed for them.

The question of what population projections should be used to quantify the water needed was raised. Paul had used the Black and Veach projections from the Banner report of March 1988 which were higher than the DAFC projections which Steve used to quantify water demand for the intervening service area. As this could not be resolved, Evan stated he would get with Purcell for an answer.
It was then decided that the following alternatives would be costed:

1. A maximum sized system with treatment facilities at the N. Platte River servicing intervening areas. The pipe line sized just for Midwest/Edgerton needs. Then an additional cost to over-size the pipe line to service the intervening area with that cost paid for entirely by the WWDC.

2. A minimum system with treatment at Midwest, expanding their existing pressure filters, and a pipe line sized just for the Midwest/Edgerton needs.

3. A modified system with treatment at Midwest using new treatment systems (i.e. conventional package treatment vs. slow sand filtration) and a pipe line sized just for Midwest/Edgerton needs.

All of the alternatives assume a new source from the N. Platte River using Stage II or Deer Creek water along with the existing Midwest water right.

The discussion turned to the existing taps and what would be done with them when the new pipe line installed. Evan asked if Cedar could locate agreements that were supposedly signed with the users. Cedar said he would look for them. Evan then stated that EPA may have some concern for tapping a raw water line and he would contact them to see what their policy was.

Meeting ended with a feeling that much had been accomplished.

Follow-up to items raised at 8/5/88 meeting received from Evan Green by phone on 8/8/88:

1. Use DAFC population projections for water quantity needs.

2. Must include in our write-up of alternatives rejected costs and disadvantages of using the BPU as source/treatment as Purcell needs for his explanation.

3. EPA will allow taps on a raw water line as long as there is an agreement of understanding with the user that the water is raw, untreated for non-domestic use only.
Meeting with Sponsors and WWDC to present alternative costing on the Edgerton/Midwest Water Supply Project.

Where: Town of Midwest, Town Hall

When: September 29, 1988, 7:00 PM

In attendance: Maxine Patterson, Mayor - Town of Edgerton
Cedar Chaffin, Mayor - Town of Midwest
Susan Ashbeck, Council member - Midwest
Mary O'Conner, Council member - Midwest
John VanderVoort, Council member - Midwest
Mike Besson, Engineer for Town of Midwest
Charlie Scott, State Senator - Natrona County
Evan Green, Project Manager - WWDC staff
Paul Rechard, Project Manager - WWC
Tom Mueller, Project Engineer - WWC
Terry Titus, Project Manager - WLCJ
Doran Boston, Project Engineer - WLCJ
Joe Feeley, Engineer - WLCJ
Steve Kurtz, Planner - WLCJ

The following was presented and discussed:

The purpose of the meeting was to comply with Task 7 - Preparation of Preliminary Cost Estimates for the three selected alternatives, and Task 8 - Selection of Preferred Alternative.

The three selected alternatives were actually broken down into five separate costings. They were: 1A - Treatment at the N. Platte River and a pipeline to carry water for Edgerton/Midwest only. 1B - Treatment at the N. Platte River and a pipeline to carry water for Edgerton/Midwest and the intervening users. 2 - Treatment at Midwest using the same method as currently being used (pressure filters) and a pipeline sized for Edgerton/Midwest only. 3A - Treatment at Midwest using a package treatment plant and a pipeline sized for Edgerton/Midwest only. 3B - Treatment at Midwest using a slow sand filter and a pipeline sized for Edgerton/Midwest only. These five alternatives were briefly explained to the group by Terry.

Tom proceeded to explain the various treatment options (pressure filter, package plant, slow sand filter) in detail. Questions were raised by Charlie concerning the advantages of one system over another. The pressure filter required less operator attention and would not need additional pumps to pump the water from the treatment location to the north storage tank as there was enough head from the south storage tanks to drive the water through the filters and up to the north tank. The package system required considerably more operator involvement plus more sophisticated equipment, more land for the plant, additional pumps to pump to the north tank and a wastewater pond. The capital cost for this system was also the most expensive. The slow sand filter was similar to the pressure filter except the water was exposed to air during filtration which required the water to be pumped to the north storage tank and could require additional land if a recirculation pond were constructed. The costs of the pressure filter and slow sand filter were comparable. A more detailed breakdown with costs for all the alternatives was handed out to all present.
Doran then explained the different costs associated with the pipeline. These included the pipe material differences depending on whether a single pump or duel pump system were used. If a single pump were used at the river then ductile iron (D.I.) pipe would be required due to the higher pump pressure. If a duel pump system were used to lift the water in stages, then polyvinyl chloride (PVC) pipe could be used as lower pressures are required. The D.I. pipe is more expensive than the PVC. It was further pointed out that the use of a duel pump system could allow for future expansion, if required, simply by adding additional pumps and operating the system at a higher pressure. Doran also went over the proposed rerouting of the pipeline from the south storage tanks to the new treatment location near the highway intersection. The reroute would be along the highway right-of-way instead of through the Amoco oil field where the existing pipeline runs. A cost savings could be realized as the number of existing pipeline crossings and conflicts in the highway right-of-way would be less than in the existing location. Again, the write up of the alternatives contained a more detail breakdown of the pipeline costs.

After some discussion amongst the group concerning the advantages, disadvantages and costs of the various alternatives, Evan proceeded to direct the mayors and council members through the process of selecting the preferred alternative. Alternative 2 was selected as the preferred alternative using the pressure filter system located at Midwest, duel pumps sized to service Edgerton/Midwest only, and PVC pipeline (10") with a reroute from the south storage tanks along the highway right-of-way to the highway intersection at Midwest.
EDGERTON/MIDWEST WATER SUPPLY PROJECT

1" = 1 MILE

ADJACENT LAND OWNERS
- OWNERS CROSSED BY MIDWEST LINE

T39N

1 SLM
2 STATE OF WYOMING
3 EDGERTON
4 MIDWEST
5 VI SHEEP COMPANY
6 PATRICK J. BESLEY
7 TOWNSITE OF LAVOYE
8 RAY M. FRANKS
9 MYRTLE F. BROPHY
10 ARCO PIPELINE
11 TEAPOT RANCH COMPANY
12 MET FARM AND RANCH PROPERTIES
13 SKYLINE RANCHES
14 J. L. WILSON
15 AMOCO PRODUCTION
16 BURKE SHEEP COMPANY
17 ANTELOPE HILLS NO. 3
18 FORGEY RANCH COMPANY
19 ANTELOPE HILLS NO. 3
20 LAWSON E. MIDDAGA
21 S. R. BROOKS COMPANY
22 ARTHUR LEE SCOTT
23 JUSTIN IRVIN YOUNG
24 H. E. STUCKENHOFF
25 CAPSHAW PROPERTIES
26 ENGLEWOOD NO. 3
27 RAY ATKINS
28 ALBERT KING
29 MRS. HARVEY DAIGLE
30 H. M. BROUILLETTE
31 BOB RUPFRACKT
32 CITY OF CASPER
33 AMOCO OIL
34 ANTELOPE HILLS NO. 1
35 JOHN L. BUCKINGHAM
36 DSBINA L. LAGASEOTES
37 GREY MAK PIPE
38 MERLON E. CARPENTER
39 PAUL LOWHAM
40 WESTBURN DRILLING
41 KRI INTERNATIONAL
42 U WYO FOUNDATION
43 HARRY FARRAR
44 EMMA NIGHTWINE
45 BETTE GOTTFRIED
46 PACIFIC POWER
47 SIGNON PROPERTIES
48 W. N. BARNHART
49 RALPH HERTHURP
50 JEANETTE STONEKING
51 HOMER HAGERTY
52 H. E. RICHARDSON
53 WOTTO
54 TOWN MILL
55 B. W. WHISNER
56 KULTER TANK
57 R. WALTER WYKAMR
58 CANW
59 BURLINGTON NORTHERN

T36N

LOT OWNERS ALONG PIPELINE IN ANTELOPE HILLS 2 AND 3

50 VILLA M. IRVINE ESTATE
51 JAMES WILLSON
52 VAN WILLSON
53 FORGEY
62 ANTELOPE HILLS NO. 2
54 WILLIAM LIE
55 JAMES RORUMAN

T35N

T34N

T33N