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EXECUTIVE SUMMARY

**WATER SUPPLY PROJECT
FOR THE TOWNS OF
EDGERTON AND MIDWEST**

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PREPARED FOR:

WYOMING WATER DEVELOPMENT COMMISSION
HERSCHLER BUILDING, THIRD FLOOR
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PREPARED BY:

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MARCH 1, 1988



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USEFUL CONVERSION FACTORS

1 cubic foot/second [cfs]	448.8 gallons/minute [gpm]
1 cfs	0.646 million gallons/day [MGD]
For 24 hours	1.983 acre-feet
For 30 days	59.5 acre-feet
For 1 year	724 acre-feet
1 MGD	694 gpm
1 MGD	1.55 cfs
For 24 hours	3.07 acre-feet
For 30 days	92.1 acre-feet
For 1 year	1,120 acre-feet
1,000 gpm	2.23 cfs
1,000 gpm	1.44 MGD
For 24 hours	4.42 acre-feet
For 30 days	132.5 acre-feet
For 1 year	1613 acre-feet
1 acre-foot	43,560 cubic feet
1 acre-foot	325,829 gallons
1 acre	43,560 square feet

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1.0 INTRODUCTION

1.1 Project Authorization

The 1986 session of the Wyoming Legislature authorized the Wyoming Water Development Commission (WWDC) to complete an investigation to identify and evaluate potential water supply sources to meet the future demands of the Wyoming towns of Edgerton and Midwest. The WWDC, under Contract No. 9-00476, authorized TriHydro Corporation to complete the investigation which included both ground-water and surface water supply alternatives. TriHydro Corporation subcontracted all water demand and surface water supply tasks of the investigation to Banner Associates, Inc.

1.2 Accompanying Report

This report is an executive summary of a water demand and water supply investigation detailed in the accompanying report Water Supply Project for the Towns of Edgerton and Midwest prepared by TriHydro Corporation and Banner Associates, Inc.

1.3 Project Description and Scope

The proposed water development project is intended to meet the combined water needs of the towns of Edgerton and Midwest projected through the year 2030.

The major components of this investigation include:

- o Projections of the quantity of water anticipated to meet current and future water demands of the towns.
- o Identification of potential surface water and ground-water supply alternatives capable of meeting the anticipated water needs of the towns.

- o Location, drilling and testing of a ground-water well.
- o Preparation of reconnaissance level designs and reliability analyses on each of the alternatives identified.
- o Development of cost estimates to compare water supply alternatives.
- o Selection of the most feasible water supply alternative.
- o Development of the preferred water supply plan.

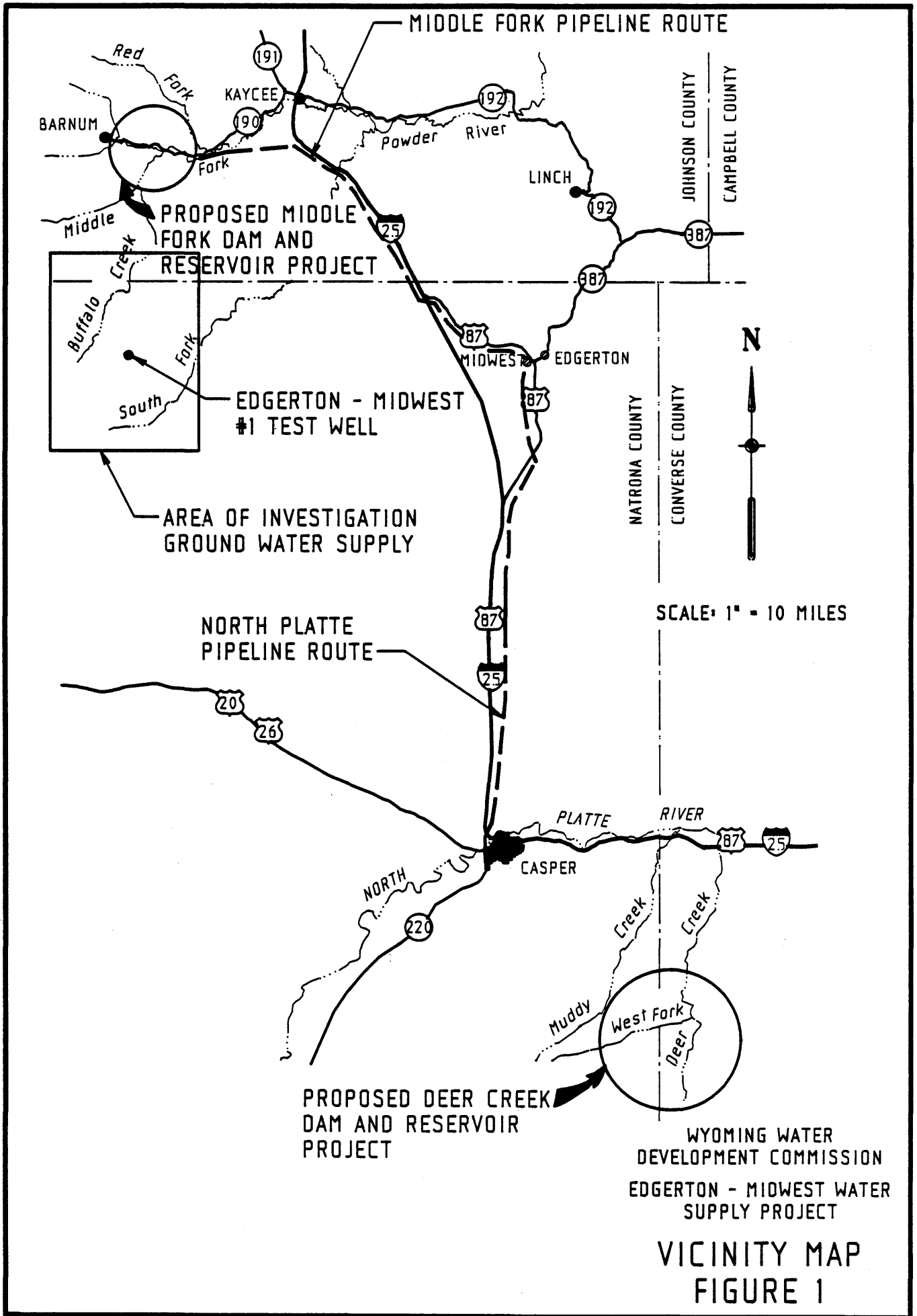
1.4 Project Setting

The project area is located in the southwestern part of the Powder River Basin in east-central Wyoming. A vicinity map of the project area and potential water supply sources and water delivery alternatives is shown on Figure 1 on the following page.

2.0 POPULATION AND WATER DEMAND PROJECTIONS

Existing reports, information and data were compared and evaluated to forecast population growth and to estimate future water demand and storage requirements for Edgerton and Midwest. A summary of the projections is presented in Table 1.

Upon evaluation of several previous reports applicable to this investigation, the report entitled Water Supply Needs Assessment for the North Platte and Little Snake River Drainage, prepared for the Wyoming Water Development Commission by Black & Veatch (1984), was selected as the most appropriate analysis for projecting population and water demand for Edgerton and Midwest. According to the Black & Veatch report, the population of Edgerton is projected to be 1,493 and the population of Midwest is projected to be 1,920



in the year 2030. Average annual water demand projections were based on estimated average day consumption rates of 150 gallons per capita per day (gpcpd) for Edgerton and 200 gpcpd for Midwest. Peak daily water demand projections were based on estimated peak day consumption rates of 413 gpcpd for Edgerton and 550 gpcpd for Midwest. Projected treated water storage includes required operational storage, emergency storage and fire storage.

Table 1. Projected Population Growth, Water Demand and Storage Requirements for Edgerton and Midwest Combined

<u>Year</u>	<u>Population</u>	<u>Average Annual Demand (acre-ft/yr) (1)</u>	<u>Peak Daily Demand (cfs) (2)</u>	<u>Total Storage (mg) (3)</u>
1980	1,148	228.6	0.87	0.88
1985	1,278	254.5	0.97	0.96
1990	1,425	283.9	1.08	1.05
1995	1,592	317.2	1.21	1.15
2000	1,771	353.0	1.34	1.38
2005	1,980	394.9	1.50	1.51
2010	2,208	440.5	1.67	1.65
2015	2,460	490.7	1.86	1.81
2020	2,755	549.9	2.09	2.23
2025	3,060	610.4	2.32	2.41
2030	3,413	681.0	2.59	2.63

- (1) acre-ft/yr = acre-feet per year
(2) cfs = cubic feet per second
(3) mg = million gallons

3.0 WATER SUPPLY ALTERNATIVES

3.1 Ground-Water Supply Alternatives

The Town of Edgerton currently obtains its water from wells located east of town. This well field is considered to have little potential for future ground-water supply development due to unacceptable water quality or well

yield. Several sites with potential for ground-water development were evaluated, but only one alternative exhibited sufficient potential for providing a ground-water supply that would meet the water quantity and quality requirements of the project. However, a hydrogeologic analysis of the most favorable site, which included drilling a Madison Formation test well located approximately thirty miles west of Midwest, lead to the conclusion that ground water was not a viable option to provide the needed water supply.

3.2 Surface Water Supply Alternatives

Of the two towns, only Midwest has a surface water right. Water is diverted from the North Platte River near Casper, Wyoming, and conveyed through approximately forty miles of steel pipeline to a treatment plant in Midwest. This water right of 0.63 cfs is insufficient to meet the estimated current peak day water demand for both communities nor the projected peak day and average annual water demands.

The following surface water alternatives were identified and evaluated as potential water sources to meet the combined needs of Edgerton and Midwest:

- o Alternative No. 1 - Surplus water from the Cheyenne Stage II project
- o Alternative No. 2 - Deer Creek Reservoir
- o Alternative No. 3 - Agricultural water rights
- o Alternative No. 4 - Treated water from the City of Casper
- o Alternative No. 5 - Middle Fork Reservoir

The first three alternatives would divert water from the North Platte River near Casper and differ only in their respective water sources. For

Alternative No. 1, the City of Cheyenne is projected to have surplus water from its Stage II project available to other users until about the year 2011. Deer Creek Reservoir, which would be the water supply for Alternative No. 2, is proposed for construction by the State of Wyoming and would provide storage for municipal and industrial users. Alternative No. 3 would require purchasing and changing existing agricultural water rights to municipal use and construction of a storage reservoir. These three alternatives would require a new 41.1 mile long pipeline and pumping facilities to divert water from the North Platte River near Casper and deliver it to Edgerton and Midwest. The existing treatment plant in Midwest would be decommissioned and a new treatment plant capable of meeting the needs of both towns would be constructed. Additional treated water storage would be necessary after the year 2005 to meet projected storage requirements.

For Alternative No. 4, the treated water distribution system of the City of Casper would be tapped to supply potable water to Edgerton and Midwest. This alternative is contingent on Casper obtaining a new long-term water supply such as the proposed Deer Creek Reservoir. The water delivery system would require pipeline, pumping and storage facilities similar to the first three alternatives.

Alternative No. 5 would use stored water from the proposed Middle Fork Reservoir conveyed through approximately 36.5 miles of pipeline to Midwest. Construction requirements would include the pipeline, pumping stations, a raw water storage tank, a new treatment plant and additional treated water storage facilities.

4.0 COST ESTIMATES

Estimates of initial construction and annual costs were developed for each surface water supply alternative. Cost estimates were not developed for a ground-water supply alternative. The estimated initial construction costs are shown in Table 2. Estimated annual costs per 1000 gallons were computed for two alternative methods of financing and are shown in Table 3.

Table 2. Summary of Initial Project Development Costs
(1990 Dollars)

<u>Alternative</u>	<u>Water Delivery System</u>	<u>Water Treatment Plant</u>	<u>Total</u>
No. 1. North Plate River - Surplus Stage II	\$10,842,000	\$774,000	\$11,616,000
No. 2. North Plate River - Deer Creek Reservoir	10,842,000	774,000	11,616,000
No. 3. North Plate River - Agricultural Water	15,052,000	774,000	15,826,000
No. 4. North Plate River - Casper Treated Water	10,460,000	17,000	10,477,000
No. 5. Middle Fork Reservoir	12,241,000	774,000	13,015,000

Table 3. Summary of Annual Water Costs Per 1000 Gallons
 Estimated for 1992 for All Alternatives
 (1992 Water Delivery = 97 mg)

Alternative No. 1: North Platte River - Surplus Stage II
 Alternative No. 2: North Platte River - Deer Creek Reservoir
 Alternative No. 3: North Platte River - Agricultural Water Rights
 Alternative No. 4: North Platte River - Casper Treated Water
 Alternative No. 5: Middle Fork Reservoir

Item	No. 1	No. 2	<u>Alternative</u> No. 3	No. 4	No. 5
1. Debt Service - Water Delivery System					
A. Method 1 (1)	\$1.72	\$1.72	\$2.38	\$1.66	\$1.94
B. Method 2 (2)	5.20	5.20	7.22	5.02	5.88
2. Debt Service - Water Treatment Plant (2)	0.37	0.37	0.37	0.01	0.37
3. Pumping	0.44	0.44	0.55	0.42	0.09
4. O&M - Water Delivery System	0.21	0.21	0.26	0.19	0.16
5. O&M - Water Treatment Plant	0.15	0.15	0.15	0.05	0.15
6. Water Purchase	0.00 (3)	0.00 (3)	0.00	1.01	0.35
7. Expansion Sinking Fund	<u>0.10</u>	<u>0.10</u>	<u>0.12</u>	<u>0.08</u>	<u>0.08</u>
Total Annual Costs - Method 1 (4)	\$2.99	\$2.99	\$3.84	\$3.42	\$3.15
Total Annual Costs - Method 2 (4)	\$6.47	\$6.47	\$8.68	\$6.78	\$7.09

- (1) Method 1 - Finance with a 67% Grant and a 33% Loan @ 4% for 50 years.
 (2) Method 2 - Finance with a 100% Loan @ 4% for 50 years.
 (3) No water purchase requirements for 1992; Midwest water right adequate.
 (4) Total annual costs do not include distribution system costs within the towns.

The initial project development and annual costs of treated water delivered to Edgerton and Midwest in the year 1992 were estimated based on the following assumptions:

- o The project would be bid and construction would begin in 1990; construction would be completed by the end of 1991.
- o The first full year of operation would be 1992.
- o The communities would receive either a 67% grant for constructing water delivery facilities under the Method 1 financing plan, or no grant assistance under Method 2.
- o The communities would receive either a 33% loan for constructing water delivery facilities amortized at 4% over 50 years under the Method 1 financing plan, or a 100% loan under Method 2.
- o The communities would receive a 100% loan for treatment plant construction amortized at 4% over 50 years.
- o Only initial construction would be included in the grant and loans.
- o The communities would receive no financial assistance for future costs to expand pumping facilities.
- o Operation, maintenance, and power costs were projected for the first year of operation (1992).
- o 297.5 acre-feet (97 mg) of water would be delivered and consumed in 1992.
- o Costs do not include current distribution charges in Edgerton and Midwest.

As shown in Table 3 the alternatives projected to produce the least expensive water, regardless of the financing method used, are the surplus Stage II and Deer Creek Reservoir alternatives. The North Platte River alternative using agricultural water rights would produce the most expensive water. Actual costs per 1,000 gallons may be higher or lower than the costs given in Table 3 depending on the validity of the assumptions stated above.

5.0 RECOMMENDED WATER SUPPLY PLAN

The only water supply alternative investigated in this report that can provide a firm water supply immediately is Alternative No. 1. This alternate would use surplus water from the Cheyenne Stage II project, which is projected to be available until the year 2011. This alternative also has the least estimated annual cost.

Agricultural water rights probably are available for purchase, but no specifics have been investigated and this alternative has the highest estimated annual cost. Deer Creek Reservoir is designed and funded, but no construction schedule has been set. Design and construction funds have not been appropriated and a project schedule has not been defined for the Middle Fork Reservoir. Finally, the City of Casper cannot release treated water to Edgerton and Midwest until Casper develops a new long-term raw water supply, such as Deer Creek Reservoir.

Based on the alternatives in this report and assuming action must be taken in the near future, the most feasible approach appears to be to begin with Alternative No. 1 by constructing the pipeline facilities from the North Platte River and use surplus Stage II water until Deer Creek Reservoir is constructed. At that time, Edgerton and Midwest could switch to Alternative No. 2 and purchase water from Deer Creek Reservoir. If Deer Creek Reservoir is not constructed, then agricultural water rights could be purchased to replace surplus Stage II water that will not be available for the entire design period.

For future planning studies, additional alternatives or extensions to the alternatives evaluated in this report should be considered. One additional alternative, which could have the potential of reducing the cost to Midwest and Edgerton, would involve serving additional entities along the pipeline route. Another approach would be to purchase surplus Stage II water or Deer Creek Reservoir water to supplement the Midwest water right, then have this water treated in the Casper water treatment plant. This water could then be delivered to the towns of Edgerton and Midwest and, in addition, could serve other entities along the pipeline route.