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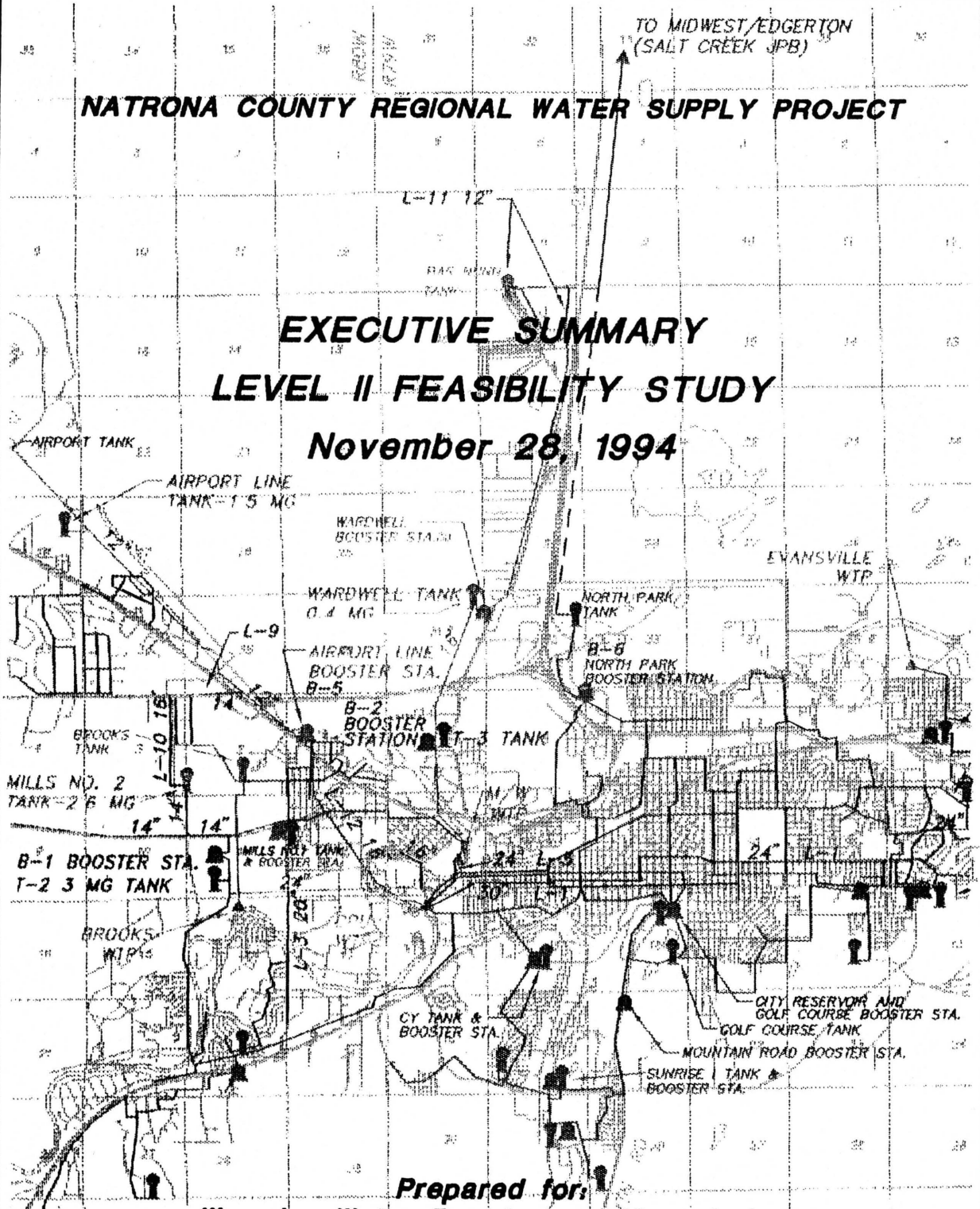
NATRONA COUNTY REGIONAL WATER SUPPLY PROJECT



EXECUTIVE SUMMARY

LEVEL II FEASIBILITY STUDY

November 28, 1994

Prepared for:
Wyoming Water Development Commission

Prepared by:
Civil Engineering Professionals, Inc.
355 North Lincoln Street
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NATRONA COUNTY REGIONAL WATER SYSTEM
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EXECUTIVE SUMMARY

NATRONA COUNTY REGIONAL WATER SUPPLY PROJECT
LEVEL II FEASIBILITY STUDY

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EXECUTIVE SUMMARY

This Executive Summary provides an overview of the Level II Feasibility Study for the Natrona County Regional Water Supply Project. Initially, the report compares the feasibility of each entity acting alone to meet future water demands and Safe Drinking Water Act (SDWA) regulations, versus regionalization. Following the feasibility evaluation, conceptual design and cost estimates are provided for the preferred alternative, regionalization.

Section 1 - Introduction

There are four major public water suppliers and many smaller water districts in the greater Casper area of Natrona County, (the City of Casper, the Mills/Wardwell Impact Joint Powers Board, the Town of Evansville, and the Brooks Water and Sewer District). These water suppliers are facing increasing difficulties in meeting water supply demands and regulations. The difficulties are primarily the result of increasingly stringent state and federal drinking water regulations being imposed by the 1986 Amendments to the Safe Drinking Water Act (SDWA). These new regulations will require modifications to the existing supply and treatment facilities of all four of the major public water suppliers.

In anticipation of the up and coming regulations, a Regional Water Systems Study Committee was organized in 1986 to examine the advantages and disadvantages of attempting to solve long-range, county-wide domestic water supply problems on a cooperative and regional basis. In 1988, the Wyoming Water Development Commission (WWDC) performed a Level I Reconnaissance Study of the potential for forming a regionalized water system in Natrona County. That Level I Study determined that regionalization of the area water systems was possible, and that regionalization had the potential to reduce water costs by a significant margin for all of the area entities except Casper, and that Casper would experience only a very slight increase.

In May 1992, Civil Engineering Professionals, Inc. (CEPI), in association with Black and Veatch and States West Water Resources Corporation was selected to perform a Level II Feasibility Study of the Natrona County Regional Water Supply Project. The purpose of this Level II Study is to determine the feasibility of developing a regional water supply system that would deliver a reliable water supply to the greater Casper area of Natrona County. The study is presented in two phases. The first phase includes development of conceptual water treatment and supply alternatives and associated cost estimates. A feasibility analysis is prepared to compare the go-it-alone alternative to the regional water system alternative. The second phase of the study presents the preliminary design and cost estimates for the preferred alternative selected in Phase I.

Section 2 - Population and Water Demand Projections

The study area for the Level II Study is shown in Figure 1. There are four major water suppliers within the study area. These suppliers and their respective customers are shown in Table 1.

TABLE 1
MAJOR WATER SUPPLIERS AND CUSTOMERS

ENTITY	ESTIMATED POPULATION 1992*
CITY OF CASPER (Casper Public Utilities Department)	
Air Base Acres Subdivision	160
Ardon Subdivision	41
Brandt-Gothberg Improvement and Service District	42
Brooks Water and Sewer District**	3,308
City of Casper	48,058
Countryside Court	120
Hanley Acres	50
Hidden Hills Improvement and Service District	16
Indian Springs Improvement and Service District	50
Masek Subdivision	50
Natrona County International Airport	58
North Platte Water and Sewer District	180
Pleasant View Water Co.	81
Rancho Mobile Home Park	35
Red Butte Village	80
Skyline Ranches Subdivision	80
Sundown Addition	50
Vista West Water Co.	746
Webb Creek Ranches Improvement and Service District	75
Westland Park Subdivision	400
Subtotal *	53,674
MILLS-WARDWELL IMPACT JOINT POWERS BOARD	
Town of Mills	1,621
Wardwell Water and Sewer District	1,582
Pioneer Water and Sewer District	499
Subtotal	3,702
TOWN OF EVANSVILLE	
Town of Evansville	1,682
Brookhurst Subdivision	170
Hat Six Improvement and Service District	50
Subtotal	1,902
BROOKS WATER AND SEWER DISTRICT*	
Brooks Water and Sewer District	3,308
OTHER DISTRICTS/SUBDIVISIONS	
Hilcrest Water Co.	30
Poison Spider Water Company	80
Sandy Lake Estates Subdivision (individual water system)	181
Ten Mile Industrial Park (non-transient pws)	50
Riverside Trailer Park	40
Midwest and Edgerton	620
Subtotal	1,001

* Population shown based upon 1992 DAFC projections
** Brooks Water and Sewer District currently has an interconnection to the City of Casper system.

Population projections were made for a 50 year planning period, through the year 2045. Three growth rates were evaluated; (1) the historic growth rate of 1.55 percent, (2) a growth rate of .70 percent as projected by DIA, and (3) a middle of the road growth rate of 1.25 percent. This study assumed an annual growth rate of 1.25 percent.

Water demand projections were calculated for each of the major entities along with the regional service area using historical water use, and an annual growth rate of 1.25 percent. The

TEN MILE IMPROVEMENT DISTRICT

NATRONA COUNTY AIRPORT (CPU)

AIR BASE ACRES (CPU)

WARDWELL WATER & SEWER DISTRICT (MWJPB)

NORTH PLATTE WATER & SEWER DISTRICT (CPU)

SANDY LAKE ESTATES

BROOKHURST (EVANSVILLE)

RIVERSIDE TRAILER COURT

VISTA WEST WATER CO. (CPU)

MASEKS SUBDIVISION (CPU)

BROOKS WATER & SEWER DISTRICT

MILLS (MWJPB)

EVANSVILLE

PLEASANT VIEW (CPU)

HAT SIX (EVANSVILLE)

BROOKS WATER & SEWER DISTRICT

PIONEER WATER & SEWER DISTRICT (MWJPB)

COUNTRY SIDE COURT (CPU)

ALLENDALE (CPU)

ARDON SUBDIVISION (CPU)

RED BUTTE (CPU)

POISON SPIDER WATER CO.

PARADISE VALLEY (CPU)

WEBB CREEK HOMEOWNERS ASSOCIATION (CPU)

SKYLINE RANCHES & WESTLAND PARK (CPU)

HILLCREST WATER CO.

INDIAN SPRINGS (CPU)

BRANDT-GOTHBERG (CPU)

LEGEND

- STUDY BOUNDARY
- SERVICE AREA
- SERVICE AREA NOT ACTIVE
- SERVICE AREA OVERLAP
- CPU SERVICE AREA

0 8000

STUDY AREA WITH SERVICE BOUNDARIES

FIGURE 1

regional service area maximum day water demands are expected to be 59.94 and 76.85 million gallons (mgd) per day in the years 2025 and 2045, respectively, as illustrated in Table 2 below.

TABLE 2
PROJECTED WATER SYSTEM DEMANDS (MGD)

	1992	2005	2015	2025	2035	2045
CASPER:						
Population	53,674	63,081	71,425	80,872	91,569	103,681
Avg. Day Demand (220)	11.81	13.88	15.71	17.79	20.15	22.81
Max. Day Demand (660)	35.42	41.63	47.14	53.38	60.44	68.43
Peak Hour Demand (1320)	70.85	83.27	94.28	106.75	120.87	136.86
EVANSVILLE:						
Population	1,902	2,235	2,531	2,866	3,245	3,674
Avg. Day Demand (220)	0.42	0.49	0.56	0.63	0.71	0.81
Max. Day Demand (660)	1.26	1.48	1.67	1.89	2.14	2.42
Peak Hour Demand (1320)	2.51	2.95	3.34	3.78	4.28	4.85
MILLS/WARDWELL:						
Population	3,702	4,351	4,926	5,578	6,316	7,151
Avg. Day Demand (220)	0.74	0.87	0.99	1.12	1.26	1.43
Max. Day Demand (660)	2.22	2.61	2.96	3.35	3.79	4.29
Peak Hour Demand (1320)	4.44	5.22	5.91	6.69	7.58	8.58
REGIONAL:						
Population	60,279	70,844	80,214	90,824	102,838	116,440
Avg. Day Demand (220)	13.26	15.59	17.65	19.98	22.62	25.62
Max. Day Demand (660)	39.78	46.76	52.94	59.94	67.87	76.85
Peak Hour Demand (1320)	79.57	93.51	105.88	119.89	135.75	153.70

Section 3 - Water Supply Sources and Water Rights

The vast majority of domestic water used within the study area is closely associated with the North Platte River, either as water diverted out of the river for treatment in area water treatment plants, or as water pumped from shallow wells in the river alluvium. These alluvial wells are concentrated within approximately one mile of the Casper and Mills/Wardwell Joint Powers Board water treatment plants (WTPs). The alluvial wells currently serve as the primary, day-to-day water source for Casper and the Mills/Wardwell water systems. The WTPs operated by these two entities serve to provide water during peak demand periods which occur during the summer months. Brooks and Evansville operate WTPs which treat raw water from the river on a year-round basis.

Casper has municipal supply water rights totaling 88 cfs (56 mgd). Mills/Wardwell has municipal water rights totalling 18 cfs (11 mgd). Evansville and Brooks municipal water rights total 3.62 cfs (2.3 mgd) and 2.3 cfs (1.50 mgd) respectively. Priority dates for Casper's rights are nearly all post-1957, making them junior to many upstream and downstream rights.

Similarly, Mills/Wardwell, Brooks and Evansville water rights are also junior to many upstream and downstream rights. While these direct flow rights if fully available, are adequate to meet Casper's and the other major water suppliers needs for the immediate future, in the long term they are not adequate. In addition, the low priority makes them subject to regulation by the Wyoming State Engineer in a low-water year.

Section 4 - Analysis of Existing Infrastructure

An analysis was performed to provide a description of the components and operation of the existing water transmission, pumping and storage systems for each of the four major water suppliers. The infrastructure analysis assumed that the regional concept and configuration proposed in the Level I study would be implemented, and examined only the infrastructure associated with that configuration. Only those portions of each water system that are considered "regionally compatible", (i.e. that would be affected by regionalization), were examined. Determining the adequacy of non-regional water transmission, distribution, pumping and storage systems was beyond the scope of this study.

For the purpose of the analysis, the regional concept as presented in the Level I study was used as a guide in determining the extent of the infrastructure evaluation. The regional concept includes:

- Consolidation of all regionally compatible water treatment systems, and water transmission and storage facilities into a single regional water system.
- The regional entity would provide water service at the same wholesale rate at metered connections to each of the public entities and districts in the regional service area.
- To maximize efficiency and minimize capital construction costs, the regional entity would assume responsibility for ownership, operation and maintenance of the regionally compatible facilities needed to treat and transport wholesale water throughout the service area. New facilities would be constructed only when existing facilities are found to be inadequate, or non-existent.
- Consolidation of water system components into a regional entity would also include consolidation of any debt or other obligations associated with the merged facilities.
- Each entity in the regional service area would purchase treated water from the regional entity and continue to be responsible for ownership, operation, and

maintenance of its internal distribution and storage systems, thereby enabling each entity to maintain its own autonomy.

To aid in the evaluation of the existing infrastructure, an analysis of the hydraulic characteristics of the existing transmission lines and distribution network was performed using the pipe network computer modeling tool KYPIPE. The initial modeling was performed using the regionalization improvements proposed in the Level I study. The proposed regional system was modeled for average and maximum day demands for 1992, and peak hour demands for the years 1992, 1995, 2005, 2015, 2025, 2035, and 2045. Where inadequacies were discovered, improvements were incorporated into the model. The recommended improvements needed to provide for the regions water needs over the next 50 years are shown in Figure 4.

Section 5 - Evaluation of Water Treatment Systems and Treatment Options

This section provides an introduction to the Safe Drinking Water Act (SDWA) regulations, potential impacts, and the corresponding treatment options for the four major water treatment facilities in the regional study area.

The 1974 SDWA mandated that Primary Drinking Water Regulations be established for a number of chemical, physical and biological constituents. These regulations consisted of maximum contaminant levels (MCLs) for individual contaminants and identified treatment technologies that could be used to comply with the MCLs. Following passage of this law, the United States Environmental Protection Agency (EPA) promulgated National Interim Primary Drinking Water Regulations, which went into effect in June 1977.

In an effort to better protect the public from water contamination and waterborne disease, the SDWA was amended in 1986. The Amendments require EPA to develop regulations and exercise stricter control of trace contaminants, many of which were unknown when the original SDWA was passed. The 1986 SDWA Amendments required EPA to develop standards for 83 specific contaminants or contaminant groups by mid-1989. In addition, Congress mandated that EPA develop (1) regulations to require all drinking water systems to disinfect their water and (2) criteria under which surface water systems would be required to provide filtration. Other requirements include limitations on the use of lead in the installation and repair of water distribution facilities, a revised MCL for lead, monitoring requirements for various "unregulated contaminants", and revised criteria for coliforms in treated water. A listing of the rules and contaminants affected by the 1986 Amendments is given on the following page.

- Inorganic chemicals (IOCs)
- Volatile organic chemicals (VOCs)
- Trihalomethanes (THMs)
- Synthetic organic chemicals (SOCs)
- Surface Water Treatment Rule (SWTR)
- Coliform Rule
- Lead and Copper Rule (LCR)
- Radionuclides
- Disinfection - Disinfection Byproducts Rule (D-DBPs)
- Local and secondary standards
- Groundwater Disinfection Rule (GDR)
- Enhanced Surface Water Treatment Rule (ESWTR)

The rules having the greatest impact on the water supply and treatment facilities in the regional service area are the SWTR, Coliform Rule, LCR, D-DBP Rule and ESWTR.

- The primary purpose of the SWTR is to protect the public from waterborne diseases. The rule applies to all public community water systems that use surface water sources or groundwater sources under the direct influence of surface water. The SWTR includes regulations for filtration, disinfection, turbidity, *Giardia lamblia*, viruses, *Legionella*, and heterotrophic bacteria. Disinfection treatment is required for all systems covered by this rule. Filtration treatment is also required for these systems unless a utility can meet certain source water quality requirements, disinfection criteria and site specific requirements.

- Previous regulations limited coliform bacteria levels in the water distribution system to 1 per 100 milliliters. The Coliform Rule now requires that coliform bacteria be absent from the water distribution system. This rule also requires disinfectant residuals be present in the system at all times.

- Exposure to lead and copper can cause adverse health effects. The LCR establishes action levels for both lead and copper in the distribution system, and requires installation and operation of corrosion control facilities where action levels are exceeded.

- The D-DBP Rule will regulate disinfectants and their byproducts. Byproducts which occur as a result of chlorination include trihalomethanes (THMs). Some disinfection byproducts are known to be carcinogens.

- The ESWTR would expand the current SWTR to include *Cryptosporidum.*

Each of the four major supply and treatment facilities were evaluated on a go-it-alone basis, and a regionalization basis in terms of complying with the SDWA amendments and meeting future water demands. The following summarizes the future needs for each entity in a go-it-alone scenario. The planning period for the treatment facilities is 25 years, through year 2020.

- **Casper:** Casper's water demand through the year 2020 is 50 mgd. Current production capacity is 36 mgd. The Casper groundwater system provides a year-round water supply of 18 mgd. Surface water from the river is treated through filtration and provides another 18 mgd. The system should be expanded by developing additional groundwater supplies and expanding the existing WTP. The groundwater is assumed to be under the influence of surface water from the North Platte River, but because of its high quality would be able to meet the EPA criteria for avoiding filtration. A wellhead protection program would be implemented to ensure continued compliance with the filtration avoidance criteria. Additional wells are needed to bring the groundwater system capacity to 25 mgd. Nearly all of the existing wells would be redrilled and provided with low head pumps. All groundwater would be routed through a buried 6 million gallon reservoir where chlorine contact would provide for adequate removal of Giardia and viruses. A new high service pump station would be required to pump the groundwater from the reservoir into the distribution system. The surface water treatment facility should be expanded by 9 mgd by adding additional flocculation facilities, filters, and on-site storage. An ammonia feed facility would be needed for chloramination to reduce the formation potential for THMs. A corrosion control facility would be required to comply with the LCR.

- **Mills/Wardwell:** The water demand for Mills/Wardwell for the year 2020 is 3.2 mgd. Current production capabilities are in excess of 4 mgd. The year-round groundwater supply is provided by 6 wells which have a combined capacity of about 2.5 mgd. The groundwater production capacity has decreased over the years and the wells produce sand. It is believed the location of the wells will make wellhead protection nearly impossible to achieve, and filtration may be required. This study assumes the wells would be filtered. Improvements include drilling new wells adjacent to the old wells, installing low head pumps, and constructing a pipeline to carry the groundwater to the treatment plant for filtration. The water treatment plant which treats surface water from the North Platte River, has the capacity to filter up to 5 mgd, so major plant expansion would not be required. WTP improvements include a 400,000 gallon baffled storage

tank to achieve adequate chlorine contact time, ammonia feed facilities to provide for chloramination and resulting THM reduction, a corrosion control facility to meet the LCR, and a modern control and telemetering system.

- **Evansville:** The year 2020 water demand for Evansville is approximately 1.8 mgd. Current plant production capabilities are 2.0 mgd. The Town operates a water treatment plant which treats surface water from the North Platte River. Only minor improvements would be needed at the plant to meet SDWA requirements. These improvements include providing separate inlet-outlet piping to the plant storage tank to improve chlorine contact time, and an ammonia feed facility to reduce THMs through chloramination.

- **Brooks Water and Sewer District:** The year 2020 water demand for Brooks is approximately 2.2 mgd. The current plant production capacity is 1.0 mgd. Brooks currently purchases water from Casper when demand exceeds plant capacity. The Brooks treatment plant treats surface water from the North Platte River. Improvements needed for Brooks to go-it-alone, would include a new river intake, a new raw water pump station, a new presedimentation basin, ammonia feed facilities to reduce THM production, and a new telemetering and control system. These improvements assume that Brooks would continue to supplement their supply by purchasing water either from Casper or Mills/Wardwell.

Regionalization

The regionalization alternative assumes that it is more cost effective to expand and operate one large treatment facility rather than four. Under the regional scenario, the Casper WTP would be expanded to eventually serve the entire study area. The Mills/Wardwell and Brooks water treatment plants would be phased out of service in the near future, and the Evansville plant would be left in service over the next 10 to 15 years. The regional production capacity would be expanded in three phases, in years 1995, 2010, and 2026. Under the regional scenario, the first phase expansion in 1995 would be to a production capability of 50 mgd, the year 2010 expansion to 61 mgd, and the year 2026 expansion to 77 mgd. Except for size, the regional alternative is very similar to the Casper go-it-alone alternative. The Casper system would be expanded by increasing the groundwater supply to 25 mgd, and the WTP to 25 mgd. The improvements for the first phase expansion include a wellhead protection plan to ensure the groundwater complies with filtration avoidance criteria, redrilling the Casper wells, redrilling the Mills, Wardwell and Midwest wells and piping them to the Casper wellfield, and routing all

groundwater through a new 6 mg reservoir to provide for extended chlorine contact time, construction of a 23 mgd pump station to pump treated groundwater into the distribution system and expanding the Casper WTP by 7 mgd. Ammonia feed and corrosion control facilities would be required for THM reduction and compliance with the LCR respectively. The Evansville WTP would be improved by adding ammonia feed facilities and providing separate inlet and outlet piping to the plant's storage tank.

Section 6 - Conceptual Design of Alternatives and Cost Estimates

Conceptual designs for both the go-it-alone alternatives and the regional alternative were prepared using the evaluations from Section 5. The estimated capital construction costs associated with each alternative is given below. These cost estimates indicate that the capital cost to construct a regional system is approximately $3.5 million more than the go-it-alone scenario. The primary cost difference is in the additional cost for regional interconnections which are not required under go-it-alone scenarios. The capital costs presented in this section are primarily cost comparisons and do not include operational and maintenance costs.

Go-It-Alone Scenario

Casper		$37,429,844
Mills/Wardwell		1,926,000
Evansville		442,000
Brooks		1,499,595
	Total	$41,297,439

Regionalization Scenario

Regional Facilities	$44,826,731

Section 7 - Preliminary Economic Analysis

A preliminary economic analysis was prepared to compare the regional and go-it-alone scenarios for the five major water providers (Casper, Mills, Wardwell, Evansville and Brooks). Financial plans for each entity were prepared showing operating fund revenues and revenue requirements, sources of capital project funds, total cost of water service, allocated cost of service and unit costs for service. Capital financing assumptions were based on funding assistance available through the Wyoming Water Development Commission (WWDC), the State

Farm Loan Board (FLB), and the State Permanent Mineral Trust Fund (PMTF). Typical monthly residential water bills were calculated for each scenario and are given in Table 3. From the data presented, the regional alternative results in significant savings for all of the entities except Casper. The regional system will cost Casper customers only slightly more than the go-it-alone scenario.

TABLE 3
TYPICAL RESIDENTIAL MONTHLY WATER BILLS
GO-IT-ALONE VS. REGIONALIZATION (a),(b)

Water Provider	Year 1994 $/bill	1995 $/bill	2010 $/bill	2026 $/bill
Brooks				
Go-It-Alone	33.92	52.11	66.45	85.75
Regional	N/A	34.98	47.30	70.34
Casper				
Go-It-Alone	13.82	24.26	29.06	34.80
Regional	N/A	24.89	28.94	37.42
Evansville				
Go-It-Alone	24.55	31.52	38.03	52.63
Regional	N/A	21.81	25.85	34.02
Mills				
Go-It-Alone	18.19	29.35	38.19	48.95
Regional	N/A	21.76	26.89	36.94
Wardwell				
Go-It-Alone	33.05	40.65	47.52	51.72
Regional	N/A	22.80	28.95	40.70

(a) Typical bills are based on 12,000 gallons of average monthly water use.
(b) Typical bills do not reflect general fund or tax revenue subsidies occurring in certain water provider utilities.

Section 8 - Selection of Preferred Alternative

The capital construction cost figures presented in Section 6 are cost comparisons for the go-it-alone and regional scenarios. Based upon the preliminary economic analysis, the preferred alternative is the regional alternative. It was decided to initially expand and maximize the groundwater supply and avoid costly filtration. Because of uncertainty with upcoming EPA regulations, the Casper WTP would be initially expanded to meet 15 year water demands. In addition, the regional entity would provide service for the Poison Spider Improvement and Service District west of Casper, and the Salt Creek Joint Powers Board which serves the Midwest-Edgerton areas 40 miles north of Casper.

Section 9 - Preliminary Design of Regional Alternative and Cost Estimates

A preliminary design for the regional alternative was prepared and is presented in Figures 2, 3, and 4. The design period used for treatment plant improvements is 15 years; future expansions are expected in 2010 and 2026. The design period for water supply, transmission and storage improvements is 50 years. Conceptually, the Casper WTP and groundwater system would become the primary Regional Water Treatment Facility (RWTF). The Evansville WTP would be upgraded and kept in service for the next 5 to 15 years to supplement the RWTF. The Brooks and Mills/Wardwell WTPs would be kept in service during construction of the regional water project, and then phased out when the new facilities can meet the region's water demands.

The initial regional water production capacity would be 54 mgd; 52 mgd provided by the RWTF and 2 mgd provided by the Evansville WTP. The groundwater supply system would be expanded from 18 to 25 mgd of capacity by redrilling existing wells and relocating other wells to the wellfield. The Mills, Wardwell and Midwest wells would be relocated to the Casper wellfield where wellhead protection should be more easily achieved. All groundwater would be routed through a 6 mg baffled water storage reservoir and mixed with chlorine to provide for required chlorine contact time. A 25 mgd groundwater high service pump station would be constructed to deliver water to the regional transmission system.

The Casper WTP would be expanded by 9 mgd to meet year 2010 water demands and upgraded to comply with SDWA regulations. The expansion generally includes additional raw water pumps and pipelines, additional filters, high service pumping improvements, chemical handling and disposal facilities, and a new 2.6 mg water storage tank. Ammonia feed facilities for chloramination and corrosion control facilities would be provided for both groundwater and treated surface water to comply with the D-DBP and the LCR respectively. The Evansville WTP would be upgraded to meet SDWA regulations by adding ammonia feed facilities restructuring the inlet and outlet piping for the plant storage tank, and making other miscellaneous improvements.

Delivery of regional water to each entity would be accomplished through regional water transmission pipelines. Existing pipelines, storage tanks and booster stations would be utilized wherever possible. New transmission pipelines, water storage tanks and booster stations would be constructed when necessary to meet the 50 year water demand requirements.

LEGEND

- PRODUCING WELLS
- NON-PRODUCING WELLS
- OTHER WELLS
- PROPOSED WELLS
- WELLFIELD SUPPLY LINES
- EXISTING TRANSMISSION LINES & METER
- PROPOSED TRANSMISSION LINE & METER
- PROPOSED WELLFIELD SUPPLY LINES
- PROPERTY BOUNDARY

RIVER
NORTH PLATTE
CASPER
WYOMING
DEMPSEY ACRES
DEMPSEY ACRES WELLFIELD
FLOOD CHANNELS
CAISSON #3
CAISSON #2
CAISSON #1
MORAD #1
MORAD #2
MORAD #3
MORAD #4
MORAD #5
MORAD #6
FLOOD CHANNEL
INFILTRATION GALLERY
PUMP STATION
TO BROOKS W & S DIST.
TO AIRPORT
#9
#10
#11
#12
#7
#8
#6
#5
#15
#14
#16
FLOOD CHANNEL
IZAAK WALTON LEAGUE
NOTE: WELLS #11, #12 & #14 TO BE ABANDONED
FT CASPAR WELLFIELD
16" LINE TO BE ABANDONED
25 MGD HIGH SERVICE PUMP STATION
6 MG CT TANK
RADON REMOVAL FACILITY
CASPER W.T.P.
FORT CASPER
MILLS WELLS
MIDWEST WELL
NOTE: MILLS/WARDWELL AND MIDWEST WELLS TO BE RELOCATED TO CASPER WELL FIELD.
WARDWELL WELL
MILLS
13TH STREET
BLVD
TO WELLS #17 & #18
WELLS #16, #17, & #18 TO BE ABANDONED AND REDRILLED IN WELLFIELD

0 100' 200' 400'

PRELIMINARY DESIGN

PROPOSED REGIONAL WELLFIELD IMPROVEMENTS

FIGURE 2

PRELIMINARY DESIGN

REGIONAL WTP RECOMMENDED IMPROVEMENTS

FIGURE 3

Civil Engineering Professionals, Inc. / Black & Veatch

TO MIDWEST/EDGERTON (SALT CREEK JPB)

L-11 12"

METER (BY OTHERS)

2-WAY METER (BY OTHERS)

BAR NUNN TANK

AIRPORT TANK

L-8

AIRPORT LINE TANK-1.5 MG

WARDWELL BOOSTER STA.

WARDWELL TANK 0.4 MG

NORTH PARK TANK

B-6 NORTH PARK BOOSTER STATION

EVANSVILLE WTP

LATHROP TANK & BOOSTER STA.

SCOTT HILL TANK

L-13

L-9

AIRPORT LINE BOOSTER STA. B-5

B-2 BOOSTER STATION

T-3 TANK

VISTA WEST TANK & BOOSTER STA.

L-7 14"

L-6 12"

L-10 16"

BROOKS TANK

MILLS NO. 2 TANK-2.6 MG

MILLS NO. 1 TANK & BOOSTER STA.

M/W WTP

L-12

L-1

L-2

4 MG TANK T-1

PIONEER TANK 0.5 MG

PIONEER W & S DISTRICT BOOSTER STATION B-3

B-1 BOOSTER STA.

T-2 3 MG TANK

L-4

BROOKS WTP

CPU WTP

THREE METERS

PRATT TANK & BOOSTER STA.

MANOR HEIGHTS BOOSTER STA.

MANOR HEIGHTS TANK

CITY RESERVOIR AND GOLF COURSE BOOSTER STA.

GOLF COURSE TANK

MOUNTAIN ROAD BOOSTER STA.

2-WAY METER

PARADISE VALLEY TANK

CY TANK & BOOSTER STA.

SUNRISE I TANK & BOOSTER STA.

VALLEY HILLS TANK

SOUTHWEST BOOSTER STA.

SUNRISE II TANK & BOOSTER STA.

MOUNTAIN ROAD TANK

SOUTHWEST TANK

POISON SPIDER TANK & BOOSTER STA.

POISON SPIDER WTP

U.S. 20/26

WYO 220

10 MILE RD

ZERO RD

POISON SPIDER RD

CASPER MTN RD

SIX MILE RD

T35N T34N T33N T32N

R81W R80W R79W R78W

LEGEND

- EXISTING PIPELINES
- PROPOSED REGIONAL IMPROVEMENTS
- PIPELINES TO BE PART OF REGIONAL SYSTEM
- BY OTHERS
- EXISTING BOOSTER STATIONS
- REGIONAL BOOSTER STATIONS
- NEW BOOSTER STATIONS
- EXISTING STORAGE TANK
- REGIONAL STORAGE TANK
- NEW STORAGE TANK
- REGIONAL TREATMENT PLANT
- NEW REGIONAL METER
- EXISTING REGIONAL METER

0 8000

PRELIMINARY DESIGN

REGIONAL ALTERNATIVE TRANSMISSION AND STORAGE SYSTEM IMPROVEMENTS

FIGURE 4

Ownership of existing treatment plants, transmission lines, water tanks and booster stations which would become part of the Regional System would be contracted over to the Regional entity. Any debt associated with the existing facilities would be merged with the overall debt to construct the regional facilities.

The estimated capital cost to construct the regional water supply system improvements in 1994 dollars is $56,901,174, and is broken down below, and is detailed in Tables 5 and 6 at the end of this summary. When debt consolidation is included, the total estimated project cost is $59,901,174.

Groundwater Supply Improvements	$15,226,392
Surface Water Treatment Improvements	17,406,016
Transmission and Storage System	24,268,766
Total Capital Construction Cost	$56,901,174
Debt Consolidation	3,000,000
Total Estimated Project Cost	$59,901,174

The difference between the project costs presented in Section 5 and Section 9 is primarily due to the nature of the evaluations performed under Phase I and Phase II of the study. Phase I provided a general overall cost comparison of go-it-alone and regional alternatives to determine feasibility. The Phase II evaluation included a more thorough and detailed preliminary design of the regional alternative, and correspondingly more detailed cost estimates. The Phase II preliminary design and cost estimates will be used to make future funding assistance requests to the WWDC and State Legislature.

The significant additional improvements included in the Phase II evaluations which account for the cost increase include:

- Expanding the WTP to 9 mgd instead of 7 mgd and providing additional office and laboratory space.
- Expanding the pumping capacity of the groundwater pump station to 25 mgd instead of 23 mgd, and adding emergency power facilities for the RWTF.
- Upsizing and replacing all the existing wellfield collection piping.
- A sanitary sewer system to serve the Dempsey Acres area as part of a wellhead protection plan.

- A sewer line to carry sludge to the North Platte Sanitary Sewer.

- Expansion and replacement of some of the electrical supply system, and a supervisory control and data acquisition (SCADA) system.

Funding assistance for the groundwater supply, transmission and storage system improvements is expected to be available through the WWDC. Treatment improvements and consolidation of debt are not eligible for WWDC funding assistance, but are expected to come through the State's Permanent Mineral Trust Fund. Because of the limited availability of state funding assistance, the project will need to be phased over the next 7 to 10 years.

Section 10 - Refined Economic Analysis

A second economic analysis for the regional water supply alternative was performed using the total project costs from Section 9. The financial plans were refined to reflect changes in the final project configuration and extended phasing requirements. A phasing schedule is provided in Table 4. The cost of wholesale water is projected to be $1.26 per 1000 gallons in 1999. This wholesale cost is the cost to each entity for treated water, and does not include each entity's costs for operating and maintaining its internal water distribution system. Typical monthly water bills for customers for each entity are shown in Figure 5.

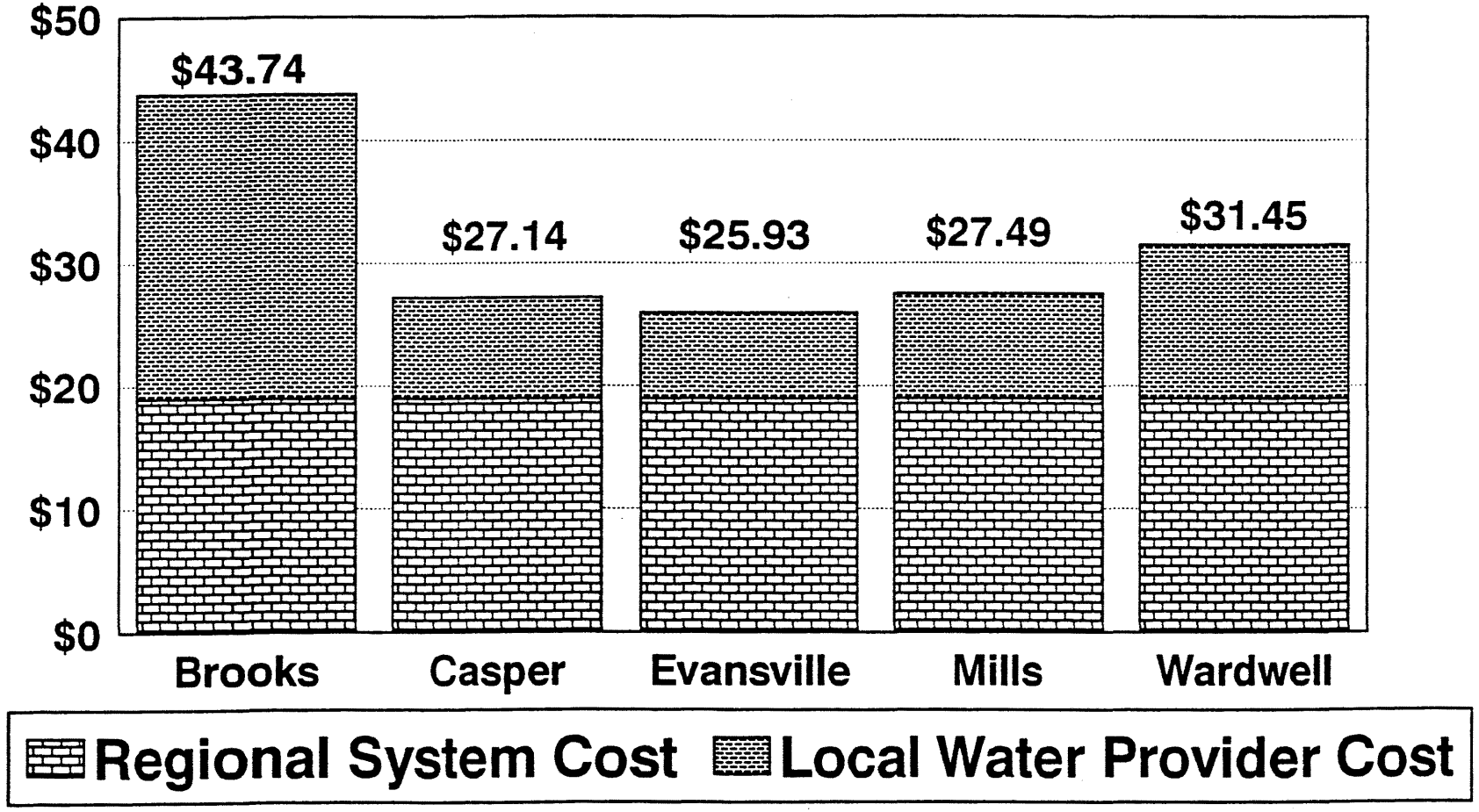
An overall comparison of monthly water bills for each entity for current, go-it-alone, and regional scenarios is presented in Figure 6. The regionalization alternative provides for significant cost savings to all entities except Casper. The cost difference for Casper go-it-alone and regionalization is not considered to be significant.

TABLE 4

CAPITAL IMPROVEMENT COST PHASING PLAN
(Phase 1 Capital Costs In 1994 $'S)

Line No.	Description	Phasing Plan (1994 $'s) 1995 $	1996 $	1997 $	1998 $	1999 $	2000 $	2001 $	Total $
	Groundwater								
1	Storage Tank & Pump Station	319,604	2,677,597	4,715,988					7,713,189
2	Wellfield Rehabilitation	132,000	928,636	1,950,982	1,804,345				4,815,963
3	Sanitary Sewer & Miscellaneous	98,800	723,710	1,249,820	624,910				2,697,240
4	*Total Groundwater Improvements*	*550,404*	*4,329,943*	*7,916,790*	*2,429,255*	*0*	*0*	*0*	*15,226,392*
5	*Surface Water Treatment Improvements*	*464,100*	*4,736,196*	*8,173,691*	*4,032,029*				*17,406,016*
	Transmission and Storage Improvements								
6	L-1: 30" and 24" Crosstown Pipeline	189,600	1,283,520	3,996,700	999,188				6,469,008
7	L-2: 24", 20" and 18" Evansville/Brookhurst Pipeline				187,800	1,959,988			2,147,788
8	L-3: 20" Paradise Valley - Brooks Pipeline Across North Platte River						61,200	515,180	576,380
9	L-4: 20" Brooks - Mills Pipeline			20,300	299,300	96,316			415,916
10	L-5: 24" Pipeline - 13th Street to Mills WTP	63,800	452,030						515,830
11	L-6: 12" Brooks - Pioneer Pipeline on 7 Mile Road						24,900	484,245	509,145
12	L-7: 14" Vista West Pipeline		69,800	1,028,400	331,228				1,429,428
13	L-8: 16: Vista West - Airport Pipeline on Zero Road		17,200	253,900	81,889				352,989
14	L-9: 12" Airport - Vista West Pipeline North of Hwy 20/26						81,600	395,876	477,476
15	L-10: 16" Pipeline from Mills Tank to Zero Road		47,600	479,200	151,800				678,600
16	L-11: 12" Pipeline to Bar Nunn Tank	62,000	191,598						253,598
17	L-12: Replace 12" Airport Line with 16"					17,700	344,435		362,135
18	L-13: 16", 12" and 8" Sandy Lake Pipeline				75,600	1,113,900	358,683		1,548,183
19	L-15: 18" Pipeline from 2nd Street to Scott Hill Tank	17,200	184,690						201,890
20	T-1: 4 Million Gallon Pratt Water Tanks					192,300	3,252,375		3,444,675
21	T-2: 3 Million Gallon Water Tank in Mountain View			132,300	1,826,100	586,675			2,545,075
22	T-3: 280,000 Gallon Water Tank in Wardwell				25,700	254,800	80,675		361,175
23	T-4: 100,000 Gallon Water Tank at Sandy Lake				18,300	146,800	45,825		210,925
24	T-5: Clean and Paint Existing Tanks and Telemetry	24,800	562,325						587,125
25	B-1: Booster Station in Mountain View			34,000	377,500	120,200			531,700
26	B-2: Booster Staton in Wardwell				28,000	289,100	91,750		408,850
27	B-3: Pioneer Booster Station	5,000	37,950						42,950
28	B-4: Airport Booster Station					9,700	142,400	45,825	197,925
29	*Total Transmission and Storage*	*362,400*	*2,846,713*	*5,944,800*	*4,402,405*	*4,787,479*	*4,483,843*	*1,441,126*	*24,268,766*
30	*Grand Total*	*1,376,904*	*11,912,852*	*22,035,281*	*10,863,689*	*4,787,479*	*4,483,843*	*1,441,126*	*56,901,174*

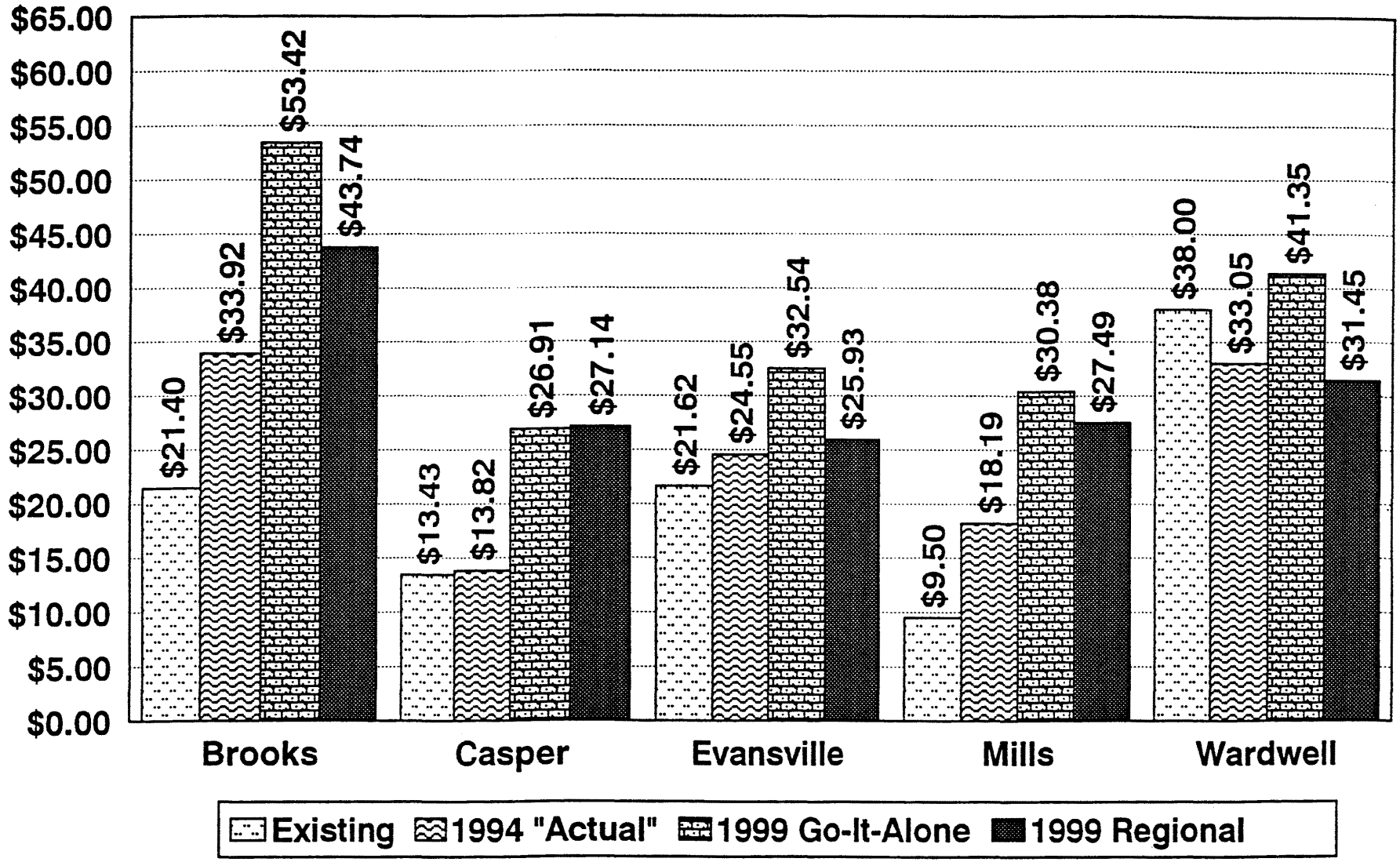
FIGURE 5
TYPICAL RESIDENTIAL MONTHLY WATER BILLS(a),(b) UNDER REGIONAL OPERATION
Test Year 1999



(a) Based on 12,000 gallons of average monthly water use.

(b) Bills do not reflect tax or general fund subsidies.

FIGURE 6
TYPICAL RESIDENTIAL MONTHLY WATER BILLS(a)



(a) Based on 12,000 gallons of average monthly water use.

TABLE 5

NATRONA COUNTY REGIONAL WATER
SUPPLY STUDY - LEVEL II

SUPPLY AND TREATMENT
CAPITAL COST ESTIMATES
FOR THE REGIONAL ALTERNATIVE

Phase 1 - Increase Regional Supply Capacity to 54 mgd in 1997
(Deactivate Mills/Wardwell and Brooks; Retain Casper and Evansville)

A. GROUNDWATER SUPPLY IMPROVEMENTS		
Preparation of Final Design and Specifications		$1,094,720
Permitting and Mitigation		$10,000
Legal Fees		$50,000
Acquisition of Access and Rights-of-Way		$100,000
Cost of Project Components		
1. Wellhead Protection Program	$500,000	
2. Baffled, 6-MG Groundwater Storage Tank at Casper	$2,100,000	
3. Radon Removal Facility for Groundwater	$400,000	
4. 25-mgd High Service Pumping Station for Groundwater	$2,500,000	
5. Wellfield Improvements	$1,790,000	
6. Well Collector Pipelines, Meters, & Appurtenances	$1,553,000	
7. SCADA, Instrumentation, & Electrical for Item A	$577,000	
9. Sanitary Sewer in Dempsey Acres	$1,000,000	
10. 36" Transmission Line	$200,000	
9. Mobilization, Bonds, Insurance @ 4%	$424,800	
Construction Cost Subtotal No. 1 (CCS No. 1)	$11,044,800	
Engineering Costs = (CCS No. 1) x (10 Percent)	$1,104,480	
Subtotal No. 2	$12,149,280	
Contingency = (Subtotal No. 2) x (15 Percent)	$1,822,392	
Construction Cost Total		$13,971,672
TOTAL COST FOR ITEM A - GROUNDWATER SUPPLY		**$15,226,392**

Note: The lagoon lining cost portion of the wellhead protection program is included in Item B.

B. SURFACE WATER TREATMENT IMPROVEMENTS

Pilot Studies		$300,000
Preparation of Final Design and Specifications (CCS No. 1 x 10 Percent)		$1,238,536
Permitting and Mitigation		$50,000
Legal Fees		$50,000
Acquisition of Access and Rights-of-Way		$100,000
Cost of Project Components		
1. Raw Water Pumps and Flow Meters	$160,000	
2. Raw Water Pipeline	$260,000	
3. 9 mgd Filter Addition	$1,560,000	
4. Transfer Pumping Station	$1,400,000	
5. High Service Pump Improvements	$160,000	
6. Liquid Alum Feed Facilities	$150,000	
7. Coagulant and Filter Aid Polymer Feed Facilities	$125,000	
8. Activated Carbon Slurry Feed Facilities	$200,000	
9. Filter to Waste Drains	$160,000	
10. Flash Mixing & Flow Splitting Facility	$270,000	
11. Flocculation Basin Distribution Flumes	$175,000	
12. Flocculator Drives	$225,000	
13. Trac-Vac Sludge Collectors	$280,000	
14. Launders & Tube Settlers	$580,000	
15. Sedimentation Basin Effluent Piping	$105,000	
16. Sludge Holding Facility & Sewer Line	$267,000	
17. Line Wash Water & Sludge Lagoons	$175,000	
18. Wash Water Recovery Pumping Station	$240,000	
19. Miscellaneous Yard Piping	$695,000	
20. Baffled, 2.6-MG Steel CT Tank	$1,300,000	
21. Baffles in Existing 2.6-MG Tank	$180,000	
22. Laboratory & Office Space	$220,000	
23. Additions to Groundwater High Service Pumping Station		
a. Ammonia Feed Facility	$110,000	
b. Chlorine Feed and Scrubber Facility	$480,000	
c. Solium Hydroxide Feed Facility	$270,000	
24. SCADA, Instrumentation, & Electrical for Item B	$1,412,000	
25. Evansville WTP Improvements	$250,000	
26. Sewer connection to NPSS	$500,000	
27. Mobilization, Bonds, Insurance @ 4%	$476,360	
Construction Cost Subtotal No. 1 (CCS No. 1)	$12,385,360	
Engineering Costs = (CCS No. 1) x (10 Percent)	$1,238,536	
Subtotal No. 2	$13,623,896	
Contingency = (Subtotal No. 2) x (15 Percent)	$2,043,584	
Construction Cost Total		$15,667,480
TOTAL COST FOR ITEM B - SURFACE WATER TREATMENT		**$17,406,016**
TOTAL PROJECT COST FOR ITEMS A + B		**$32,632,408**

TABLE 6
SUMMARY OF COSTS FOR WATER TRANSMISSION AND STORAGE SYSTEM IMPROVEMENTS

FACILITY IDENTIFIER CODE	FACILITY DESCRIPTION	TOTAL ESTIMATED COST
L-1	30" and 24" crosstown pipeline	6,469,008
L-2	24" and 20" Evansville/Brookhurst pipeline	2,147,808
L-3	20" Paradise Valley/Brooks pipeline	576,380
L-4	20" Brooks/Mills pipeline	415,916
L-5	24" pipeline-Mills Water Treatment Plant	515,810
L-6	12" Brooks-Pioneer pipeline, 7 Mile Road	509,145
L-7	14" Vista West pipeline	1,429,428
L-8	14" Vista West/Airport pipeline north of 20/26	352,989
L-9	14" Airport/Vista West pipeline on Zero Road	477,476
L-10	16" from Mills Tank to Zero Road	678,600
L-11	12" pipeline to Bar Nunn tank	253,598
L-12	Replace 12" Airport line with 16"	362,135
L-13	16", 12", and 8" Sandy Lake pipeline	1,548,183
L-15	18" pipeline from 2nd Street to Scott Hill Tank	201,890
T-1	4 MG Pratt water tank	3,444,675
T-2	3 MG tank in Mountain View	2,545,075
T-3	280,000 gallon water tank in Wardwell	361,175
T-4	100,000 gallon water tank in Sandy Lake	210,925
T-5	Clean and Paint Existing Tanks and Telemetry	587,125
B-1	Booster Station in Mountain View	531,700
B-2	Booster Station in Wardwell	408,850
B-3	Pioneer Booster	42,950
B-4	Airport Booster	197,925
TOTAL ESTIMATED COST		$24,268,766

*See Appendix "C" for Detailed Cost Breakdown for the Transmission and Storage Improvements.