Executive Summary

WYOMING WATER DEVELOPMENT COMMISSION

SOUTH LARAMIE WATER SUPPLY STUDY - LEVEL 1

November 1, 1991

Snowy Range
Water Consultants, Inc.

410 Grand, Suite 211
Laramie, WY 82070
(307) - 745-4109
Ladies and Gentlemen:

Pursuant to our agreement dated June 5, 1991, Snowy Range Water Consultants, Inc. is pleased to present 35 copies of the Final Report and 50 copies of an Executive Summary. This report summarizes our study effort and presents conclusions and facilities development recommendations for consideration by the Commission and Project Sponsors.

We would like to express our thanks to the WWDC staff, particularly to Jon Wade for his assistance throughout this study effort. In addition, we would like to express our appreciation to the Project Sponsors, particularly to Jay Deveraux, Chairman of the South Laramie Water and Sewer Steering Committee for his valued assistance. Finally, we would like to express our appreciation to Natalie Siderius, City/County Planning Director, and to Natalie's staff, for their considerable assistance during this study effort.

We are looking forward to making a presentation to the Commission at one of the Commission's regular meetings in the near future.

Respectfully Submitted,

Snowy Range Water Consultants, Inc.

Darryl D. Alleman P.E.
President

November 1, 1991
NOVEMBER 1, 1991

Snowy Range Water Consultants, Inc.
410 Grand, Suite 211
P.O. Box 2080
Laramie, Wyoming 82070
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EXECUTIVE SUMMARY

This Executive Summary provides an overview of the results of the South Laramie Water Supply Study. The report focuses on the capital requirements and operational costs to develop a potable water supply for the South Laramie Area of Albany County, Wyoming.

SECTION 1 - INTRODUCTION

The purpose of the South Laramie Water Supply Study is to evaluate the potential for providing potable water to the South Laramie vicinity, in Albany County. The majority of South Laramie water users are currently using individual wells, however, several wells have failed, particularly in the northern portions of the Project Planning Area. There is evidence of ground water contamination from septic tanks in the area. There are an estimated 845 persons living within the Project Planning Area which includes an estimated 157 single family detached residences, 111 mobile homes, one multi-family apartment building, and 20 commercial establishments. Several home owners within the Planning Area have experienced difficulty selling or re-financing their homes since these water quality problems have surfaced.

In 1990, the Wyoming Water Development Commission was approached by the South Laramie Water and Sewer Steering Committee, a local citizens group, which expressed interest in (1) either receiving expanded water service from the City of Laramie, or (2) developing an independent water supply for the South Laramie Area. In response to this request, the Wyoming Water Development Commission has approved this study. We have completed our Level 1 study and this report gives our recommendations.

Figure 1, on the following page, presents an overview of the project vicinity including the major existing key jurisdictional boundaries near the City of Laramie. The selected Project Planning Area is shown by a heavy cross-hatched outline in Figure 1. The Project Planning Area lies immediately south of Interstate 80, and includes properties near and adjacent to Highway 287 running south from Laramie toward Fort Collins, Colorado. The selected Project Planning Area is approximately 3 miles long (from north to south), and 1.5 miles wide (east to west). Most of the developed areas within the Project Planning Area occur within one-half-mile east and west of the Highway 287 corridor.

SECTION 2 - EXISTING WATER SYSTEMS

This Section provides a summary of existing water distribution lines and wells within the Project Planning Area. Figure 2 presents the approximate location and size of existing major water lines capable of supporting water service to the South Laramie Area. At the present time, a single 10-inch line serves as the only source of water for the area. This 10-inch line extends southward from a 24-inch line near Third and Sanders Streets, within the City of Laramie. The 10-inch line provides water service to the Albany County Fairgrounds and to the Highway Department Port-of-Entry Complex. An 8-inch line extends southward from the 24-inch line, west of the Union Pacific railroad tracks. This 8-inch line is presently valved-off and is not in service. The 10-inch line is not capable of providing required fire flows to the South Laramie Area.

Regarding shallow groundwater, the shallowest hydrogeologic unit is the surficial alluvial and colluvial material within the Project Planning Area. There is very little information on this unit, although numerous wells have been drilled into it for water supplies in the South Laramie Area. Residents of the area report widely varying yields and water quality. There is no evidence that the shallow units are capable of producing adequate water to supply more than a few families at best. In addition, since there is no sewer system in the area, each house has its own septic tank and leach...
LEGEND

- Dense Line: 201 Service Area Boundary
- Thin Line: City Limits

Hatched Area: South Laramie Water Supply Study Planning Area Boundary

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FIGURE 1
PROJECT VICINITY MAP
FIGURE 2
EXISTING MAJOR WATER MAINS
field. The potential for contamination of shallow wells is great. For these reasons, the shallow strata are not considered suitable for consideration as a municipal water supply.

Figure 3 presents a general vicinity map showing the location of major wells into the Casper Formation. The Casper Aquifer, which includes both the Casper Formation proper and the Fountain Formation (a facies of the Casper Aquifer), is slightly over 600 feet thick in the South Laramie Area. Average porosity, according to Lundy (1978), is about 22 percent, indicative of good permeability. The formation consists of alternating sandstone and limestone units. Some units produce much more water than others, making it necessary to construct wells through several hundred feet of the aquifer in order to ensure production from at least one of the highly-productive units. This formation is the preferred target for any proposed development of a groundwater supply.

SECTION 3 - SERVICE AREA WATER DEMAND

A maximum growth rate for the Planning Area, as a whole, is seen at 3 percent per year, if (both) water and sewer services are made available in the area. If a 3 percent growth rate were to occur, maximum-day water demands within the area would be approximately 480 gallons per minute in 20 years. This water demand would be characteristic of an essentially doubled existing population. The capital facilities necessary to provide 480 gallons per minute are "contained within" facilities that must be built to satisfy fire flow requirements. Therefore the controlling factor in sizing (and estimating costs for) future facilities such as water lines, elevated storage tanks, and pumping stations, is fire flow requirements and not domestic or culinary service needs.

On the other hand, the ability to finance and operate future facilities is controlled by the number of people who will be contributing to the financial operation of a future water district. Since the chances for vigorous population growth in South Laramie are seen to be minimal, as evidenced by the latest State Department of Administration and Fiscal Control projections of 0.6 percent for Albany County, and an even more-uncertain growth picture in South Laramie, financial plans presented in this report do not reflect heavy reliance on growth to pay for new facilities.

SECTION 4 - ANALYSIS OF WATER SUPPLY ALTERNATIVES

The purpose of this section is to present the most promising alternatives for water supply that have been identified during the course of this study. With several desirable aspects for the potential service alternatives in mind, the study team set out to identify the most promising alternatives for water system development. The study team identified seven basic water service concepts for general evaluation. These general service concepts have been identified, for purposes of this report, as (1) a "Do-Nothing" Alternative, (2) Alternative One, (3) Alternative One-A, (4) Alternative Two, (5) Alternative Three, (6) Alternative Three-A, and (7) Alternative Four. These alternative service concepts cover a range of possibilities for service which start with the status-quo, and which increase in complexity from basic systems which feature minimal fire flow and service area capabilities, to more complex systems which provide increasing fire flow capabilities to larger service areas.

Figure 4 presents a conceptual plan for Alternative Two, the preferred alternative at this stage of the Project's development. Alternative Two features construction of two wells, separated by one mile, along the Laramie Fault, approximately one mile east of Highway 287. These two wells would provide water for an independent water district that could be readily incorporated into the City at a later date. Alternative Two does not meet all of the existing requirements for fire flow capability. In order to meet minimum fire flow requirements, additional pumping and storage capability would need to be added to northern end of the distribution system. The distribution system is sized to accommodate the future pumping facility.
FIGURE 3
MAJOR WELLS AND SPRINGS
NEAR LARAMIE, WYOMING

Casper Formation Outcrop

Major Well or Spring

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Alternative One features construction of a minimal distribution system, with satisfies only immediate health and safety concerns. Two wells to supply the small distribution grid would be drilled near Highway 287. Alternative One would not satisfy established City/County planning criteria.

Alternative One - A features construction of a minimal distribution system, with satisfies only immediate health and safety concerns. A ground- level storage tank and pumping station, located in the northern portion of the Planning Area would serve as the water source. The tank would be filled from a 10-inch City-owned water line. Alternative One would not satisfy established City/County planning criteria.

Alternative Three would feature the same distribution grid as Alternative Two, but the distribution system would be fed from the City of Laramie's 10-inch water line, located near Highway 287, in the northern portion of the Project Planning Area. Alternative Three would meet all of the legislated fire flow requirements for the South Laramie Area. This alternative is not competitive with other alternatives at this time because operations and maintenance costs are higher than other alternatives. If operations and maintenance costs could be reduced through negotiations with the City of Laramie, Alternative Three would be the preferred alternative.

Alternative Three-A would feature a system that is fed entirely from the City of Laramie system. Instead of tapping the existing 10-inch line near Highway 287, a new 24-inch line would be constructed from Third and Russell Streets, north of the Project Planning Area Boundary. Two pressure zones, similar to City of Laramie water pressure zones One and Two, would be created. All areas below elevation 7,180 feet would receive water pressure directly from the 24-inch line. Above elevation 7,180 feet water pressure would be maintained by a pump station which would pump from Zone 1 to Zone 2. Alternative Three - A is not competitive with other alternatives at this time because its capital and operations costs are significantly higher than for other alternatives.

Alternative Four involves construction of a well supply at Simpson Springs which is located approximately 3 miles southeast of the Project Planning Area Boundary. Alternative Four, is not competitive with other alternatives at this time because of capital cost considerations.

**TABLE 1**

**FINANCIAL COMPARISON OF WATER SUPPLY ALTERNATIVES**

<table>
<thead>
<tr>
<th>Alternative No.</th>
<th>Estimated Capital Cost</th>
<th>Estimated Operations Cost</th>
<th>Estimated Monthly Charge</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>$3,106,094</td>
<td>$115,028</td>
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<tr>
<td>1-A</td>
<td>$2,625,008</td>
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</table>

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SECTION 5 - PREFERRED ALTERNATIVE

Alternative Two has been identified by the South Laramie Water and Sewer Steering Committee as the most promising alternative at this point in the Project's development. Each of the main selection criteria is summarized below.

Health and Safety Concerns

Alternative Two satisfies the basic health and safety issues concerning a safe and adequate supply of drinking water for the South Laramie area. The proposal is to develop two separate wells with the most promise for quality and quantity of water. The two-well system is expected to be more reliable than a single-well concept. The smaller wells placed at one mile separation should serve to interfere less with existing well systems. Toward this end, the chances of the Alternative Two concept being opposed by other existing water rights holders is lessened.

Capital Cost

Given anticipated grant and loan levels by three separate funding agencies, the capital cost of facilities proposed in Alternative Two are expected to be affordable by the project sponsors. The sponsors are assuming, (1) that the Wyoming Water Development Commission, (WWDC), will participate in funding water supply and transmission facilities, and (2) that the Wyoming Farm Loan Board, (WFLB), and the Farmers Home Administration, (FmHA) will split the remaining required capital costs with grants. Alternative Two proposes water service by an independent entity that is not annexed to the City or served by the City water system. Because of the intent to serve the rural area with an independent system, the FmHA funds are available.

Operations and Maintenance Costs

Operations and maintenance costs for Alternative Two are expected to be near the lowest available from the alternatives possible. The reason for this is that the service area is expanded to near its maximum potential size. The expansion in service area enables the systems operations and maintenance costs to be spread initially over a greater number of users, resulting in lower monthly costs to cover operations and maintenance costs. With a larger service area, the possibility of adding new customers to the system in the future is enhanced. Since the adding of new customers will not result in significant increases in operations and maintenance costs, new customers should serve to ease the financial burdens of the proposed water district in the future. The estimated monthly water charge of $41.00 per residential connection is significantly higher than the existing in-city rate, but is in line with other rural water projects that are now being implemented in the State of Wyoming.

The proposed $41.00 per month rate is lower than any alternative associated with connecting to the City water system. The reasons for this are two-fold. The first reason is that the City of Laramie currently charges twice the inside water rate to outside-city water customers. Thus, under existing planning conditions, the new district would be required to pay for all of the operations and maintenance of its own distribution system, including pumping costs on "its" side of a master meter, and, in addition, pay twice the in-city rate per thousand gallons for water. This requirement makes the alternatives associated with connecting to the City undesirable at this time because the resulting estimated monthly charge per individual residence is approximately $58.00.
Service Area

Alternative Two provides for a relatively large service area that should allow for continued addition of new customers to the water distribution system.

City/County Planning Requirements and Goals.

Alternative Two is not the least capital intensive Alternative. Alternative Two does not immediately satisfy all of the planning objectives established by the City/County Planning Comprehensive Land Use Element. Alternative Two does, however, provide for a water distribution system that is sized to "fit in with" or "dovetail" into the City/County Comprehensive Plan in the future. The major water lines to be constructed in the northern half of the Planning Area are sized to eventually carry 4,000 gallons per minute, which is consistent with plans for industrial development in the area. Upon future annexation, Alternative Two can be converted essentially into Alternative Three by adding a storage tank and pumping station in the northern portion of the service area. At that time, the two wells constructed for Alternative Two can be either kept in service or their water right can be transferred to the City. Alternative Three allows for operation of the South Laramie water system as a separate service zone or for integration with the City of Laramie's water distribution system.

SECTION 6 - CONCLUSIONS AND RECOMMENDATIONS

The key conclusions reached from this study are:

1. Alternative Two is the preferred Alternative at this point in the Project's development. Alternative Three would be preferred if negotiations with the City resulted in a monthly service rate equal-to or less-than Alternative Two.

2. Proposed line sizes for Alternative Two and Alternative Three are essentially identical. The chief difference between the two alternatives is the source of water for each. Alternative Two can be readily converted into Alternative Three at some future date.

3. For this specific project, the largest factor affecting monthly service rates to residential users appears to be the projected operations and maintenance costs for the system alternatives.

4. Potential human health and safety problems exist in South Laramie, due primarily to possible contamination of shallow wells by nearby septic systems.

5. The construction of a central water system for the South Laramie area can reduce the possible threat to human health from septic system pollution of shallow wells.

6. Without construction of a central sewer system in South Laramie, groundwater contamination is likely to increase.

7. Growth rates in South Laramie will be limited to between 0.6 percent per year and 3 percent per year, depending upon whether water and/or sewer service is provided within the area.
8. For this project planning requirements for adequate fire flows for industrial uses are significant. A "rural-type" water distribution system will not meet established fire flow requirements.

9. The most promising groundwater source for a new water district appears to be along the "Laramie Fault", located approximately 1 mile east of Highway 287, along a north-south orientation.

10. The most immediate source of water available from the City of Laramie system is a 10-inch line near Highway 287, located in the northern portion of the Project Planning Area. Through combined use of this 10-inch line's capacity with new storage and pumping facilities, it appears possible to delay, indefinitely, the planned construction of a proposed 24-inch line that would be required to cross under the Spring Creek Channel, Interstate 80, and the Union Pacific Railroad tracks.

11. With Alternatives Two or Three, or Three-A, it is possible to develop a "gravity-fed" system concept in the future. This would be accomplished by connecting the proposed elevated tank to the City's Soldier Springs transmission line. This connection would be accomplished by constructing a mile-long pipeline to the east of the tank and boring under the Union Pacific Railroad tracks.

The following recommendations are hereby made as a result of this study:

1. The City of Laramie should be contacted to determine if more-favorable service terms can be negotiated.

2. A level II Water Supply Study should be pursued with the Wyoming Water Development Commission.

3. A sewer system study for the South Laramie Area should be completed as soon as practicable.

4. Upon completion of recommendations one and two, steps should be taken to implement a water service district in South Laramie. When item three is completed, a decision should be made regarding whether or not to pursue a combined water and sewer district. If possible, future construction of water and sewer facilities should take place simultaneously.