EXECUTIVE SUMMARY

Level I Water Supply Project

Salt Creek Water District

Newcastle, Wyoming

Prepared By:

R.C.H. and Associates
P.O. Box 1659
Glenrock, WY 82637

&

Wester-Wetstein & Associates
P.O. Box 29
Laramie, WY 82070

December, 1996
EXECUTIVE SUMMARY
LEVEL I WATER SUPPLY PROJECT
SALT CREEK WATER DISTRICT
NEWCASTLE, WYOMING

Submitted To:
Wyoming Water Development Commission
Herschler Building
Fourth Floor West Wing
Cheyenne, WY 82002

&

The Salt Creek Water District
P.O. Box 847
Newcastle, WY 82701

Prepared By:
R.C.H. and Associates
P.O. Box 1659
Glenrock, WY 82637

P.O. Box 29
Laramie, WY 82070

December, 1996
INTRODUCTION

The Salt Creek Water District was formed in 1963 after a local business man, Louis Carlson, drilled a Madison formation well. He needed a use for the water and approached the residents living East of Newcastle asking them to form a water district. Originally, the District had only 16 members. These members borrowed money from the Farmers Home Administration, donated their own labor to install the pipeline and the Salt Creek Water District was established.

Since that time the District has grown to include 170 users and extends three miles East and three miles South of the City of Newcastle. The Newcastle area is somewhat unique in Wyoming as there is no potable water in the area except in the Madison formation which is over 3,000 feet in depth which necessitated the formation of water districts. Before the formation of water districts people living in rural areas were restricted to hauling their drinking water

SERVICE AREA

The Salt Creek Water District services begins at the meter where possession of the water is transferred from Water Unlimited to the District. This meter is located North of the intersection of Highway 85 and Highway 16. The District extends East along both sides of Highway 16, approximately three miles, to a subdivision known as Tubb Town and it extends East and South, approximately three miles, along old Highway 85 to a subdivision known as Rural Acres.

At the South end of the Salt Creek Water District, it connects to the Blacktail Water Users. The Blacktail Water Users system was constructed in the 1960's to provide water to the rural ranchers as far as eight miles South of the City of Newcastle. Originally, this system was primarily designed for stock water purposes with the few residents living in the area acquiring water from cisterns fed by the Blacktail Water Users pipeline.

For the purpose of this study, we expanded the initial area to the West to include the City of Newcastle and the Westend Water District. By expanding the study area we were able to begin the initial steps to create an area wide water system. This system would utilize the strengths of each system and assist in solving the weaknesses of each individual system without duplicating any services. At the same time accomplishing the goal of maintaining the autonomy of each entity.

NEEDS PROJECTION

Population Projections for the Salt Creek Water District (SCWD) were estimated using four separate methods based on data furnished by the Wyoming Department of Administration and Information (WDAI), Division of Economic Analysis in the 1991 Wyoming Data Handbook and the 1995 Equality State Almanac. Projections were
performed for a 25-year planning horizon from 1996 to 2021 using both historical trends and growth estimates made by the WDAI for Weston County and the City of Newcastle. The results of these projections were then averaged and applied to the SCWD.

**Historical Trends**

Utilizing the current District population of 510, the lineal projection of historical data, exponential projection of historical data, WDAI projection for Weston County and the WDAI projection for the City of Newcastle the following population was extrapolated for the year 2021.

<table>
<thead>
<tr>
<th>Projection Method</th>
<th>Projected Population of SCWD in 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear Projection of Historical Data</td>
<td>679</td>
</tr>
<tr>
<td>Exponential Projection of Historical Data</td>
<td>760</td>
</tr>
<tr>
<td>WDAI Projection for Weston County in 2000</td>
<td>558</td>
</tr>
<tr>
<td>WDAI Projection for Newcastle in 1994</td>
<td>675</td>
</tr>
</tbody>
</table>

Utilizing this data the population projection use for the report and design of the system was 670 for the year 2021.

The City of Newcastle's existing wells appear to just meet the existing peak demands and with the distance to the Westend Water District and taking into account the anticipated head loss, leaves the Westend Water District unable to help the Salt Creek Water District. The Sioux Oil and the Coronado wells do not have the capacity to assist the District, which leaves the most advantageous method of increasing the production for the Salt Creek Water District is the drilling of a new Madison formation well.

Based on geology of the existing high producing wells a site has been chosen for a potential new well for the Salt Creek Water District. This location is on property currently owned by the District and is near their existing office. Based on the Black Hills Monocline and the Monocline fold in the area the "trend of fold feature" indicates an excellent probability of a well similar to the Newcastle No. 1 and the Westend Water District well. The well design being 9 5/8" OD casing with a cost of $268,000.

**WATER SUPPLY EVALUATION SUMMARY**

The findings of the examination of the eight Madison formation wells in the Newcastle area indicates that the integrity of the wells is generally fair to good. Actual inspection of the casing through a television survey or a casing log is really the only way that the integrity could be confirmed. However, there is no data which would indicate that any of the wells currently suffer from casing damage. The oldest wells in the City of Newcastle well field, the Newcastle No. 1 and No. 2 Wells, could develop problems at any
time due to their nearly 50 years of service. Conversely, the wells may continue to operate at current levels well into the future. The other wells are newer and generally have cement protection for the production casings. The Carlson No. 1 well, however, does not have cement protection through the majority of the water producing zones above the Madison by design. This could lead to earlier casing deterioration but does not preclude repair operations. One repair option for this well would be to install a liner inside the well, sealing off any leaks which may have occurred in the original casing. This option would significantly restrict the well’s capacity, however, due to the increased friction loss in the smaller liner. This well was drilled much more recently than the old City of Newcastle wells and could last several more years before any problems develop.

Some of the wells in the area have more capacity than are currently being utilized and some of the small production wells are not being used at all. The only well that tends to lend itself to the possibility of a large increase in production would be the City of Newcastle No. 4 Well. This could be attempted through a stimulation process. Although no certainty of a large increase in yield could be relied on, past experience in areas of known high production zones have been generally successful.

Water Conservation Measures

Although the District’s consumption seems high during peak demand months, when it is compared to other communities in Wyoming and taking into consideration the size of rural lots, the consumption is within limits: However, like many systems without meters, there are a few water consumption abusers which are being carried by the remaining District members. The only way to control this abuse and assure prompt leakage repair is to meter individual water taps. Therefore, the consensus of the Board is to install water meters on each tap and place it just after the curbstop which will, also enable the District to install backflow preventers.

EVALUATION OF THE DISTRIBUTION SYSTEM

The Salt Creek Water District takes possession of the water from Water Unlimited, approximately 1,800 LF downstream from the well. Prior to the Salt Creek Water District meter the well supplies water to the following:

15 Residences
1 Fountain which runs continually
24 Unit apartment building
7 Space mobile home park
24 Space campsite without water service
1 Truck loadout with 2 1/2" tap located directly off the well head

63 Unit motel with a restaurant, bar, pool
1 Large sprinkler system
39 Unit mobile home park
40 Space campground with water service
5 Stall shower facility at the campground

During the modeling process it was estimated during a peak period the flow prior to the Salt Creek Water District was in excess of 700 gpm.
The District has two initial concerns with the existing system. The first being the level of commitment ahead of the Salt Creek Water District meter, which historically has caused considerable pressure drops within the District. At times a reading of zero water pressure has been observed in the higher elevations of the District. This was substantiated during test while flowing only 300 gpm from a fire hydrant. The second concern, and possibly the major concern is the lack of backflow prevention at truck loadout, the fountain with a pond around it and the swimming pond, which leaves the system vulnerable to contamination.

The Salt Creek Water District was constructed in the 1960's with 4 inch pipe with a majority of the pipe being asbestos cement. The District has changed out much of the asbestos cement pipe, however 3,000 feet still needs to be replaced due to deterioration. Also, the pipe size needs to be increased to meet peak flow demands. In addition to this, the thin walled PVC which was installed in portions of the District in the past, has numerous leaks and should be replaced. All the pipe was the standard of the industry when it was installed but now it is less than adequate.

Demand Estimates and System Modeling

Based on the current system and current population the entire Salt Creek Water District was modeled with this being substantiated by field test including the demand flows between the meter and the Water Unlimited's well head. Field tests were taken on July 29, 1996, and substantiated flows around 700 gpm prior to the Salt Creek Water District's meter.

Deficiencies in flows were noted including areas that went to zero pressure. The system model was then used to develop various options to bring the system up to current standards.

SALT CREEK WATER DISTRICT OPTIONS

The options for improvements were evaluated based on improvements to the Salt Creek Water District as to maintain maximum day demand of 670 gpm and flows of 500 gpm.

Option 1

Water Supply      Water Unlimited well
Water Storage     Utilize City of Newcastle storage

Not having modeled the City of Newcastle's system, Option 1 includes a 12 inch transmission line from the Salt Creek Water District to the Newcastle water tank.
Option 1 A
Water Supply       Water Unlimited well
Water Storage      Utilizing the City of Newcastle storage

This option makes the assumption the City of Newcastle existing mains are capable of supplying flows connecting the City to the District's existing distribution system. This needs to be substantiated by the modeling of the City of Newcastle's water system.

Option 2
Water Supply       Water Unlimited well
Water Storage      The construction of a storage tank for the Salt Creek Water District system

The tank was located to optimize the flows and minimize the required improvements.

Option 3
Water Supply       A new Salt Creek Water District Madison formation well
Water Storage      The City of Newcastle storage

The well will be located at an optimum location on Salt Creek Water District property. Estimated flows of the well indicate minimum flows are needed for storage. The City of Newcastle's excess storage will be utilized to meet the DEQ requirements for two sources or water storage.

Option 4
Water Supply       A Salt Creek Water District new Madison formation well
Water Storage      The City of Newcastle's storage

This option was based not only on the minimum improvements required to meet demand, but on improvements needed to assist future operation and reduce future repair.

As stated all options, with the exception of Option 4, were completed based on the same criteria with minimum improvements to meet standards. Option 4 provides for the replacement of the old, thin walled PVC pipe in addition to the minimal requirements resulting in an improved system which reduce future repairs.
COST ESTIMATES FOR THE OPTIONS WITH COST PER MONTH PER USER

Based on current cost, current Salt Creek Water District expenses and anticipated future expenses, estimates were completed including the cost per month per user. The following tabulation compares construction cost and cost per user and also included is the calculation for Option 4 and the cost per user. It should be noted the large decrease in cost between Options 1, 1 A and 2, and Options 3 and 4 is the cost of the purchasing water from Water Unlimited. Currently, the cost for purchasing the water is $48,192 per year.

Evaluation of Proposed Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Total Construction Cost</th>
<th>Cost Per Month Per User</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1,034,644</td>
<td>$48.18</td>
</tr>
<tr>
<td>1A</td>
<td>$886,000</td>
<td>$47.36</td>
</tr>
<tr>
<td>2</td>
<td>$1,041,992</td>
<td>$48.22</td>
</tr>
<tr>
<td>3</td>
<td>$834,388</td>
<td>$23.50</td>
</tr>
<tr>
<td>4</td>
<td>$934,500</td>
<td>$24.03</td>
</tr>
<tr>
<td>Item</td>
<td>Unit</td>
<td>Unit Cost</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>------</td>
<td>-----------</td>
</tr>
<tr>
<td>6” PVC</td>
<td>LF</td>
<td>$16.00</td>
</tr>
<tr>
<td>8” PVC</td>
<td>LF</td>
<td>$18.00</td>
</tr>
<tr>
<td>6” Gate Valve</td>
<td>EA</td>
<td>$540.00</td>
</tr>
<tr>
<td>8” Gate Valve</td>
<td>EA</td>
<td>$700.00</td>
</tr>
<tr>
<td>6”x6”x6” Tee</td>
<td>EA</td>
<td>$350.00</td>
</tr>
<tr>
<td>8”x8”x8” Tee</td>
<td>EA</td>
<td>$500.00</td>
</tr>
<tr>
<td>6” Fitting</td>
<td>EA</td>
<td>$180.00</td>
</tr>
<tr>
<td>8” Fitting</td>
<td>EA</td>
<td>$200.00</td>
</tr>
<tr>
<td>Services - 6” x 3/4”</td>
<td>EA</td>
<td>$800.00</td>
</tr>
<tr>
<td>Services-8” x 3/4”</td>
<td>EA</td>
<td>$820.00</td>
</tr>
<tr>
<td>Meters - New Service</td>
<td>EA</td>
<td>$500.00</td>
</tr>
<tr>
<td>Meters - Old Service</td>
<td>EA</td>
<td>$700.00</td>
</tr>
<tr>
<td>Road Boring</td>
<td>EA</td>
<td>$10,000.00</td>
</tr>
<tr>
<td>Air Valve Station</td>
<td>EA</td>
<td>$1,100.00</td>
</tr>
<tr>
<td>Blow-off Valve</td>
<td>EA</td>
<td>$400.00</td>
</tr>
<tr>
<td>Salt Creek Water District - New Well 9 5/8’s</td>
<td>LS</td>
<td>$268,700.00</td>
</tr>
<tr>
<td>Fire Hydrant</td>
<td>EA</td>
<td>$1,600.00</td>
</tr>
<tr>
<td>Connection to Newcastle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8” PVC</td>
<td>LF</td>
<td>$18.00</td>
</tr>
<tr>
<td>8” Gate Valve</td>
<td>EA</td>
<td>$700.00</td>
</tr>
<tr>
<td>8” x 6” Reducer</td>
<td>EA</td>
<td>$150.00</td>
</tr>
<tr>
<td>Construction Cost Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contingencies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cost #4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Option 4

Disconnect from Water Unlimited Well, drill a new well for the Water District located at the District's office and connect to Newcastle at Grey Addition.

Total Construction Cost $934,500.00
WWDC Grant - 67 % $626,115.00
Salt Creek Water District-33 % $308,385.00

FINANCING
Salt Creek Water District Share $308,385.00
Farm Loan Board Grant $154,192.00
   USDA-RD Loan(5 1/8 %) $154,192.00
   $ 154,192 @ 5 1/8 % interest for 30 years $839.55 per month
   $ 839.55 per month x 12 $10,074.66 per year

Salt Creek Water District Monthly Rate Calculation
District Expenses $44,418.73
District Income(Blacktail) ($17,543.50)
Sinking Fund $12,077.62
Debt Retirement WWDC Project $10,074.66
Total $49,027.51
$ 49,027.51/170 = $ 288.40 per year/per user = $24.03 per month/per user
MASTER PLAN

A. Regional Water System

As a portion of the Salt Creek Water District Level I Study an area wide review of water systems was conducted. This culminated in the establishment of Newcastle Area Water System Committee consisting of members of the Newcastle City Council, the West End Water District Board and the Salt Creek Water District Board. The objective of this committee was to review the area wide water systems with an eye towards the benefits that each can contribute to the whole as well as the prevention of the duplication of infrastructure.

The following conclusions were drawn;

1) Work towards connection of West End Water District to the City of Newcastle system. This connection would supply Newcastle with much needed water during peak demand periods and stabilize pressure and flows on the West end of Newcastle, while utilizing the Newcastle storage allowing the Westend Water District to stabilize pressures in the District's higher elevation. It also gives the Westend Water District an additional source and storage as directed by the Wyoming Department Environmental Quality Regulations.

2) The drilling of a new well for the Salt Creek Water District through the Wyoming Water Development Commission with a view towards an area wide water system. The connection of the Salt Creek Water District to the City of Newcastle gives the City of Newcastle an additional source of water. Presently, Newcastle just has an adequate supply with storage picking up the shortfall during peak demand. The Salt Creek Water District well will meet Salt Creek Water District's demand needs giving them a secure, stable source of water under their control. The connection will stabilize the pressures while giving the District storage thereby meeting the Wyoming Department of Environmental Quality requirements.

3) All parties agreed, in Level II, to the need of the Salt Creek Water District well in the area wide approach. The connection of the Salt Creek Water District, the Westend Water District and the City of Newcastle will benefit all three entities while maintaining the autonomy of each entity to run their own systems. As a critical part of the area wide approach, it is felt that Level II should, also, include a model and the much needed study of the City of Newcastle's water system. This modeling will ensure an adequate and efficient system will be in place for the area wide approach.
Phase I

Salt Creek Water District Madison Well

1. Engineering and Geology $ 73,985
2. Well Construction $ 268,700

Total Cost Phase I $ 342,685

Phase II

Newcastle, Wyoming Area Study with Modeling of the City of Newcastle's System $ 100,500

Total Cost Phase II $ 100,500