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APPENDICES

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APPENDIX D  - Hydraulic Modeling Report
APPENDIX E  - Hinckley Memorandum
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SECTION 1 - INTRODUCTION
This introductory section of the Study provides background information about the South Circle Master Plan Level I Study and the South Circle Estates Improvement and Service District. This section also describes the purpose of the Study, and acknowledges some of the people who were influential in the successful completion of this Study.

STUDY BACKGROUND
The South Circle Improvement and Service District (District), is located in Washakie County, approximately one mile north of the Town of Ten Sleep, see Figure 1-1. The District was formed in the early 1980’s. The District incorporates the South Circle Estates subdivision and a few other outlying properties.

The District is currently supplied domestic and irrigation water from the Beth No. 1 well. This well was originally constructed as an irrigation well, but use was expanded to meet the needs of the local homeowners when the subdivision was built. The well flows at the surface from the Flathead Formation (approximately 2700 to 2900 ft. in depth). According to District representatives, the well flows at a rate of 600 gallons per minute (gpm). However, during the irrigation season, the yield has reportedly dropped in past years to about 300 gpm and there is concern the yield is declining. The “shut in” pressure of the well is 240 pounds per square inch (psi). The high discharge pressure is controlled by pressure reducing valves to protect the downstream piping and homeowners plumbing. Irrigation use is shared with two adjacent agricultural operations and includes three domestic-supply taps. The District’s water system serves 18 subdivision lots through a combination of domestic and irrigation taps supplied by a local transmission and distribution piping system.

The water delivery system carries both the domestic water and irrigation water supply. The delivery system is believed to be constructed of thin walled plastic irrigation pipe (PIP). Recently, the aging water distribution system piping has experienced numerous breaks and leaks. The piping is nearing its rated thirty-year life span. In addition, the summer demands of both domestic use and irrigation use cause low pressure problems in portions of the domestic water system. Neither the well nor the existing water system are metered, there are no storage facilities, and there is no redundancy in the event that there are problems with the well supply.
FIGURE 1-1
VICINITY MAP
SOUTH CIRCLE ESTATES - IMPROVEMENT & SERVICE DISTRICT
SCALE: 1" = 2000'

NOTE:
BORDER AND LOCATIONS SHOWN ARE APPROXIMATE ONLY.
Initially, several of the distribution water pipelines were constructed across private lands, and some are constructed along roadways. According to District representatives, the precise locations of several sections of the water pipelines are not documented, and accurate maps are not available. It is also uncertain whether recorded easements are available for the pipelines located on private lands. The supply well is also located on private land, and it is uncertain if there is a formal agreement which defines physical ownership of the well, the well building, and piping. The District operates the system in accordance with an agreement which defines the proportional use of the water produced by the well.

HISTORY OF THE DISTRICT
The Beth No. 1 well was originally drilled and constructed in 1971 as an irrigation well to serve the Ten Sleep Cattle Company. Some time later, a portion of the land served by the well was subdivided for residential use. The well water right was enlarged to include “miscellaneous use” to provide a domestic water supply for the subdivision. In 1980 and 1981, protective covenants and a water agreement were adopted. In 1986, the residents of the subdivision petitioned to Washakie County Commissioners to form an Improvement and Service District. The purpose of forming the District was to enable the residents to collect funds for maintaining the roads and the water system. On September 23, 1986, the Commissioners established the area as the South Circle Estates Improvement District. In 1987, the District adopted by-laws for operating the water system. Appendix A contains the documents which describe the District history, as provided by the County Clerks office for Washakie County.

STUDY PURPOSE
The purpose of this Level I Study is to perform a “Reconnaissance” Study of the water systems serving the District area. The tasks required under the scope of work generally include evaluation and mapping of the existing water system and making recommendations for improvements to upgrade the system to meet District needs and WDEQ regulations.

STUDY FORMAT
This Study was initiated in the summer of 2008. The Level I portion of the study was completed in the fall of 2009. The study was expanded in the spring of 2010 in an effort to further refine the recommended improvements and cost estimates. The study is divided into eight sections in
accordance with the scope of services in the agreement with the WWDC. The Study is laid out to address the subjects normally required by the state funding agencies. The sections of the Study are highlighted as follows:

- Section 1 - Introduction
- Section 2 – Groundwater Supply Analysis
- Section 3 – Evaluation of Existing Water Delivery Systems
- Section 4 – Population Growth and Water Demand Projections
- Section 5 - Water Supply Options and Cost Estimates
- Section 6 – Conceptual Design and Cost Estimates
- Section 7 – Economic Analysis, Project Financing and Implementation
- Section 8 – Revised Conceptual Design, Cost Estimates & Economic Analyses

**ACKNOWLEDGEMENTS**

Many people assisted in the preparation and completion of this Study. Listed below, are a few of the people whose assistance and input were valuable and greatly appreciated.

- Wyoming Water Development Commission staff: Jon Wade and Jodie Pavlica for assistance and administration of the contract, progress meetings, cooperation and direction.

- Boyd Whitlock, John Murphy and Kim Norman of the South Circle Board of Directors for their assistance, guidance and support.
SECTION 2 – GROUNDWATER SUPPLY ANALYSIS

This section provides a review of hydrogeologic conditions and water rights information about the water supply serving the South Circle Estates Improvement and Service District (District) north of Ten Sleep, Wyoming. Figure 2-1 provides the location of relevant features.

HYDROGEOLOGY

The District is located on the outcrop of the Goose Egg Formation, which overlies, in descending order, three important aquifers of the Bighorn Basin:

1) The Tensleep Aquifer - consisting of the Tensleep Sandstone. This aquifer is the least productive of the three, because it is the shallowest of the three. However, it has been widely developed for small-scale supplies, including two domestic-supply wells adjacent to the District.

2) The Madison Aquifer - consisting of the Darwin member (sandstone) of the Amsden Formation, the Madison Limestone, and the Bighorn Dolomite. This aquifer is quite variable in productivity over short distances. Although found to be relatively unproductive at the Hope #2 well (1 mile southeast of the Beth No. 1 well), the Madison is the source aquifer for the Town of Tensleep municipal supply wells\(^1\) (1 mile southwest of the Hope #2 well).

3) The Flathead Aquifer - consisting of the Flathead Sandstone and productive limestone beds in the overlying Gros Ventre Formation. This aquifer is interpreted to be the primary source aquifer for the Beth No. 1 well supplying the District.

These three aquifers are separated by other, less-permeable formations – the Amsden Formation (shale) and Gallatin Formation (shale and limestone); see Figure 2-2.

\(^1\)Recent investigations by Lidstone (2002) suggest that casing interconnections in the Ten Sleep No. 1 may allow comingling of groundwater between the Madison and Tensleep Aquifers.
Figure 2-1 - South Circle Location Map
Figure 2-2 - Beth #1 Well; UW7134, UW60072, UW69122
T47N, R88W, NE ¼ SE ¼, Section 8

Note: Formation thickness quite approximate, based on regional data and bare-bones well log.
Although at a regional scale, these three aquifers are commonly considered as part of the generalized “Paleozoic Aquifer System”, and are likely to experience some level of hydraulic interaction, pressure head and groundwater-quality comparisons demonstrate that intervening, lower-permeability strata create reasonably distinct aquifers in the South Circle area. U.S. Geological Survey research in the Tensleep area considers there to be three distinct aquifers (e.g. Cooley, 1986; Susong et al., 1993).

The District is not known to be underlain by specific geologic structures (folds or faults) that would serve to enhance local aquifer productivity\(^2\). Rather, it appears to occupy the gently westward dipping strata forming the east side of the Bighorn Basin. In any of the underlying aquifers – Tensleep, Madison, Flathead – fractures are the dominant source of high permeability, however, so small-scale, unmapped structures may impact local production characteristics. Because the detailed distribution of permeability is unknown, there is no detailed siting guidance available beyond the projected depths of the aquifers.

In the District area, specifically, there are two private wells completed in the Tensleep Aquifer (Stinnet and Sutherland wells on Fig. 2-1) with pressure heads of 4696 ft. elevation (i.e. Oct., 2008 surface shut-in pressures of 132 and 72 psi, respectively). Contemporaneous measurement of the Beth No. 1 Well, which is cemented through the Tensleep Aquifer, found a pressure head of 4922 ft. elevation, demonstrating substantial hydraulic separation.

**GROUNDWATER QUALITY**

Review of groundwater analyses from wells in the surrounding area for which the producing aquifer is known (Susong et al, 1993) indicates that the Tensleep Sandstone is generally higher in Total Dissolved Solids (TDS) than either the Madison or Flathead, and that the Flathead is generally lower in calcium than the Madison. (Calcium carbonate is the primary mineral of the Madison Limestone; the Flathead Sandstone is primarily silicon dioxide.) Table 2-1 provides groundwater quality information for the Beth No. 1 well and for select wells in the surrounding area, and includes the relevant U.S. EPA Drinking Water Standards. “Primary” drinking water standards are health-based, compulsory standards, the exceedance of which is grounds for

\(^2\)The closest geologic structures included on the comprehensive compilation along the east side of the Bighorn Basin by Weston (2008) are the east-west trending Tensleep Fault 1.5 miles to the south of South Circle, and the northwest-southeast trending Broken Back Anticline, 5 miles to the north.
## Table 2-1 - South Circle Groundwater Quality

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Well Sample Date</th>
<th>Well #</th>
<th>Aquifer Source</th>
<th>Tensleep #1</th>
<th>Tensleep #2</th>
<th>4708901cac01</th>
<th>4708912db01</th>
<th>4708913aba01</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Madison</td>
<td>1050</td>
<td>1098</td>
<td>755</td>
<td>901</td>
<td>901</td>
</tr>
<tr>
<td>Microbiological (P/A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Bacteria, Total Coliform | | | | | | | | Absent
| Major Ions (mg/L) | | | | | | | | |
| Alkalinity | 250 | 250 | 231 | 220 | 244 | 256 | 260 | 270 | 260 |
| Bicarbonate, HCO3 | 24 | 45 | 43 | 47.0 | 42 | 49.4 | 93 | 49 | 46 | 49 | 49 |
| Carbonate, CO3 | 2 | 0 | 1.0 | 0 | 0 | 1.0 | 0 | 1.0 | 0 | 0 | 0 |
| Calcium | 1.5 | 2.0 | 4.3 | 2.6 | 3.2 | 1.8 | 2.0 | 1.0 | 3.6 | 1.1 | 250 |
| Chloride | 0.4 | 1.0 | 0.3 | 0.3 | 0.3 | 1.0 | 0.4 | 0.3 | 0.5 | 0.4 | 4.0 | 2 |
| Magnesium | 14 | 25 | 24 | 25.2 | 22 | 26.8 | 29 | 25 | 27 | 28 | 26 |
| Nitrate as N | 0.7 | 3.5 | 0.14 | 0.8 | 0.18 | 0.56 | 0.6 | 0.8 | 0.18 |
| Nitrite as N | <0.1 | | | | | | | |
| Nitrogen, NO2+NO3 | 0.01 | | | | | | | <0.01 |
| Phosphorous | | | | | | | | |
| | 20 | 19 | 34 | 18.4 | 18 | 17.6 | 150 | 15 | 18 | 29 | 16 | 250 |
| Physical Properties | | | | | | | | |
| Conductivity (umhos/cm) | 640 | 421 | 421 | 460 | | | | | | | |
| Hardness as CaCO3 (mg/L) | 119 | 218 | 210 | 221 | 200 | 234 | 350 | 230 | 230 | 240 | 230 |
| pH (s.u.) | 7.7 | 7.9 | 8.0 | 8.0 | 8.12 | 7.8 | 7.3 | 7.7 | 7.8 | 6.5 | 8.5 |
| TDS (mg/L) | 155 | 216 | 223 | 198 | 238 | 224 | 414 | 230 | 235 | 263 | 235 |
| Metals - Total (mg/L) | | | | | | | | |
| Aluminum | 0.1 | | | | | | | 0.05 - 0.2 |
| Antimony | <0.001 | | | | | | | |
| Arsenic | <0.005 | | | | | | | 0.01 |
| Barium | <0.1 | | | | | | | 2 |
| Beryllium | <0.0005 | | | | | | | |
| Cadmium | 0.0013 | | | | | | | |
| Chromium | <0.05 | <0.01 | <0.1 | <0.05 | <0.01 | <0.05 | <0.05 | 0.1 | |
| Copper | <0.01 | 0.03 | <0.01 | <0.01 | <0.01 | 1.3 | 1.0 | |
| Cyanide, Total | <0.005 | | | | | | | |
| Iron | 0.03 | <0.03 | <0.03 | 0.710 | 0.050 | 0.3 | 0.3 | |
| Lead | 0.003 | <0.01 | <0.1 | <0.001 | <0.01 | <0.001 | 0.015 | 0.015 | |
| Manganese | | | | | | | | |
| Mercury | <0.0005 | | | | | | | |
| Nickel | <0.02 | | | | | | | |
| Selenium | <0.005 | | | | | | | 0.05 |
| Uranium (natural) | 0.002 | | | | | | | 0.0041 |
| Uranium, Activity (pCi/L) | <50 | | | | | | | 0.03 |
| Thallium | <0.0004 | | | | | | | |
| Radionuclides (pCi/L) | | | | | | | | |
| Gross Alpha | 18.6 | | | | | | | |
| Radium 226 | 5.3 | 1.1 | 1.1 | 0.9 | 15 | |
| Radium 228 | 0.04 | | | | | | | |
| Ra226 + Ra228 | 5.4 | | | | | | | |

Beth #1 Well water was also tested for EPA-regulated organic chemicals (volatile and synthetic); test results were all non-detect.

Wyo. Dept. of Ag. Water Standards for Human Consumption states that the maximum sodium level recommended for people on a low sodium diet or with heart trouble by the U.S. Public Health Service is 110 parts per million.
condemnation of a public water supply. “Secondary” standards are aesthetics-based (e.g. taste, color, hardness) and are advisory in terms of EPA enforcement.

**FLATHEAD AQUIFER - BETH NO. 1 WELL**
The Beth Well No. 1 groundwater quality is basically excellent – well within all EPA Primary and Secondary Drinking Water Standards, with one significant exception. Analyses of samples taken from the well for the present study have found levels of radioactivity at the Primary standard. The water analyses are included in Appendix B. The radionuclides were sampled three separate times to ensure the accuracy of the results.

Laboratory results from the sample taken 10/23/08 include a concentration of Radium-226 of 5.3 ±0.4 picocuries per liter (pCi/l) and a concentration of Radium-228 of 0.04 ±0.9 pCi/l. Combined, the analysis for Ra-226 + Ra-228 was 5.4 ±1.0 pCi/l. (A picocurie represents about 2 nuclear disintegrations per second.)

The US EPA Public-Water-Supply Drinking Water Maximum Contaminant Level (MCL) for combined Ra-226 + Ra-228 is 5.0 pCi/l. Thus, the Beth No. 1 analysis is slightly above the standard, but the standard is within the margin of error of the analysis.

Most drinking water sources have very low levels of radioactive contaminants. Both Ra-226 and Ra-228 are naturally occurring isotopes of radium, created through radioactive decay of minerals containing uranium and thorium, respectively. The parent uranium and thorium are commonly found in small concentrations in granitic rocks, like those composing the bulk of the Bighorn Mountains.

Based on the depth, construction, and general chemistry of the Beth No. 1 well, it appears the source of water is the Flathead Formation. We have located no additional analyses for radioactivity in groundwater from the Flathead Formation in the eastern Bighorn Basin, but this result is not inconsistent with the nature and location of this aquifer. (Reported analyses of Radium-226 for groundwater from the Madison and Tensleep Formations in the area provide concentrations around 1.0 pCi/l.)
The EPA drinking water standard is based on complex models that estimate the increased incidence of disease for a population drinking 2 quarts of water per day for a 70-year lifespan. The EPA has concluded that, “Some people who drink water containing radium -226 or -228 in excess of the MCL over many years may have an increased risk of getting cancer.” Rather than having specific studies of low-level radiation exposure, however, the EPA models must rely on health research of groups with much greater exposure and projections from there down to the levels found in drinking water. Given the common occurrence of radioactivity elsewhere in the environment (e.g. sunshine, x-rays, television), EPA recognizes “the inherent uncertainties that exist in estimating health impact at the low levels of exposure and exposure rates expected to be present in the environment” and that “the actual health impact from ingested radionuclides will be difficult, if not impossible, to distinguish from natural disease incidences”. (Quotes from EPA’s “Radionuclides Notice of Data Availability Technical Support Document” - March 2000, and related website materials available at http://www.epa.gov/safewater/radionuclides/regulation.html.)

Some measure of the uncertainty of the EPA models is indicated by the history of the estimates. When the 5 pCi/l standard was originally set in 1976, EPA calculated that a lifetime exposure at that concentration “may cause” 1 additional incidence of cancer per 10,000 people. Later, 1991 studies led EPA to propose raising the radium MCL to 20 pCi/l, with the same risk level. The most recent studies (March, 2000) have returned to a 5 pCi/l standard for this level of risk.

In short, the apparent exceedance of the EPA drinking water standard for radium in water from the Beth No. 1 well is not an indication of any acute toxicity. The standard is based on lifetime exposures. Nonetheless, radiation – from any source – is known to adversely impact human health and should be taken seriously.

While each individual should appropriately assess health risks throughout their environment, the regulatory environment must also be taken seriously. If upon further investigation, the radium concentrations in the Beth No. 1 well are found to be consistently above EPA standards, it will likely require treatment to remove these constituents or replacement from another source.
MADISON AQUIFER - TOWN OF TEN SLEEP WELLS
Table 2-1 includes analyses for the two municipal wells serving the Town of Tensleep from the Madison Aquifer. Although slightly more mineralized (TDS) than groundwater from the Beth No. 1 well, the Madison provides excellent quality with respect to the constituents analyzed, including being well within the standards for radium.

TENSLEEP AQUIFER - SOUTH CIRCLE PRIVATE WELLS
The two wells serving individual lots within the South Circle Subdivision have not been sampled for laboratory analysis. October, 2008 electrical conductivity measurements – 380 and 308 umhos/cm, for the Stinnet and Sutherland wells, respectively – indicate TDS levels of approximately 230 mg/l. These are consistent with the more complete analyses listed in Table 2-1 for three Tensleep Aquifer wells within 2 miles of the subdivision. Although these analyses indicate no water-quality issues with the Tensleep Aquifer, and none are anticipated, a complete analysis for EPA-regulated constituents is recommended before commitment of resources to a subdivision Tensleep-aquifer well.

BETH NO. 1 WELL
Figure 2-1 shows the location of the Beth No. 1 well; Figure 2-2 provides a construction diagram, including approximate stratigraphy as interpreted from the sketchy well log and general formation thicknesses from published sources (e.g. Susong et al., 1993). The Statement of Completion for the well filed with the Wyoming State Engineer’s Office (SEO), is attached in Appendix C.

The well is not pumped; all water is supplied by artesian flow from the wellhead. The recovered shut-in pressure is approximately 240 psi. Wellhead pressure drops to near-zero during heavy use.

The well penetrates all three of the primary Paleozoic-age aquifers – the Tensleep, Madison, and Flathead. According to the Statement of Completion, it is cemented through the Tensleep and “into the Madison Limestone”. No independent data are available to verify the completion details, but this report is consistent with other aspects of the report (e.g. casing information) and is reasonable drilling practice for the area.
As reported, the well completion appears to have been an attempt to allow water to enter the well from both the Madison and Flathead formations (see Fig. 2-2), with a small-diameter perforated liner installed in the lower well to provide a pathway for Flathead flow in the event of collapse of unstable (and unproductive) shale strata between the two aquifers. Based on chemical considerations, the fact that the Beth No. 1 well was continued through the Madison to the substantially deeper Flathead Sandstone (presumably in search of irrigation-level groundwater production which was not found in the Madison) and the report (Cooley, 1986) of a similar well 1 mile southeast which was continued to the Flathead “when water could not be obtained from the Madison-Bighorn Aquifer”, we concur with the U.S. Geological Survey identification of the Beth No. 1 well as basically a Flathead-aquifer well despite the dual completion in the Madison.

The reported main casing weight (23 #/ft for the 7-inch string) for the Beth No. 1 well is reasonable for this application and this string was reported to have been fully cemented in place, so a long life could be expected. The 4-1/8” liner is also reported at 23#/ft, which is unreasonable (probably a typographical error), so we cannot assess its condition. No further records on the construction or condition of the well have been located. No investigations beyond the wellhead equipment visible at the surface were made for this report. Flow data and chemistry indicate the well remains in good condition, including the access to the Flathead Aquifer provided by the installed small-diameter liner.

The Beth No. 1 well was completed in 1971. Of the 34 Paleozoic-aquifer wells in Washakie County identified by Susong et al. (1993), 71% had been completed prior to 1971 (the earliest was in 1940), so the Beth No. 1 well is on the younger side of such wells. However, comparison of Cooley (1986) and Susong et al. (1993) identifies 3 Flathead-aquifer wells drilled between 1966 and 1971 that had deteriorated to the point of “making accurate measurements of wellhead pressure impossible”. The remaining useful life of the Beth No. 1 well is indeterminate.

WELL TEST DATA
The Beth No. 1 well provides irrigation through pressure pipelines to two adjacent landowners – Doherty to the east and southeast; Smith to the north and northwest. It supplies irrigation water to lands within the subdivision. It supplies domestic water to the subdivision. The latter two uses are supplied through the same pipeline system, but the irrigation use is managed separately,
through different taps, from the domestic use. During the summer (May - September), irrigation use is rotated among the three users (two agricultural users and in-subdivision irrigation) on a 10-day basis, i.e. each user has exclusive irrigation use of the well for 10 days in each 30-day period. According to the system operator (Whitlock, 2008), the wellhead pressure through the rotation reflects the rate of use by each of the three irrigation systems: 90 psi during Doherty’s use; 60 psi during Smith’s use; and 40 psi during subdivision use. The higher pressures reflect the need to overcome greater resistance (e.g. higher elevation), against which less water will flow.

Consistent with this representation, when we arrived for reconnaissance-level testing of the Beth No. 1 on October 23, 2008, the wellhead pressure was 60 psi and the Smith lands were being irrigated. (Although the formal 10-day rotation ends at the end of September, Smith was irrigating with the acquiescence of his neighbors.) A flow gage was installed on the Beth No. 1 well for the first time for the present investigation. The Smith irrigation occurring at the time was measured at 340 gpm; it was reported to have been going on continuously for the preceding 2 weeks.

The well supplies subdivision domestic water at all times. Our estimate of the non-irrigation flow from the well, at 9:30 AM on a Friday in late October, based on flow gage readings, was 5.8 gpm.

The well was shut in (except for domestic-supply flow) for 21 hours. Wellhead pressure built up to 198 psi during this period. The well was then allowed to flow as freely as possible to monitor flow rate and wellhead pressure. Figure 2-3 provides a plot of well production and wellhead pressure under “wide-open” conditions immediately following the recovery period.

Plumbing and drainage circumstances precluded open discharge right at the wellhead (i.e. zero wellhead pressure). Instead, the Smith irrigation pipeline was opened at the first opportunity, approximately 500 ft. of 4-inch pipeline from the wellhead.
Figure 2-3 -- Beth No. 1 flow test (10/24/08)
The maximum observed flow was approximately 725 gpm, but this dropped to approximately 550 gpm within one minute of opening the discharge valve. A flow of 400 gpm was sustained for an hour, with approximately 35 psi of wellhead pressure. Assuming a roughly linear relationship between pressure and flow, had open discharge been achieved at the wellhead (i.e. zero remaining wellhead pressure), the well could have produced approximately 480 gpm.

The system operator remembers a report of a flow measurement of 300 gpm measured approximately 10 years ago (no further details). If measured under operating conditions, towards the end of an irrigation season, this is not inconsistent with our findings. A sustained production of 300 - 350 gpm at a wellhead delivery pressure around 30 psi is probably a reasonable characterization of this well’s long-term capability.

The Statement of Completion for the well lists an initial (1971) shut-in pressure of 280 psi and a production rate of 2500 gpm. We monitored a long-term recovered shut-in pressure of 230 psi (see below). A 50 psi decline over 37 years of irrigation use is not unreasonable for this aquifer, but our tested relationship between pressure and production rate – a specific capacity of approximately 1.1 gpm per foot of drawdown – indicates even the reported 280 psi is unlikely to have produced flow in excess of 700 gpm more than momentarily. We conclude the 2500 gpm report is in error.

SEO records compiled by Division Superintendent Loren Smith for the present project provide the following flow records for the Beth No. 1 Well:

“The State Engineer’s Office is aware of two flow measurements of the well. The first occurred on August 7, 1974 as part of the field inspection. The use of the well prior to the inspection is not documented. The flow of the well was measured at 660 gallons per minute (rounded to 675 for purposes of adjudication) using a pitot tube inserted into the first sprinkler head hole on the center pivot sprinkler system in place at the time, and a manometer system. The second occurred on August 19, 1986 and was witnessed by Mr. Sheldon Shilling of the Homeowners Association. According to our records, the well had been used extensively that dry summer, and immediately prior to the measurement. For
the measurement, all of the flow of the well was directed into a 6" diameter discharge pipe on the west side of the well house and the flow through the end of the open pipe was measured using a Hoff type current meter. Two successive measurements of 358 and 351 gallons per minute were taken at this time.”

These measurements are reasonably consistent with our 2008 observations, considering some decline in flow is likely to have occurred over the 37 years of irrigation from the well and that year-to-year variations in recharge and use will create fluctuations in well performance.

Considering that we measured approximately 350 gpm with the Smith irrigation line open at the first opportunity, the sustained flow into their pressurized sprinkler system (most of which is downhill of this point) is unlikely to exceed approximately 300 gpm. Opening valves to the Doherty irrigation system during this brief test had no impact on flow, demonstrating that it takes even more pressure, resulting in less flow, to push water through sprinklers to his irrigated fields, which are higher in elevation than the Smith fields. Only by opening irrigation pipes within the subdivision, which is downhill from the Beth No. 1 well, were we able to increase discharge to 435 gpm and reduce the remaining wellhead pressure to the 10 psi range (see the right-hand portion of Figure 2-3).

With respect to low-pressure conditions within the subdivision, it appears that only subdivision irrigation has the hydraulic capacity to draw wellhead pressures down to the operator’s target minimum of 20 psi. Thus, placing pressure-sustaining valves on the non-subdivision irrigation lines at the wellhead would have little utility – the outside irrigators do not appear to be the source of low pressure conditions. If, as indicated here, low-pressure is the result of subdivision irrigation, which occurs from the same transmission/distribution system as the domestic supply, pressure-sustaining valves would only be useful if installed on the scattered, in-subdivision irrigation taps.

Finally, a pressure logger was connected to the wellhead, and pressure readings were taken at 15-minute intervals from Oct. 24, 2008 through July 21, 2009. These data are plotted on Figures 2-4 and 2-5. Limited irrigation apparently continued through October 31 (approximately 120 psi
wellhead pressure); following which the well was used only to supply the small, winter domestic demands. Pressure recovery over the 2008/09 winter reached a maximum of 231 psi, in mid-April. Figure 2-6 provides a log-normal plot of the recovery data following effective cessation of flow. An ideal aquifer will produce a straight line on a plot of this type. The two line segments indicated on the figure indicate a near-well transmissivity of 4,000 gpd/ft and an effective transmissivity in the wider aquifer of approximately 900 gpd/ft.

Irrigation use commenced on April 30, 2009, as clearly evidenced by the drop in wellhead pressure to approximately 100 psi. Pressure fluctuations over the remainder of the monitoring period occur in 10-day blocks, commensurate with the 10-day rotation agreement among the three irrigation users. There was an overall, slow decline in pressure over the 2009 irrigation season (and it likely continued to decline somewhat following termination of monitoring on July 17). The lowest recorded value was 22 psi on July 6. The system operator reduces irrigation discharge as necessary to maintain a target minimum of 20 psi to secure delivery of domestic water. (Since most of the subdivision is at lower elevation than the Beth No. 1 wellhead, this provides delivery pressures of greater than 20 psi.)

Susong et al. (1993) report the following US Geological Survey pressure measurements from the Beth No. 1 well:

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>198 psi</td>
<td>5/14/74</td>
</tr>
<tr>
<td>198 psi</td>
<td>5/3/76</td>
</tr>
<tr>
<td>189 psi</td>
<td>4/27/77</td>
</tr>
<tr>
<td>175 psi</td>
<td>5/5/89</td>
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</tbody>
</table>

This would suggest a downward trend were it not for our measurements of 198 - 231 psi, and our 198 psi measurement was after only a short recovery, at the end of the irrigation season. The details of the US Geological Survey measurements with respect to well recovery were not provided, however, so an apples-to-apples comparison is difficult. Earlier US Geological Survey studies (Cooley, 1986) had concluded that groundwater pressure in the Flathead Aquifer had been declining from the time of completion through 1978.
Figure 2-4  -- Beth No. 1 Wellhead Pressure
Figure 2-5 - Beth No. 1 Wellhead Pressure (irrigation period)
Figure 2-6 - Beth No. 1 long-term recovery (approx. 350 gpm)
BETH WELL USE AND WATER RIGHTS

The Beth No. 1 well supplies irrigation and domestic uses through a complex arrangement of valves and piping in and around the small building at the wellhead. These uses include an irrigation line to lands northeast and southeast of the well (operator: Doherty), an irrigation line to lands west and northwest of the well (operator: Smith) from which two isolated domestic lines split off to properties northwest (see Figure 2-1), a domestic line to a residence immediately east of the well, and a combined irrigation/domestic line to the South Circle Subdivision, which subsequently splits into separate irrigation and domestic distribution lines.

The original water right for the Beth No. 1 well is for irrigation. This right was subsequently enlarged for “miscellaneous” use to provide a domestic water supply for the subdivision, which was largely carved out of the originally-irrigated area. The current water rights configuration is as follows (see Appendix C also):

1. An October 1, 1970 priority to irrigated 142 acres (Permit UW7134), with an adjudicated flow rate of 675 gpm. There is no water-right limitation on the volume of water that can be produced within this flow rate, as long as the water is beneficially used for the permitted uses at the permitted locations.

2. An April 27, 1981 priority to serve domestic water to 12 subdivision lots (Permit UW 60072), and an April 10, 1984 priority to serve the remaining 6 lots (18 total lots) (Permit UW 69122). Both of these rights are enlargements (of use) of the original irrigation right, so must be accommodated within the original 675 gpm.

The earlier priority of the irrigation use gives it nominal seniority over the domestic use, but use of the well is controlled by a multi-user agreement rather than routine priority administration. The irrigation use of the Beth No. 1 well is controlled by the July, 1996, three-party agreement between the South Circle Estates Improvement and Service District and the two adjacent irrigators (currently Doherty and Smith). This agreement has been filed with the SEO and accepted by the court. It is a legally binding part of the water right. The agreement covers the period from May 1 to October 1. It provides for rotation among the three users every 10 days.
Outside the defined irrigation season, use is regulated by mutual agreement among the three parties.

Additional criteria for management of the water supply within the Subdivision’s rotation are provided through the Bylaws of the Improvement and Service District (see Appendix A). For example, a 1987 version of the Bylaws precludes construction of additional sprinkler lines, prohibits open-ended pipe irrigation (i.e. sprinklers only are allowed), a maximum nozzle size of 5/32-inch, 60-ft. set minimum, and 24-hour set maximum.
SECTION 3 – EVALUATION OF EXISTING WATER DELIVERY SYSTEM

This section provides the results of the evaluation, both field and technical, of the District’s current water delivery system.

EXISTING WATER SYSTEM OPERATIONS

As part of the water system evaluation, assessments were made of the existing system operations. There are two distinct operating seasons for the District’s water system: irrigation season and non-irrigation season. The irrigation season runs from May 1 to October 15, or approximately five months. The non-irrigation season runs from October 15 through April 30, or approximately seven months.

During the irrigation season, production from the Beth No. 1 well is maximized to meet the 24-hour per day irrigation needs of the three irrigating parties. The pressure reducing valves in the well house are opened up to allow maximum flow to the system. The system seems to be able to meet the irrigation and domestic needs of the users during the periods when the two large parcels are being irrigated. However, during the subdivision’s ten-day irrigation cycle, the system sometimes cannot adequately meet the demands of the domestic users. It is uncertain whether the well capacity, the domestic distribution system, or both are limiting the delivery to homes during the irrigation cycle.

During the non-irrigation season the well production is throttled down and the pressure reducing valves are required to control the discharge pressure from the well.

WELL HOUSE AND PIPING SYSTEM

The existing Beth No. 1 well is housed in a metal building, (see Photo No. 1). The water quality from the well was discussed previously in Section 2 and is presented in Appendix B. The well house has no concrete floor, and is not insulated. There is no electricity at the well house.
The well piping system is shown in the Photo No. 2 and Photo No. 3. The steel well casing extends above the ground elevation approximately 12 inches. An old flanged gate valve is installed on the casing to control the flow of the well. Field evaluations indicated that the gate valve does not seal tightly, probably due to the age of the valve and years of little or no exercising. Immediately above/downstream of the gate valve is a flanged valve that is believed to be the original pressure control valve for the well. It is not known if the valve serves any useful functions. Downstream of the second valve, the well piping is transformed into an inverted U, composed of 6-inch diameter welded steel piping.
The inverted U then branches into a perpendicular manifold system. The manifold serves as a connection point for the supply piping for the two large land parcels and the subdivision. The two larger pipes which serve the two irrigated parcels are a 6-inch pipe that serves the northern Smith parcel (exits to the west), and a 4-inch pipe that serves the eastern parcel (Dougherty). There are not any pressure reducing valves on the two irrigation lines leaving the well house. There is a PRV on the 6-inch line located in a manhole north of the well house that serves the Smith property.

There are two connections to the manifold which serve the subdivision, and each has an individual pressure reducing valve. The smaller connection is a 2-inch pipe which is the primary source for the subdivision’s water supply during the non-irrigation season. The 2-inch sizing was required for the 2-inch PRV to be able to provide accurate pressure control for the small flows needed to supply the domestic needs during the non-irrigation season. The larger connection is a 4-inch pipe which is needed to meet the combined domestic and irrigation needs of the subdivision during the irrigation season. The two subdivision pipelines are connected in the well house downstream of the PRVs to a buried 6-inch pipeline which conveys both irrigation and domestic water to the subdivision. The valving on the subdivision well house piping appears to be in good and operable condition.

**BURIED WATER DISTRIBUTION PIPING SYSTEM EVALUATIONS & GIS MAPPING**

The water from the well is delivered to the users through a system of buried PVC distribution system piping. It is reported that the piping system is constructed of “PIP”, or low pressure irrigation piping. It is also reported that several portions of the domestic water system and the irrigation system are constructed side by side in the same original pipe trench. It is also reported that the piping system is only buried 3 feet deep, but that because of the temperature of the well water, the piping system has never experienced any freezing problems. As part of this study, an effort was made to excavate the water distribution system to evaluate its condition and to verify depths, sizes and conditions.

Initial locations of the water system were obtained from the system operators. The irrigation portion of the pipeline system has irrigation valves which are located on the main irrigation.
pipeline and are used for supplying irrigation water to the individual lots. These irrigation valves are clearly visible and indicate the location of the main irrigation system pipeline, see Photo No. 4. The domestic portion of the water system was more difficult to identify from the surface, although individual shut-offs for the house service lines were occasionally visible. In addition to the visual aids, old subdivision maps and water rights maps were obtained to assist with locating the water system piping.

Using the best information available, utility locates were requested. In the fall of 2008, a local utility contractor was contacted and hired to excavate the water lines at selected locations. An old water system map that was found to be a useful guide is included in Appendix A. As part of the field investigations, the water system was also surveyed with GPS equipment to ultimately provide a GIS map of the water system and its components. Existing exposed utilities such as water lines, but also including power lines and telephone pedestal boxes were mapped during the field evaluations. The accuracy of the GPS equipment is 1 meter or less.

For reference, the results of the water system excavations and mapping are shown on the GIS map in Figure 3-1. Excavations were made at several pre-selected locations in the water system. The first excavation was made south of the Lot 5 residence. It was determined that the pipeline heading southward from Lot 5 was a single pipeline which carries combined irrigation and domestic water to the upper portions of the District, see Photo No. 5.
Figure 3-1. Water System Map (GIS)
The pipeline heading southward was reported to split into a separate domestic and irrigation pipeline at a manhole just east of Lot 8 in the upper portion of the District. This manhole is shown in Photo No. 6, and it was verified that the irrigation and domestic systems are separated at the manhole. It is also reported that one or both of the pipelines may run westward from the manhole under a portion of the garage on Lot 8. The exact locations of the pipelines could not be determined, but it is probable that the garage was constructed over the pipelines sometime after the pipelines were constructed.

The piping system was excavated near Lot 9 to determine the status of the two water pipelines. It was determined that there are two distinct and separate pipelines which serve the upper subdivision area, see Photos No. 7 and Photo No. 8. The irrigation pipeline is 6-inch PIP buried approximately 48 inches deep. The domestic pipeline appears to be a 3-inch PVC pipeline, but the diameter for its full length was not confirmed. The exterior of the pipe appeared to be in good condition. It is assumed the two pipelines were constructed in the same trench for most of their alignment.
The pipelines serving the lower portion of the subdivision were also excavated to determine condition, location, size and depth. Excavations were made at 3 locations along the alignment of the irrigation pipeline serving the lower portion of the District. One location was at Lot 4, where it was determined that the irrigation pipeline is a 6-inch PIP, buried 42 inches deep, and the line
may run under the corner of the existing house, see Photo No. 9 and Photo No. 10. A second excavation was made at Lot 2, see Photo No. 11, where it was found the irrigation pipeline to be a 4-inch diameter PIP, buried 30 inches deep. The third excavation was made at the assumed end of the irrigation pipeline at Lot 1. The pipeline was determined to be a 4-inch PIP, buried 40 inches deep. It was assumed the pipeline terminated at the Lot 1 property, (see Photo No. 12).
The domestic pipeline serving the lower portions of the District could not be located from Lot 5 westward. It was determined that the domestic pipeline is not constructed in the same trench as the irrigation pipeline. It is reported that the domestic pipeline is only a 1-inch pipeline and that it may serve 4 or 5 homes, which if true, is inadequate and undersized to meet domestic
pressures and demand. Several property owners (Lot 2 and Lot 3) were contacted and were somewhat sure of their domestic line location, but Lot 2 had experienced a recent line leak and never could locate his service line.

The water system is protected by a type of pressure relief valve which is located at the cul-de-sac in the upper portion of the District, labeled “blow-off” in Figure 3-1. The purpose of the valve is believed to be to protect the system from overpressurization by relieving water at a certain pressure setting. It also serves to allow the system to keep moving and may be part of the reason the system has never been seriously affected by freezing problems. The valve is shown in Photo No. 12, and it relieves a small flow continuously.

In general the following findings can be reported from the field investigations and mapping (please also refer to the GIS map):

- Beth Well No. 1 has been permitted by the State of Wyoming Engineers Office (WSEO) for irrigation and “miscellaneous use”. However, the well has not been permitted by the WDEQ. The services are not metered and there are not any backflow prevention devices.
- The pipeline conveying water from the well to both the lower and upper portions of the District is a 6-inch PIP, and it conveys both the domestic and irrigation flows in a single pipeline. The lower irrigation line is not believed to be located in the easements planned for the pipeline.
- The domestic and irrigation water systems are separated at two distinct points for the lower and upper district areas. The two pipelines are constructed in the same trench in the upper portion of the District. However, the two pipelines are not constructed in the same trench for the lower District area. It appears the domestic pipeline is constructed of PVC material and may be of a higher pressure grade than the irrigation piping.
- The pipelines are laid at a depth of 30 to 48 inches.
- The domestic water distribution system has not been approved or permitted through the WDEQ. The system is not adequately valved and there are not any hydrants for flushing or fire protection.
HYDRAULIC MODELING

Current water system engineering practice requires that water system evaluations also include development of a hydraulic computer model that can be used to evaluate the water system. A hydraulic model of the existing water systems can be developed to evaluate the operation and adequacy of the system, and its ability to provide adequate flows and pressures to all customers under all demand conditions. It has been reported that the domestic water delivery system experiences low flows and low pressures during times of the year when the subdivision is irrigating.

As part of the overall water system evaluation, a hydraulic model was developed for the existing water systems and the Town of Ten Sleep. The model was developed to include the two water systems as mapped and sized in the field inventory, and the Beth No. 1 well as the source of supply. The well was treated as a source of supply that declined in flow rate and pressure output as demands on the well increased. The hydraulic modeling methods and results are presented in more detail in Appendix C. The results of the modeling indicate that the combination of declining well production capability and the smaller domestic water system piping in the lower portions of the District result in inadequate domestic flows and pressures for the entire system.
SECTION 4 – POPULATION GROWTH AND WATER DEMAND PROJECTIONS

This section of the study provides population projections for the District’s service area and corresponding water demand projections.

POPULATION AND GROWTH

Typically, public water distribution systems are expected to have a useful life of 50 years. Typically, population projections are made for the 50-year planning period to determine the system’s water demand, and to size the piping system for the 50-year projected population. The District currently has about 24 property owners, which equates to a population of approximately 75, based on an assumption of 3.2 persons per household in Washakie County. The District is bounded on the north, east and west by agricultural lands, and on the south by BLM lands. Because of the large undeveloped acreages surrounding the District, projecting development and population growth around the District service area is difficult and speculative. For the purpose of this Study, a conservative population growth of one percent per year has been used to project population growth in the District area. For the purpose of estimating water demands, it is assumed that the District population will grow from 75 to 123 by the end of the 50-year design period.

WATER DEMANDS

Neither the well production nor the individual services on the water system are metered. As a result, there are not any water use records to serve as a basis for water demands. Typically, there are three water usage figures that are used in evaluating water demands. The first is the “average day demand”, or ADD. The ADD is calculated by dividing the total water use in the system throughout the year by the service area population, and then dividing again by 365 days. Typically, recent studies have identified the ADD for residential use in the rural areas similar to the District to be about 150 gallons per capita per day (gpcpd).

The second water usage figure is “peak day demand” or PDD. PDD is defined as the highest water usage experienced during a 24-hour period. The PDD usually occurs in the summer when irrigation watering is at its peak. PDD is used to size the pumping facilities in the water system. The previously referenced studies have identified the PDD for rural residential use as being three times the ADD, or in the District’s case, 450 gpcpd.
The third water usage figure is the “peak hour demand”, or PHD. PHD is the peak water usage observed at a point in time due to daily cyclical water demands. The PHD is used to size the water transmission and distribution system piping. The previously referenced studies have identified the PHD in the service area to be six times the ADD, or 900 gpcpd in the District.

WATER DEMAND PROJECTIONS

The water demand projections for the District’s water service area are presented in Table 4-1. The current peak day demand for the District is estimated to be 33,750 gallons per day, or 23 gallons per minute (gpm). The expected peak day demand at the end of the 50-year design period is projected to be 55,350 gallons per day, or 38.5 gpm.

TABLE 4-1 – WATER DEMAND AND POPULATION PROJECTIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>ADD GPD</th>
<th>ADD GPM</th>
<th>PDD GPD</th>
<th>PDD GPM</th>
<th>PHD GPD</th>
<th>PHD GPM</th>
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<td>2009</td>
<td>75</td>
<td>11,250</td>
<td>8</td>
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<td>23</td>
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<td>110,700</td>
<td>77</td>
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</table>
SECTION 5 – WATER SUPPLY OPTIONS AND COST ESTIMATES

This section of the Study presents the water supply options determined to be feasible for the District. Conceptual designs and preliminary cost estimates are also presented.

WATER SUPPLY OPTIONS

Three options were identified for providing a reliable domestic supply for the District. It is assumed under all three options that the existing irrigation system will be separated and made independent of the domestic water system. In addition, because of the inadequacies of the existing domestic water system, the domestic system should be completely replaced with a new system that meets all DEQ standards, and includes metered services with backflow devices for each water user. The peak day capacities of the source should be 40 to 50 gpm to meet the future demands. The three options are described below, and are detailed in the remainder of this section.

- **Option No. 1 - Beth Well Rehabilitation.** This option will allow the District to continue using the existing well for both irrigation and domestic use. A separate supply will be drawn from the well to provide the domestic supply, and will be treated to reduce the radionuclide levels before being distributed to the users through the new domestic distribution system. And, because of the occasional water pressure and supply problems when the Beth Well is being used by the District, a water storage tank will be constructed to ensure that domestic demands and pressures are met at all times.

- **Option No. 2 – New Ten Sleep Formation Well.** This option provides for a new domestic supply from a well drilled into the Ten Sleep formation (same formation as the nearby Town of Ten Sleep wells). Such a new well is expected to be artesian, and to have an adequate quantity, and a good quality that will not need treatment. The well will be connected to the new domestic distribution system.

- **Option No. 3 – Town of Ten Sleep Water Supply.** Option No. 3 involves extending a water supply line from the Town of Ten Sleep to the District, and connecting it into a new domestic distribution system. This option includes a storage facility to meet domestic needs.
OPTION NO. 1 – BETH WELL REHABILITATION

The existing Beth Well No. 1 is clearly capable of meeting flow-rate objectives for a domestic water supply. In the absence of water treatment to reduce radioactivity, however, the current well is not suitable for a public water supply. The low levels of radium present in the well are likely treatable with conventional water softening, but the present wellhead has no accommodation for such facilities (even a basic power supply) and efficient operation would certainly not extend treatment to the irrigation portion of the water supply.

We have not evaluated design and construction issues that may be associated with permitting the well for public water supply in detail, but review of available information and inspection of the wellhead suggests no insurmountable failings (with respect to the well itself) in this regard. The Wyoming State Engineer’s Office has verified that a pump could be installed in the well to restore production to the adjudicated 675 gpm without further permit work necessary. However, the 7-inch casing installed in the well may preclude this as a cost-effective option to increase irrigation capability.

The Beth No. 1 well is a valuable asset to the District and the irrigators. The well has been used to meet the irrigation and domestic needs of the District area for nearly twenty years. Even though the well and the water system have never been permitted by DEQ, it is believed the system could be brought up to DEQ standards and could continue to serve as a valuable asset. Upgrading would generally include confirming proper well construction, separating the domestic distribution system from the irrigation system, and treating the domestic system for radionuclide reduction. The conceptual features of this option are shown in Figure 5-1. Some of the significant components and features of the conceptual design are highlighted below:

- The existing above ground well piping, manifold and valving would be replaced with new reliable materials.
- The existing pressure reducing valves (PRVS) would be replaced with new reliable dual purpose pressure reducing/pressure sustaining valves (PRPSV). The sustaining feature would ensure that a minimum operating pressure of 35 psi was maintained in the domestic system regardless of the irrigation demands.

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Figure 5-1. Option No. 1, Beth Well Rehab
The existing 2-inch domestic supply piping will be disconnected from the irrigation piping and extended to a new treatment house to be constructed adjacent to the existing well house.

The treatment house would house the domestic piping, valving, metering and treatment systems. The treatment systems would include an ion exchange type water softener for radionuclide removal, and a chlorination system that would provide the ability to chlorinate in accordance with DEQ rules and regulations.

The existing well site and treatment house would be fenced to provide better security.

A septic system would be constructed to dispose of the brine waste from the softening regeneration process.

A 60,000 gallon water storage tank would be constructed approximately 2,000 feet south of the existing well house to provide for stored water and consistent system pressure. The tank would be constructed at an elevation of about 4585 and have an overflow elevation of 4610. The tank dimensions would be about 24 feet diameter and 20 feet tall.

The new domestic distribution system would be constructed at the sizes shown on Figure 5-1. The water lines would be constructed in existing roadways wherever possible, to make the pipelines more accessible for maintenance, and to avoid the need for obtaining easements from private property owners.

Water services and meter pits would be constructed for each water user and the house plumbing converted to the new distribution system.

Flush hydrants would be installed on all dead end pipelines.

Air vacuum relief valves would be installed at high points in the distribution system.

Any disturbed asphalt would be replaced.

Existing graveled roadways disturbed by construction would be re-graveled.

A power supply would need to be constructed to serve the new treatment house. The power is needed to run the treatment systems and to provide heating and lighting.

**OPTION NO. 1 – COST ESTIMATE**

The cost to construct Option No. 1 in year 2011 is estimated to be $930,003 as shown in Table 5-1. The land acquisition costs include the cost to purchase the well site, tank site, and an
## Table 5-1 Project Cost Estimate

**Option No. 1 - Rehab Beth Well**

### WWDC Eligible Components

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Total</th>
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**Construction Cost Subtotal No. 1 (CCS No. 1)**: $488,825

**CCS No. 1 inflated 5% for Year 2011**: $513,266

**Engineering Services During Construction (10% CCS No. 1)**: $19,327

**Construction Cost Subtotal No. 2 (CCS No. 2)**: $648,993

**Contingency (15% of CCS No. 2)**: $94,899

**Construction Cost Total (CCT)**: $649,282

**Total Estimated Project Cost - WWDC Eligible(2011)**: $737,282

### WWDC Non-Eligible Components

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**Construction Cost Subtotal**: $127,025

**CCS No. 1 inflated 5% for Year 2011**: $133,376

**Engineering Services During Construction (10% CCS No. 1)**: $13,338

**Construction Cost Subtotal No. 2 (CCS No. 2)**: $146,714

**Contingency (15% of CCS No. 2)**: $22,007

**Construction Cost Total (CCT)**: $168,721

**Total Estimated Project Cost - WWDC Non-Eligible(2011)**: $192,721

**Combining Project Costs - WWDC Eligible + WWDC Non Eligible**: $930,003
**OPTION NO. 1 – ADVANTAGES AND DISADVANTAGES**

Some of the obvious advantages of constructing Option No. 1 are as follows:

- The Beth No. 1 Well is a known resource with known output and water quality.
- The District would be able to maintain its autonomy.

Some of the obvious disadvantages of constructing Option No. 1 are as follows:

- This option is expensive and relies on rehabilitating a 40-year old well.
- The water for the domestic system will need to be treated for radionuclide removal, therefore requiring a higher degree of operator certification.
- The inability of the well to meet the domestic needs of the District and the irrigation needs of the irrigators concurrently.
- The potential for the Beth No. 1 Well to experience a future decline in capacity.
- The District will need to hire a licensed water system operator and backup operator to be responsible for the water system operation and maintenance.
- The District will need to perform all the sampling, testing and reporting required by EPA.

**OPTION NO. 2 – NEW TEN SLEEP FORMATION WELL**

Given the modest demands of a subdivision domestic supply (not including the present subdivision irrigation demands), a new domestic well with a capacity far less well than the Beth No. 1 Well would be fully adequate to meet demands. Chances are good that such a supply could be secured from the shallowest available aquifer - the Ten Sleep Sandstone - at depths of less than 700 feet.

The Ten Sleep Sandstone has not been extensively developed for irrigation in the area, due to low productivity relative to the deeper aquifers. However, it is likely satisfactory for the modest domestic demands of the subdivision. We have not located representative analyses for all regulated parameters, but, based on the general chemistry available through local US Geological Survey studies (see Table 2-1) and the general character of the formation, full compliance with EPA standards is likely.
Based on depth, pressure, water-quality, and the driller’s log, the Beth No. 1 Well is open to both the Madison and Flathead Formations below 960 feet., but the water appears to be primarily coming from the lower aquifer, i.e. the Flathead. The Town of Ten Sleep wells are open to the Madison Formation below 850 feet. The Stinnett and Sutherland wells at the edges of the District appear to have been completed in the Ten Sleep Sandstone. Thus, the potential for groundwater use interference is likely confined to a few local domestic-supply wells; there is little concern with negative impacts on either irrigation or municipal wells in the surrounding area.

The existing Stinnett and Sutherland wells (and other, similar wells in the surrounding area) suggest no strong siting constraints on a Ten Sleep Sandstone well constructed to meet the modest demands of the District. Consideration of the relative elevations of these two wells and the reported depth of the “main water-bearing zone” suggests a westward dip of 2.4°. This is reasonable in terms of the surface geology and suggests a certain continuity of water-bearing strata at the subdivision scale. It appears that a useful well could probably be located at a site of engineering and legal (e.g. easements) convenience. The potential for interference with existing wells would be minimized by maximum spacing. The “proposed well” could be located simply to maximize the distance from existing Ten Sleep-Formation wells, while remaining adjacent to public access via existing subdivision roads. Further consideration of this option should certainly include a more complete siting analysis, including incorporation of appropriate engineering factors.

The following reconnaissance-level calculations are based on a Ten Sleep-aquifer well in the approximate center of the subdivision, a shut-in head of 4690 feet. (MSL; the average measured Oct. 23, 2008 at the Stinnett and Sutherland wells), “a representative transmissivity of 150 ft²/day” cited in the “Water Resources of Washakie County” (US Geological Survey Water-Resources Investigation Report 91-4044; 1993), and a generic confined-aquifer storage coefficient of 0.001.

A Ten Sleep-aquifer well stands a very good chance of providing the target flow at sufficient pressure to flow into a tank at 4610 feet elevation without pumping. There is a fair chance that
such a well could produce 60 gpm for short periods at a delivery head of 4610 feet elevation. Nonetheless, a well design that could accommodate installation of a submersible pump would provide a considerable safety margin against unexpected hydrogeologic conditions and future changes in conditions and demands.

Forty years of production averaging 5 gpm should produce approximately 12 feet of drawdown at the well (a pressure loss of 5 psi) and 4 feet of drawdown (a pressure loss of 1.7 psi) at a distance of 1,500 feet, the distance to the nearest existing Tensleep-aquifer well. A 3-month maximum use period averaging 25 gpm would produce approximately 10 feet of drawdown at the well and 1.3 feet of drawdown at a distance of 1,500 feet. Thus, the aquifer impact of this small development would likely have no regional significance.

The conceptual features of this option are shown in Figure 5-2. Some of the significant components and features of the conceptual design are highlighted below:

- A new well would be drilled into the Ten Sleep Formation, approximately 800 to 900 feet deep. Based on other similar wells in the area, it is expected the well could produce 60 gallons per minute at a pressure of 60 to 100 psi. Water quality is expected to meet all EPA drinking water standards.
- The well may be located at any location in the District. Because of the existing Beth No. 1 Well location and the configuration of the existing pipeline systems, the initially preferred location for the new well is adjacent to the Beth Well No.1.
- The combined well sites would be graded, and a security fence constructed around both wells.
- A well house of approximate dimensions of 12 feet by 20 feet would be constructed to house the well piping, metering, and chlorination system. The new well would be required to be constructed with the capability for disinfection to meet WDEQ requirements.
- In water systems with one well as a supply, WDEQ regulations require a water storage tank. However, based on recent conversations with WDEQ, a water storage tank will

44
probably not be required if the system is served by a flowing artesian well. A variance from WDEQ will need to be requested if the District pursues this option in the future. A water storage tank has not been included in this option, although it would provide valuable redundancy for the system.

- The new domestic distribution system would be constructed at the sizes and locations shown on Figure 5-2. The water lines would be constructed in existing roadways wherever possible, to make the pipelines more accessible for maintenance, and to avoid the need for obtaining easements from private property owners.
- New water services and meter pits would be constructed for each water user and the house plumbing converted to the new distribution system.
- Flush hydrants would be installed on all dead end pipelines.
- Air vacuum relief valves would be installed at high points in the distribution system.
- Any disturbed asphalt would be replaced.
- Existing graveled roadways disturbed by construction would be re-graveled.
- A power supply would need to be constructed to the new well house to be able to run the disinfection system and to provide heating and lighting.

**OPTION NO. 2 – COST ESTIMATE**

The cost to construct Option No. 2 in year 2011 is estimated to be $722,091 as shown in Table 5-2. The land acquisition costs include the cost to purchase the well site.

**OPTION NO. 2 – ADVANTAGES AND DISADVANTAGES**

Some of the obvious advantages of constructing Option No. 2 are as follows:

- This is the least expensive option.
- The new well will be a reliable source of supply for the District, and will be completely independent of the Beth Well.
- Initially, no treatment is required.
- A water storage tank is not required (with WDEQ variance).
- The District would be able to maintain its autonomy.
### TABLE 5-2 Project Cost Estimate

#### Option No. 2 - New Well

**WWDC ELIGIBLE COMPONENTS**

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**WWDC NON-ELIGIBLE COMPONENTS**

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**COMBINED PROJECT COSTS - WWDC ELIGIBLE + WWDC NON ELIGIBLE**

| Total Project Cost - WWDC Eligible + Non-Eligible | $722,091 |
Some of the obvious disadvantages of constructing Option No. 2 are as follows:

- The Town of Ten Sleep has indicated it will contest the drilling of a well within a two mile radius of the Town’s limits in an effort to protect the town’s wells. It is uncertain whether the Town has the legal authority to contest drilling of a new well.
- The District will need to hire a licensed water system operator and backup operator to be responsible for the water system operation and maintenance.
- The District will need to perform all the sampling, testing and reporting required by EPA.

**OPTION NO. 3 – TEN SLEEP WATER SUPPLY**

The third option for a reliable water supply is for the District to obtain its water supply from the nearby Town of Ten Sleep water system. The Town has two very productive flowing groundwater wells that are supplied from the Madison aquifer. The water quality is very good, and the shut-in pressure is about 150 psi. Previous studies indicate the combined capacity of the two wells is 2,000 to 3,000 gpm, although the combined adjudicated water rights for the wells are limited to 1,100 gpm. The Town’s water system appears to have adequate capacity to serve the projected 40 gpm domestic peak day demands of the District. Therefore, this option includes extending a water line from the Town’s northern water system northward to supply the domestic needs of the District.

The conceptual features of this option are shown in Figure 5-3. Some of the significant components and features of the conceptual design are highlighted below:

- A connection to the Town’s water system would be made near the existing Ten Sleep Well No. 2.
- A master meter vault would be constructed near the point of connection to measure flows to the District and to provide billing information for the Town.
- A 6-inch water transmission pipeline would be constructed from the Town along the west side of the right-of-way of the Hyattville Highway to the District. Two highway under-crossings would be required. The highway is under the jurisdiction of the Washakie County Road and Bridge Department.
Figure 5-3. Option No. 3, Ten Sleep Water Supply

Legend:
- Well
- Meter Vault - Proposed
- Valve - Proposed
- Fire Hydrant - Proposed
- Approximate Property Boundary
- 6" Water Main - Proposed
- 4" Water Main - Proposed
- 2" Water Main - Proposed
- Water Main - Existing, Domestic Only
- Water Main - Existing, PIP Irrigation Only
- Water Main - Existing, Same Trench

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Option No. 3
Ten Sleep Water Supply

Master Meter Vault
Ten Sleep No. 2

2155 North Main Street
Sheridan, WY 82801
(307) 674-0609

Option No. 3
Ten Sleep Water Supply

Hyattville Hwy
Nowood River

THIS SECTION HAS BEEN UPDATED. SEE SECTION 8
• Isolation valves would be provided at approximately 2,000-foot intervals along the transmission pipeline.
• A new domestic distribution system would be constructed at the sizes and locations shown on Figure 5-3. The water lines would be constructed in existing roadways wherever possible, to make the pipelines more accessible for maintenance, and to avoid the need for obtaining easements from private property owners.
• New water services and meter pits would be constructed for each water user and the house plumbing converted to the new distribution system.
• Flush hydrants would be installed on all dead end pipelines.
• Air vacuum relief valves would be installed at high points in the transmission pipeline and the distribution system.
• Any disturbed asphalt would be replaced.
• Existing graveled roadways disturbed by construction would be re-graveled.

OPTION NO. 3 – COST ESTIMATE
The cost to construct Option No. 3 in year 2011 is estimated to be $845,367 as shown in Table 5-3. It is not expected that this option will require any land acquisition costs. However, a small cost has been included to be conservative.

OPTION NO. 3 – ADVANTAGES AND DISADVANTAGES
Some of the obvious advantages of constructing Option No. 3 are as follows:

- The Town appears to have adequate capacity and pressure to serve the District.
- No treatment would be required.
- No water storage would be required, although if affordable, storage should be considered.

Some of the obvious disadvantages of constructing Option No. 3 are as follows:

- This is an expensive option.
- Initial discussions with the Town indicate that the District would own and need to maintain the 6,000-foot transmission pipeline between the Town and the District.
- The District would be subject to water rationing should the Town’s water system capacity be diminished.
# TABLE 5-3 Project Cost Estimate

## Option No. 3 - Ten Sleep Water Supply

<table>
<thead>
<tr>
<th>WWDC ELIGIBLE COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Final Design and Specifications</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
</tr>
<tr>
<td>Legal Fees</td>
</tr>
<tr>
<td>Acquisition of Access and Right-of-way</td>
</tr>
</tbody>
</table>

## Construction Costs

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilization and Bonds</td>
<td>1</td>
<td>LS</td>
<td>$20,000</td>
<td>$20,000</td>
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<tr>
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<td>1</td>
<td>LS</td>
<td>$5,000</td>
<td>$5,000</td>
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<tr>
<td>Master Meter Vault</td>
<td>1</td>
<td>LS</td>
<td>$60,000</td>
<td>$60,000</td>
</tr>
<tr>
<td>Roadway Undercrossing</td>
<td>180</td>
<td>LF</td>
<td>$150</td>
<td>$27,000</td>
</tr>
<tr>
<td>6-inch Piping and Fittings</td>
<td>6,400</td>
<td>LF</td>
<td>$30</td>
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<tr>
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<td>$8,000</td>
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<tr>
<td>Flush Hydrant Assembly</td>
<td>2</td>
<td>EA</td>
<td>$2,500</td>
<td>$5,000</td>
</tr>
<tr>
<td>Air/Vac Relief Valve</td>
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<td>EA</td>
<td>$3,500</td>
<td>$7,000</td>
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<td>Water Line ID Posts</td>
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<td>Asphalt Repair</td>
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<tr>
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<td>3</td>
<td>Acre</td>
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<td>$6,000</td>
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### Construction Cost Subtotal No. 1 (CCS No. 1) 403,625

CCS No. 1 Inflated 5% for Year 2011 423,806

### Engineering Services During Construction (10% CCS No. 1)) 42,381

### Construction Cost Subtotal No. 2 (CCS No. 2) 466,187

Contingency (15% of CCS No. 2) $69,928

### Construction Cost Total (CCT) 536,115

### TOTAL ESTIMATED PROJECT COST - WWDC Eligible(2011) 607,115

## WWDC NON-ELIGIBLE COMPONENTS

<table>
<thead>
<tr>
<th>WWDC NON-ELIGIBLE COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Final Design and Specifications</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
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<tr>
<td>Legal Fees</td>
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<tr>
<td>Acquisition of Access and Right-of-way</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Mobilization and Bonds</td>
<td>1</td>
<td>LS</td>
<td>$5,000</td>
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<td>$5,000.00</td>
</tr>
<tr>
<td>Air/Vac Relief Valve</td>
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<td>$7,000.00</td>
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<td>Acre</td>
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<td>$2,000.00</td>
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</table>

### Construction Cost Subtotal No.1 (CCS No. 1) $160,175

CCS No. 1 Inflated 5% for Year 2011 168,184

### Engineering Services During Construction (10% CCS No. 1)) 16,818

### Construction Cost Subtotal No. 2 (CCS No. 2) 185,002

Contingency (15% of CCS No. 2) $27,750

### Construction Cost Total (CCT) $212,752

### TOTAL ESTIMATED PROJECT COST - WWDC Non-Eligible (2011) $238,252

## COMBINED PROJECT COSTS - WWDC ELIGIBLE + WWDC NON ELIGIBLE

<table>
<thead>
<tr>
<th>Component</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Project Cost - WWDC Eligible + Non-Eligible</td>
<td>$845,367</td>
</tr>
</tbody>
</table>
- The District would still be required to provide a licensed operator and backup to be responsible for the water system operation and maintenance.
- EPA testing and sampling, and reporting requirements would be considerably reduced compared with options 1 and 2.

**PREFERRED WATER SUPPLY OPTION**

Financing plans were initially developed for each of the water supply options presented above. It was soon realized that based on typical agency funding programs for the typical state funding agencies, none of the options was going to be economically feasible because of the small customer use. Conversations with USD and Rural Utilities Services were initiated, and it was discovered that the District would qualify for considerable grant funding from RUS. In fact, a preliminary determination by RUS indicated that the area would qualify as a poverty area, and may be eligible for a greater portion of grant funding than low income areas. Apparently, the RUS uses an equation for determining grant funding that provides whatever level of grant is needed to result in a water system debt service and water user rate that is typical for other Wyoming communities of similar size.

The discovery of RUS funding eligibility altered and added complexity to the calculations for the financing plans for the three water system options. RUS indicated that it would provide funding for any of the options, and through the use of the RUS equations, all the options would be eligible for grant funding at a level that would result in debt assessments and user rates similar to other similarly sized communities. Therefore, it is difficult to select a preferred option when the RUS funding goal would be to make the water system costs to the users the same for all options. A primary requirement for the RUS funding is that the WWDC would also need to be involved in providing funding assistance for the project, and the preferred option would have to be agreed upon by both WWDC and RUS.

Conversations with WWDC indicate that the funding program for rural water systems gives a lower priority to individual systems and higher priority to rural systems connecting to central water systems. The consensus of WWDC representatives was that the only option that would receive any priority for funding under the WWDC program was the “regional concept” of the
District connecting to the Town of Ten Sleep water system, Option 3. Therefore, the preferred water supply alternative is Option No. 3, the Ten Sleep Water Supply Option. The next two sections provide a conceptual design, cost estimate, and financing plans for the preferred option. The reader should be advised that this section has been revised, please refer to Section 8.
SECTION 6 - CONCEPTUAL DESIGN & COST ESTIMATES
This section of the Study presents the conceptual design and cost estimates for the preferred water system option selected by the District.

PREFERRED WATER SUPPLY ALTERNATIVE
As indicated in the previous section of the Study, the preferred water supply alternative is Option No. 3, the Ten Sleep Water Supply Option. The preferred alternative includes extending a water supply pipeline from the Town of Ten Sleep water system to the District, and constructing a new distribution and storage system to serve the District. The existing Beth No. 1 Well and irrigation system will continue to be used for irrigation only, and will not be interconnected with the new water system. The reader should be advised that this section has been revised, please refer to Section 8.

ENGINEERING CONSIDERATIONS
There are several engineering considerations that must be taken into account when developing a conceptual design for the District’s water system. The first consideration is the capacity of the existing Ten Sleep well system, and its ability to meet the current and future water demands of the District system and the Town. The Ten Sleep water supply system consists of two groundwater wells with a reported total combined sustained capacity of 1,750 gpm. There is no storage facility. From the previous water demand projections and hydraulic modeling, the peak hour demand of the Town’s water system is projected to be 680 gpm. The typical fire flow demand for a community of this size is in the range of 1,000 to 1,500 gpm for a duration of two to three hours. The total demand on the Town supply system is therefore projected to be 1,680 to 2,180 gpm. For the purpose of this Study, it is assumed that the total demand on the system is projected to be 2,100 gpm.

Both of the Town’s wells have been evaluated and tested through WWDC funded studies in 2002 and 2003. In addition, the capacity of the wells has been reviewed for this Study and a memorandum is attached as Appendix E. Because the wells are artesian with a shut-in pressure of 135 psi, the studies indicated that the combined short term yield for a short duration of two to three hours (the fire flow requirement) is between 2,500 and 3,000 gpm, which is more than adequate to meet the total projected demand of 2,100 gpm discussed above. Historically
however, the Town has had water supply difficulties in the summer months when lawn and
garden watering demands place a burden on the system capacity. The difficulties were primarily
caused by undersized distribution lines and excessively high customer water usage rates. The
Town has recently replaced many of the undersized water lines and also installed water meters,
and will begin billing based on water consumption, which are both expected to greatly reduce the
high consumption. With these improvements, the Town’s water well system should be able to
better meet water system demands without the low pressure problems experienced in the past.
However, the best long term solution for the Town to meet its water system demands is to
construct a water storage tank. A tank would eliminate the need for the manual adjusting of the
well PRVs to maintain flows and pressures. The wells would be piped directly to the tank
instead of the system. The wells would be controlled to keep the tank full, and the tank would
provide gravity flow to the system. In addition, a new tank for the Town would ensure that the
Town could meet fire flow demands while meeting peak water system demands in the highest
demand periods. A new tank should be located at an elevation to provide standard operating
pressures in the system from 60 to 95 psi, and store a volume of 300,000 to 500,000 gallons.

Another engineering consideration is the ability of the Town’s well system to provide
pressurized flow to the District without pumping. Both wells are constructed with pressure
reducing valves (PRVs) that are manually adjusted to meet the flow and pressure requirements of
the Town system. In the winter when demands are low, the well system is manually throttled to
control the pressure in the distribution system. In the summer when demands increase, the PRVs
are manually adjusted to allow more flow and to maintain a consistent pressure. The manual
operation of the PRVs creates the need for an attentive operations staff so that water demands
and pressures are met. There is adequate pressure from the artesian wells to easily deliver water
to the District. However, the manual operation of the Town’s PRVs may occasionally reduce the
discharge pressure and prevent free flow to the District. Therefore, the District’s connection to
the Town water system should be made at the Well No. 2 well house and a separate PRV should
be installed on a new line that serves the District only. By providing a direct connection to the
well, the District is assured of adequate water pressure regardless of the manual PRV settings on
the Town’s delivery system.
A third and perhaps most important engineering consideration is regulation of flow to the District. As indicated in Section 4, the current peak hour demand of the District is expected to be a flow of 25 gpm. The future demand is projected to be 40 gpm. The Town’s system must be able to deliver this flow uninterrupted in order to meet District customers’ demands. It is uncertain at this time whether the Town will pledge to provide a direct connection to Well No. 2, or guarantee a 40 gpm flow. Therefore, the District should plan to provide storage to meet the peak hour demands if the Town system cannot. It is expected that the Town will want to regulate the flow to the District so that if there is a line break in the District system, the Town’s system will not be adversely affected.

A final engineering consideration for the District’s water system is to provide a reliable, simply functioning system. The system should have enough storage capacity to meet peak hour demands regardless of flow limitations from the Town system. In addition, the District’s storage tank should be located at an elevation that provides standard operating pressures in the new District water system of 60 to 95 psi. Fire flow capabilities cannot be provided as it is believed to be too expensive to provide the oversized pipelines and numerous fire hydrants needed to supply adequate flow demands.

CONCEPTUAL DESIGN

The conceptual design for the water system improvements is based primarily on the engineering considerations described above. Several design considerations need to be taken into account in the development of the conceptual design, including DEQ Rules and Regulations, hydraulic modeling, surface features, subsurface conditions, existing utilities, and right-of-way constraints. Each of these engineering design considerations and corresponding impact on the water system design are discussed below.

DEQ RULES AND REGULATIONS

The most important considerations are the Wyoming Department of Environmental Quality (WDEQ) Rules and Regulations for a rural water supply system. These requirements are summarized as follows:
• The system must be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow. The normal working pressure in the distribution system must not be less than 35 psi.
• Where dead-end water mains occur, they are to be provided with a flushing hydrant or blow-off for flushing purposes.
• Isolation valves must be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs.
• All water lines and service lines shall be constructed below frost line.

HYDRAULIC MODELING
Current practice in the area requires that the water system sizing be based on a hydraulic model. A hydraulic model was developed for the proposed water system alignment to determine the pipeline sizing needed to adequately serve the current and future demands of the water system. The water modeling was discussed previously in Section 3. The demands were distributed throughout the water system to correspond to existing homes and potential future development areas. The goal of the hydraulic modeling was to size the water system to provide for the projected water demands at a minimum working pressure of 60 psi. The hydraulic modeling methods and results are presented in Appendix D.

SURFACE FEATURES
There are several surface features that were considered in developing the conceptual design of the water system, including paved and graveled roadways, drainages, creeks and ditches, pastures, and wetland-type areas. Each feature is discussed below:
• The supply pipeline from the Town to the District is planned to be aligned along the Hyattville Highway right-of-way. The highway is under the jurisdiction of the Washakie County Road and Bridge Department. During construction, the alignment will need to be planned to avoid any unnecessary damage to the roadway. The alignment also needs to take into consideration the side of the roadway that is most accessible and best for construction. The best alignment to meet those criteria is the west side of the highway. A traffic control plan will need to be designed and implemented during construction to ensure a safe working environment and to allow for the safe movement of traffic. Any
roadway undercrossings should be made by boring under the roadway (rather than open cutting the roadway) to avoid damage and the need to shut down the road.

- All of the roadways in the District are private roadways, operated and maintained by the District. Most of the roadways are paved with asphalt, although a portion of the peripheral roads are graveled. In general, the water line alignments will be planned to follow existing water line easements and the roadways in order to make the pipelines available for maintenance. The design of the water delivery system will need to be planned to minimize disturbance of the roadways and private properties as necessary. In addition, any disturbance to the roadways and private properties will need to be restored to pre-existing conditions or better.

- There are several large drainages along the Hyattville Highway and in the District area that present challenges for pipeline construction. Many of the drainages are located in difficult terrain and are steep and difficult to access. Pipeline crossings in these areas will need to be well planned to avoid excessive costs for difficult construction techniques.

- Some of the water line alignments in the District area will need to cross private properties in order to access the current private service lines. The new water line alignments are mostly planned to parallel the existing water lines that serve the residents. It is believed that these alignments may not be in the originally designated easements. If so, new easements will need to be obtained to properly define the water line alignment. Disturbances from excavations must be restored to satisfy the property owner.

- There are areas in the District that may be considered as wetland-type areas. These areas have formed from irrigation seepage and poor drainage. These areas must be avoided for pipeline alignments, because of the potential for wetlands disturbance, and because of the higher costs associated with construction in wet and unstable conditions.

**SUBSURFACE CONSIDERATIONS**

Planning for the water system will need to take into account the subsurface soil conditions and the groundwater table. In October of 2008, excavations were made along the existing water line alignments to both locate and evaluate the water piping, and to evaluate soil conditions and groundwater depths. These excavations indicated that the soils are generally good, and no shallow bedrock was discovered. Groundwater was not present in any of the excavations.
EXISTING UTILITIES
Existing utilities, particularly underground utilities, will need to be avoided when planning alignments for the water system. During the course of arranging for the excavation, utility companies should be notified in order to locate their utilities in the areas of the excavations. Existing underground utilities are generally located along the roadway borrow ditches, and include cable TV, telephone, and natural gas. Power, cable TV and phone are generally located above ground on wooden poles. Natural gas lines are buried at depths ranging from 18 to 36 inches and need to be accurately located during the planning phase of the project.

RIGHT-OF-WAY CONSTRAINTS
Existing rights-of-way will present constraints to the design of and alignments for the water supply pipelines. As indicated previously, the planned alignments for the water system are proposed to follow roadways wherever possible. The right-of-way width for the Hyattville Highway is generally 66 feet, and it appears that there is adequate space to construct a water line along the west side of the roadway. As for the pipeline alignments which need to cross private property, easement agreements will need to be obtained for constructing the water lines on these properties.

DIRECTIONAL DRILLING OPPORTUNITIES
Opportunities for directional drilling techniques were investigated during the course of the Study. Discussions with directional drilling contractors indicate that pipelines could easily be installed under creeks, irrigation ditches and even paved roadways to avoid disturbance. In terms of cost, directional drilling may be a more cost effective solution than trenching and dewatering operations. Directional drilling may be performed through wet and unstable soils areas for distances up to 300 feet. Typically, directional drilling is performed using High Density Polyethylene (HDPE) piping. If directional drilling is performed for portions of the project, PVC to HDPE transitions will be required.

DESIGN FEATURES OF CONCEPTUAL PLAN
The conceptual design of the proposed water supply system for the District is presented in Figure 6-1. Preliminary plan and profile drawings of the major pipelines are provided in Appendix F.
Figure 6-1. Preferred South Circle Water Supply Option

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2155 North Main Street
Sheridan, WY 82801
(307) 674-0609

Figure 6-1
Preferred South Circle Water Supply Option

Legend

- Well
- Meter Vault - Proposed
- Valve - Proposed
- Hydrant - Proposed
- Tank - Proposed
- 6" Water Main - Proposed
- 4" Water Main - Proposed
- 3" Water Main - Proposed
- 2" Water Main - Proposed
- 1" Water Main - Proposed

Approximate Property Boundary

THIS SECTION HAS BEEN UPDATED.
SEE SECTION 8
The conceptual design has been developed in accordance with the engineering and design
considerations previously presented. The goal of the conceptual design is to locate and align the
new water mains so that every property can be served in very close proximity to the existing
residential service line in an effort to minimize the cost to the property owner for connecting to
the new water system. Some of the significant design elements and features of the conceptual
design are highlighted below:

- The connection to the Town system is planned to be made directly to the discharge piping
  in the well house for Well No. 2. The connection needs to be made upstream of the
  Town’s PRVs to ensure that the District supply line is not subject to the pressure controls
  used to control the pressure to the Town system. By making a direct connection to the
  well, the District’s supply line will have the pressure needed to move the water over the
  hill and into the District. The new supply line, connection, and PRV will need to be sized
  at 3-inch diameter. The PRV may be located in the well house, or in the master meter
  vault. All costs associated with the connection to the well house piping will be the
  responsibility of the District.

- The supply pipeline to the District will be routed through a new buried concrete meter
  vault where the flow will be metered for the Town’s billing purposes. A typical water
  meter vault design is provided in Figure 6-2. The vault will have an electrically operated
  control valve that will automatically stop the flow when the District water storage tank
  fills. The valve will automatically open when the level in the tanks drops. The vault
  piping will also include a check valve to ensure the water from the District cannot pass
  backwards from the supply line into the Town system. All costs associated with the
  pipeline to the vault and the vault itself will be the responsibility of the District.

- A new 6-inch pipeline will be constructed across the highway at the area near the meter
  vault to the west side of the highway right-of-way. The highway undercrossing is
  planned to be bored to avoid damage to the pavement.

- The 6-inch pipeline will be aligned along the west side of the highway right-of-way for
  its entire length up to the entry road into the District. At that point, the pipeline will cross
  under the highway into the District. The undercrossing will be constructed by boring,
  and the pipeline will be encased in a steel casing pipe to allow for future access without
  having to disturb the roadway surface.
METER VAULT - PIPING PLAN

SCALE: 1/2" = 1'-0"

METER VAULT - SECTION

SCALE: 1/2" = 1'-0"

5'-6" MINIMUM COVER
1'-6"
6" 18-1/2" 18"

TO SOUTH CIRCLE
2'-6"

FROM TEN SLEEP

10'-0"
4'-0"

3" ELECTRO-MAGNETIC FLOWMETER SENSOR
6" FLxFL PIPE PUP
15" FLxFL PIPE PUP
3" THROTTLING VALVE
0-150 PSI GAGE WITH SNUBBER AND SHUT OFF VALVE
3" TEE
3x3x3/4" TEE FOR FUTURE CHLORINATION
3" CHECK VALVE
3" GATE VALVE
3" 90° ELBOW
OMNI SLEEVE - WALL PENETRATION
6x3 REDUCER - OUTSIDE VAULT

24" SQUARE ACCESS HATCH HALLIDAY OR EQUAL
ALUMINUM ACCESS LADDER ANCHOR TO WALL

PRECAST CONCRETE VAULT

PIPE SUPPORT (TYP OF 2)

4" SQUARE ACCESS HATCH HALLIDAY OR EQUAL
ALUMINUM ACCESS LADDER ANCHOR TO WALL

TO SOUTH CIRCLE

FROM TEN SLEEP

FINISHED GRADE

5'-6" MINIMUM COVER

2'-6"

3" TEE

3" 90° ELBOW

OMNI SLEEVE - WALL PENETRATION

PRECAST CONCRETE VAULT

ANCHOR TO WALL

FINISHED GRADE

TO SOUTH CIRCLE

FROM TEN SLEEP
• The alignment for the 6-inch pipeline through the District is planned to follow the existing water line alignment for the domestic water lines in the northern (lower) portion of the District. The pipeline will then be aligned along the existing roadway until it crosses Lot 6, and then will be aligned southward to connect into the water storage tanks.

• The water storage facility will be a battery of two or three buried fiberglass tanks piped in parallel, and located on land owned by the U.S. Bureau of Land Management (BLM). In this case, buried storage offers many advantages over above ground storage, including maintenance and vandalism. The total capacity of the storage tanks will be 30,000 gallons and will be able to meet the average day demand of the District for two days if the pipeline flow from Town is interrupted. A conceptual design of the tankage is provided in Figure 6-3. Each tank will be 8 feet in diameter and approximately 28 feet long. This sizing was selected based on shipping and transportation limitations, and also special handling requirements during installation. The tanks will be located at an elevation of about 4610 which will provide an operating pressure in the District system of 50 to 95 psi depending on the elevation of the property. The pressure to the three properties located on the hill near Town will be limited to 25 to 35 psi because of their higher elevation location.

• The water storage system will include a pressure transmitter to monitor and transmit the elevation of the water level in the tank. The level will be signaled to the master meter vault where a programmable logic controller (PLC) will control the electric valve operation. The PLC will close the valve when the tanks are full and open the valve when the level in the tanks drops.

• A new 4-inch pipeline is planned to be constructed along the existing roadway to serve Lots 9 through 17. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Up to 9 new meter pits will be constructed at the property lines to serve the properties.

• A new 4-inch pipeline will be constructed to the Beth No. 1 Well site to serve the existing customers, and 3 to 4 new services planned to be developed by the property owner. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Up to 8 new meter pits will be constructed at the property lines to serve the properties.
BURIED FIBER GLASS WATER STORAGE TANKS 8' DIA. x 26' LONG

(3) BURIED FIBER GLASS WATER STORAGE TANKS 8' DIA. x 26' LONG

6" INLET LINE

6" DRAIN VALVE (TYP)

6" DRAIN

6" DRAIN

2" DRAIN LINE WITH VALVE AND BOX

6" OVERFLOW

(3) 6" ISOLATION VALVES

6" AIR VENT

36" DIA. ACCESS HATCH

6" OVERFLOW

LEVEL SENSOR WELL

ACCESS LADDER

6" INLET

80.0'

24.0'

4.0'

24.0'

4.0'

6" INLET

6" DRAIN TO DAYLIGHT

6" DRAIN

6" DRAIN

6" DRAIN VALVE (TYP)

6" OVERFLOW

6" OVERFLOW

6" OVERFLOW

10,000 GALLONS BURIED

10,000 GALLONS BURIED

10,000 GALLONS BURIED

SCALE: 1" = 10'

STORAGE TANK SITE PLAN

FIGURE 6-3

THIS SECTION HAS BEEN UPDATED. SEE SECTION 8
A new 3-inch pipeline will be constructed and necked down to two 2-inch lines to serve Lots 6, 7, and 8. Flushing hydrants will be installed at the end of the dead end pipelines to allow for occasional flushing and maintenance. Three new meter pits will be constructed at the property lines to serve the properties.

It is proposed that the pipeline from the southern highway undercrossing to the entrance to the District will be fused high density polyethylene piping so that there are no fittings or joints that could require maintenance. The piping inside the District is planned to be gasketed-joint class 160 PVC because it is easier to repair and find parts for. Fittings should be PVC push-on fittings because it eliminates the need for metal fittings and bolts that can corrode and fail. Any metal fittings, valves, hydrants and accessories should be protected with sacrificial anodes. All water line piping should be installed with tracer wire and metallic detector tape.

The location of all fittings, valves, and road undercrossings will be marked with 4-inch painted steel posts with information stenciled on the post. All meter pit locations will also be marked with similar posts and the readouts for the touch read system will be attached to the posts for easy access.

Air-vacuum release valves will be installed at the tops of hills to relieve the air that can build up in the pipeline and reduce capacity.

Flushing hydrants will also be installed at locations along the Hyattville highway pipeline that are favorable for flushing the water line for maintenance.

Isolation valves are located to minimize service disruptions during maintenance.

Disturbed or damaged asphalt paving along the Hyattville Highway will be repaired.

All areas along the graveled roadways that are disturbed by construction will be re-graveled and restored to pre-existing condition.

All areas within the easements for water lines across private property will be seeded or graveled and returned to pre-existing condition to satisfy the property owner.

The new water meters will be located in buried “meter pits” that will be located in public rights-of-way or easements dedicated to the District, and as close to the existing water service lines as possible. A touch read meter system will be provided to allow efficient meter reading for the District operator. A typical water meter pit is shown in Figure 6-4.
1" SERVICE METER DETAIL / PRE-PLUMMED PIT

NOT TO SCALE

VARIABLE DEPENDS ON WATER MAIN LOCATION

NOTE:
WHERE METER BOXES ARE DESIGNATED ON OPPOSITE SIDE OF ROADWAY FROM PIPING/PIPE BOX SHALL BE LOCATED WITHIN 5' OF METER BOX

LID WITH TOUCH-READ
READOUT ON POST - LID TO BE SET 4" BELOW GRADE

LOCKABLE ANGLE BALL VALVE

CURB STOP W/BOX

DOUBLE STRAP SADDLE (PVC)

1" CORP STOP

WATER DISTRIBUTION MAIN SIZE VARIES

1" POLYETHYLENE PIPE

PRECAST NON-REINFORCED CONCRETE BLOCK (2" THICK)

NOTE:
SEE SPECIFICATIONS FOR APPROVED MATERIAL AND MANUFACTURERS FOR SERVICES AND METER BOXES.

1" POLYETHYLENE PIPE

1" POLYETHYLENE PIPE W/ TEMPORARY PLUG (TYP OF ALL LOTS)

FORD SENSUS 90 TANDEM COPPER METER SETTER WITH PRESSURE REGULATOR. CONVERT TO 1" P.E. SERVICE PIPING AS SOON AS POSSIBLE

PVC PIPE BRACE

24" MINIMUM FORD PLASTIC METER BOX WITH INSULATING PAK

1" POLYETHYLENE PIPE W/ TEMPORARY PLUG (TYP OF ALL LOTS)

FROST PROOF METER PIT COVER

INSULATING PAD

1" SENSUS METER - SEE SPECIFICATIONS DRAIN / TEST VALVE

ANGLE CARTRIDGE DUAL CHECK VALVE

FORD SENSUS 90 TANDEM COPPER METER SETTER WITH PRESSURE REGULATOR. CONVERT TO 1" P.E. SERVICE PIPING AS SOON AS POSSIBLE

PVC PIPE BRACE

24" MINIMUM FORD PLASTIC METER BOX WITH INSULATING PAK

1" POLYETHYLENE PIPE W/ TEMPORARY PLUG (TYP OF ALL LOTS)

NOTE:
SEE SPECIFICATIONS FOR APPROVED MATERIAL AND MANUFACTURERS FOR SERVICES AND METER BOXES.
LAND AND RIGHT-OF-WAY ACQUISITION NEEDS

Nearly all of the proposed water lines are planned to be located in established public road rights-of-way. Where the proposed water line alignment crosses private property, a right-of-way must be obtained from the property owner in the form of an easement agreement. The easement agreement contains a legal description of the property to be granted to the District for the right-of-way. Once the parties have executed the easement agreement, it is filed with the County Clerks office, and the right-of-way becomes recorded as an integral part of the property.

The following portions of the proposed water system are identified where rights-of-way will be required to construct the proposed water system (see Figure 4-1 also):

- The water line serving the three residents at the top of the hill outside the District.
- The water line and access road on the east side of Lot 6.

In addition to the need for easements, a lease will be required from the BLM for the pipeline, access road and storage tank site located on the BLM property. Initial requirements include an archeological survey and an environmental assessment for any proposed disturbance on the BLM property.

PERMITTING AND LICENSING NEEDS

In order to design and construct the water system, several permits will need to be acquired. The primary permitting needs for the project are highlighted below:

- All water mains and meter pits aligned within the County road rights-of-way require a permit from the Washakie County Road and Bridge Department. The permit will define how the roadways and borrow ditches will be restored.
- A DEQ Permit to Construct will be required prior to construction of the water system.
- The U.S. Army Corps of Engineers (ACOE) usually requires a permit for a water main to cross under a surface water or drainage ditch. Conversations with ACOE representatives indicate the ditch crossings are covered under the “nationwide” permit, and a project specific permit is not required. However, ACOE notification, and coordination are required under the existing nationwide permit.
ENVIRONMENTAL MITIGATION

As a part of this Study, an Environmental Report (ER) was prepared. The ER is required when federal funding agencies such as the State Revolving Loan Fund (SRF) are involved. Results of the ER are highlighted below. The Environmental Report is included in its entirety in Appendix G.

- A cultural resource survey must be conducted prior to the ground disturbance activities, primarily in those areas not previously disturbed by development, road construction, etc.
- A wetland delineation must be conducted to determine the acreage and boundaries of wetlands, if any, impacted by construction of the project, and appropriate US Army Corps of Engineers permits obtained prior to commencing construction.
- A survey for threatened, endangered, and candidate species, as well as for raptor nests will need to be conducted prior to any construction activities. If any listed species or raptor nests are found that might be impacted by the project, a mitigation plan coordinated through the US Fish and Wildlife Service will need to be developed to mitigate any impacts.
- Mitigation efforts will need to be planned for and executed during construction to limit runoff and erosion, control dust, and re-vegetate disturbed lands.

COST ESTIMATES

Cost estimates for the proposed water system are shown in Table 6-1. The total project cost is estimated to be $1,558,572 and is based on year 2012 construction costs. The estimate was prepared using costs from recent similar work on rural water system construction. Right-of-way costs where needed for the pipelines were estimated at $2.50 per linear foot. The engineering and contingency cost formulas shown are as required by the WWDC. Project component eligibility and financing plans are discussed in the next section.
## TABLE 6-1 Project Cost Estimate

**Preferred Water Supply Option - Ten Sleep Water Supply**

### WWDC ELIGIBLE COMPONENTS

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<thead>
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<th>Unit Cost</th>
<th>Total</th>
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<td></td>
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<td>$10,000</td>
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<tr>
<td>Acquisition of Access and Right-of-way</td>
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<td>$20,000</td>
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### Construction Costs

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<th>Unit Cost</th>
<th>Total</th>
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**Construction Cost Subtotal No. 1 (CCS No. 1)** $262,525

**CCS No. 1 Inflated 5% for Year 2011** $287,851

**Engineering Services During Construction (10% CCS No. 1)** $28,785

**Construction Cost Subtotal No. 2 (CCS No. 2)** $314,636

**Contingency (15% of CCS No. 2)** $47,195

**Construction Cost Total (CCT)** $361,831

**TOTAL ESTIMATED PROJECT COST - WWDC Eligible (2012)** $1,214,832

### WWDC NON-ELIGIBLE COMPONENTS

<table>
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<tr>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
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### Construction Costs

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**Construction Cost Subtotal No. 1 (CCS No. 1)** $234,700

**CCS No. 1 Inflated 5% for Year 2011** $246,435

**Engineering Services During Construction (10% CCS No. 1)** $24,644

**Construction Cost Subtotal No. 2 (CCS No. 2)** $271,079

**Contingency (15% of CCS No. 2)** $40,662

**Construction Cost Total (CCT)** $311,740

**TOTAL ESTIMATED PROJECT COST - WWDC Non-Eligible (2012)** $343,740

### COMBINED PROJECT COSTS - WWDC ELIGIBLE + WWDC NON ELIGIBLE

<table>
<thead>
<tr>
<th>Description</th>
<th>Total Project Cost - WWDC Eligible + Non-Eligible</th>
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SECTION 7 - ECONOMIC ANALYSIS, PROJECT FINANCING & IMPLEMENTATION

This section presents an economic analysis for the proposed water supply project. The intent of this section is to provide the financial information necessary to determine the end cost to users under the funding scenarios involving WWDC assistance and other state and federal funding. The reader should be advised that this section has been revised, please refer to Section 8.

DEBT FINANCING PLAN

Typically, four sources of financing have been available for cooperatively financing the design and construction of rural water supply projects. The four funding agencies are summarized as follows:

- Wyoming Water Development Commission (WWDC) – Recently, the WWDC has been providing grant and loan funding in a 67:33 grant-loan ratio. Loans are typically available at an interest rate of 4% for a term of up to 30 years, although some terms may be longer. Eligible water system components usually include water transmission pipelines, booster stations, water storage tanks and flushing hydrants.

- State Revolving Loan Fund (SRF) – The program is known as the Wyoming Drinking Water State Revolving Fund. The program receives money from the federal government and is administered by the State Lands and Investments Board (SLIB), and is only a loan fund. This loan fund can be used for all components of a water system. Currently, loans are available at an interest rate of 2.5% for a term of up to 20 years.

- State Lands and Investments Board (SLIB) – The SLIB is composed of five elected state officials. The SLIB currently provides grant and loan funding in a 50:50 loan-grant ratio. Loans are currently available at an interest rate of 5.17%, for a term of up to 30 years. Eligible water system components typically include all portions of the water system including fire hydrants, water services and meter pits.

- Rural Utilities Services (RUS) – RUS is a federal agency and a part of the U. S. Department of Agriculture (USDA). Typically, the RUS provides loans for all water
system components. In low income areas, RUS can provide grants for water systems, and the level of grant funding availability is based on the level of income of the area. Loans are available on a variable rate depending on the income level of the area, and for a term of up to 30 years.

Financing plans were initially developed for each of the water supply options presented in the Phase 1 Report. However, it was soon realized that based on typical agency funding programs for the first three agencies listed above, none of the options was going to be economically feasible. Conversations with RUS were initiated, and it was learned that the District might qualify for considerable grant funding from RUS. In fact, a preliminary determination by RUS indicated that the area may qualify as a poverty area, and may be eligible for a greater portion of grant funding than low income areas. RUS has indicated that it uses an equation for determining grant funding that provides whatever level of grant is needed to result in a water system debt service and water user rate that is typical for other Wyoming communities of similar size.

The total project is estimated to cost $1,558,572 as shown in Table 6-1 previously, although the reader should be advised that this section has been revised, please refer to Section 8. The WWDC eligible project cost is $1,214,832 and the non-eligible portion of the project cost is $343,740. The approach to funding the project assumes that the typical water system debt assessment for similar water districts is about $400 per year, and the typical water user rate is $50 per month. These figures are only estimates and will need to be determined in the future by RUS and other appropriate funding agencies. Based on conversations with RUS, the level of grant funding for the area, if determined to be a poverty area, could be as high as 90 to 95% of the total project cost.

There are a number of scenarios that could be developed for funding construction of the project. However, this Study presents two options that appear to be likely and achievable. It should be pointed out that with participation of RUS, the actual grant and loan mix corresponds to the levels which are needed to achieve the “typical” water debt assessment and water user rate as other similar rural water districts. Scenario No. 1 is summarized in Table 7-1. It is assumed that 24 properties will be served by the project and will be subject to the debt assessment. Funding
Scenario No. 1 includes funding the WWDC eligible components with a grant for 67% of the cost, or $813,937. The remaining 33% not funded by the grant would be funded through a RUS grant of $340,153 and a RUS loan of $60,742 for a 30-year term. The non-eligible portions of the project would be funded through a 50% grant of $171,735 from SLIB, a RUS grant of $103,041 and a RUS loan of $68,694 for a 30-year term. The resulting assessment annual cost would be $331 per property.

TABLE 7-1 – PRELIMINARY FUNDING SCENARIO NO. 1

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<td>WWDC Grant (67% of CCT)</td>
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</tr>
<tr>
<td>SLIB Grant (50% of CCT)</td>
<td>$171,735</td>
</tr>
<tr>
<td>RUS Grant (30% of CCT)</td>
<td>$103,041</td>
</tr>
<tr>
<td>RUS Loan (20% of CCT)</td>
<td>$68,694</td>
</tr>
<tr>
<td>RUS Loan Conditions</td>
<td>4.25%, 30 Years</td>
</tr>
<tr>
<td>Total Cost Per Property (CCT/24 Properties)</td>
<td>$2,862</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Property</td>
<td><strong>$176</strong></td>
</tr>
<tr>
<td>Total Combined Assessment</td>
<td><strong>$5,393</strong></td>
</tr>
<tr>
<td>Total Combined Cost per Property</td>
<td><strong>$331</strong></td>
</tr>
</tbody>
</table>

Funding Scenario No. 2 appears to be a probable scenario based on conversations with RUS. Scenario No. 2 is a bit of the opposite of Scenario No. 1, and includes funding all WWDC eligible components ($1,214,832) with a grant for $813,937 from RUS rather than the WWDC, which is 67% of the WWDC eligible cost. The remaining 33% of the WWDC eligible cost not funded by the RUS grant would be funded through two sources: 1) a grant from the WWDC for $340,153; and, 2) a loan of $60,742 from the RUS for a 30-year term. The WWDC non-eligible portion of the project ($343,370) would be funded with a 50% grant of $171,685 from RUS, a
SLIB grant of $103,011, and a RUS loan of $68,674 for a 30-year term. The resulting assessment annual cost would be $331 per property, which is the same as Scenario No. 1. Funding Scenario No. 2 is presented in Table 7-2.

For the purpose of this Study, and in an effort to be conservative, the SRF funds have not been included in the funding mix. In addition, it has been assumed that as long as RUS is providing a large portion of the funding in the form of a grant, all loan funds would be provided by RUS as well.

**TABLE 7-2 – PRELIMINARY FUNDING SCENARIO NO. 2**

<table>
<thead>
<tr>
<th>SCENARIO NO.2 - WWDC Eligible Components</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT(2011)</td>
<td>$1,214,832</td>
</tr>
<tr>
<td>RUS Grant (67% of CCT)</td>
<td>$813,937</td>
</tr>
<tr>
<td>WWDC Grant (28% of CCT)</td>
<td>$340,153</td>
</tr>
<tr>
<td>RUS Loan (05% of CCT)</td>
<td>$60,742</td>
</tr>
<tr>
<td>RUS Loan Conditions</td>
<td>4.25%, 30 Years</td>
</tr>
<tr>
<td>Total Cost Per Property (CCT/24 Properties)</td>
<td>$2,531</td>
</tr>
<tr>
<td><strong>Assessment Cost Per Year per Property</strong></td>
<td><strong>$155</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SCENARIO NO.1 - WWDC Non-Eligible Components</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT(2011)</td>
<td>$343,740</td>
</tr>
<tr>
<td>RUS Grant (50% of CCT)</td>
<td>$171,870</td>
</tr>
<tr>
<td>SLIB Grant (30% of CCT)</td>
<td>$103,122</td>
</tr>
<tr>
<td>RUS Loan (20% of CCT)</td>
<td>$68,748</td>
</tr>
<tr>
<td>RUS Loan Conditions</td>
<td>4.25%, 30 Years</td>
</tr>
<tr>
<td>Total Cost Per Property (CCT/24 Properties)</td>
<td>$2,865</td>
</tr>
<tr>
<td><strong>Assessment Cost Per Year per Property</strong></td>
<td><strong>$176</strong></td>
</tr>
<tr>
<td><strong>Total Combined Assessment</strong></td>
<td><strong>$5,395</strong></td>
</tr>
<tr>
<td><strong>Total Combined Cost per Property</strong></td>
<td><strong>$331</strong></td>
</tr>
</tbody>
</table>

**WATER SYSTEM DEBT ASSESSMENT**

The two funding scenarios presented above are both feasible, and the resulting construction debt for both Scenarios is assumed to be $129,416, or about 8.3% of the total project cost. The financing plan for both funding scenarios proposes that a large portion of the project cost will be paid by RUS and State agency grants, totaling $1,429,156. The remaining portion of the project
cost not funded through grants totals $129,416. If the total non-grant portion of the project cost is divided equally among the 24 properties served by the water project, the cost per property would be $5,392. There are several methods for each property to pay its share of the project cost. One common method is for the property owner to pay it off either with cash, or by obtaining a personal loan.

One of the standard methods for obtaining the non-grant portion of the project cost is for the District to borrow the funds on behalf of the property owners. In order to borrow the funding, by State Statute, the District must hold a public hearing to consider adoption of a resolution authorizing an assessment on each property in the District that benefits from the water project. If no more than 30% of the property owners to be assessed object to the assessment, the District can adopt a resolution which authorizes the assessment to repay the debt. If more than 30% of the property owners to be assessed object to the assessment, the District cannot adopt the resolution, and another resolution cannot be considered for a year.

Once the District authorizes the assessment, and the loans are obtained, the District will need to work with the County Assessor to develop an assessment roll of properties to be assessed for repayment of the water system debt. The County will then issue the water system debt assessment and include it with the annual property tax assessment. The County will reimburse the collected assessments to the District on a quarterly basis. The District will make its annual loan payment from the collected assessments.

Another method for obtaining the non-grant portion of the project cost is for the District to borrow the funds on behalf of the property owners through the sale of bonds. RUS typically requires the District to purchase General Obligation (GO) Bonds to fund the debt. The GO bonds are then repaid by the District over the life of the bond, usually 30 years. In order to purchase bonds, the District must pass a bond election period. The election must pass by the majority of those voting.

**WATER USER RATES**

In addition to the debt assessment for constructing the project, the District will need to establish a water user rate. The use of water by each customer will be measured by the individual water
meter installed in a buried meter pit at each property. The water user rate set by the District must be adequate to account for all the operating expenses of the District’s water system and perhaps the debt assessment if RUS provides the debt funding. Table 7-3 presents the estimated operation and maintenance (O&M) costs for the proposed system with 24 taps, and does not include the construction debt assessment. The annual operating budget is estimated to be $17,260, which equates to a monthly user fee of $59.93 per month. These costs are based on other similar rural water districts around the state. There are many different options for establishing a water user fee, and one will be determined by the District. A typical water user fee to cover the water system expenses could be a base rate of $36 per month for all customers (whether water is used or not) plus a fee of $4 per thousand gallons used. It is assumed that the wholesale rate for water purchased from the Town of Ten Sleep will be $1.25 per 1,000 gallons purchased at the master meter.

**TABLE 7-3 – OPERATION AND MAINTENANCE COSTS FOR USER RATES**

<table>
<thead>
<tr>
<th>Description</th>
<th>Monthly Unit</th>
<th>Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator Wages</td>
<td>$250</td>
<td>$3,000</td>
</tr>
<tr>
<td>Materials and Supplies</td>
<td>$25</td>
<td>$300</td>
</tr>
<tr>
<td>Ten Sleep Water Cost (6,000 gal/mo/home)</td>
<td>$180</td>
<td>$2,160</td>
</tr>
<tr>
<td>Water Sampling</td>
<td>N/A</td>
<td>$300</td>
</tr>
<tr>
<td>Bookkeeping</td>
<td>$200</td>
<td>$2,400</td>
</tr>
<tr>
<td>Repairs</td>
<td>N/A</td>
<td>$1,000</td>
</tr>
<tr>
<td>Emergency Fund</td>
<td>N/A</td>
<td>$500</td>
</tr>
<tr>
<td>Sinking Fund ($150K@4%/30yr.)</td>
<td>$200</td>
<td>$2,400</td>
</tr>
<tr>
<td>Bonding</td>
<td>N/A</td>
<td>$200</td>
</tr>
<tr>
<td>Liability Insurance</td>
<td>N/A</td>
<td>$1,000</td>
</tr>
<tr>
<td>Legal Services</td>
<td>N/A</td>
<td>$500</td>
</tr>
<tr>
<td>Advertising</td>
<td>N/A</td>
<td>$200</td>
</tr>
<tr>
<td>Engineering Services</td>
<td>N/A</td>
<td>$500</td>
</tr>
<tr>
<td>Stamps/Mailings</td>
<td>$25</td>
<td>$300</td>
</tr>
<tr>
<td>Audit</td>
<td>N/A</td>
<td>$2,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$17,260</strong></td>
</tr>
</tbody>
</table>

Avg. cost per user/month: **$59.93**
ONE-TIME CONNECTION COSTS TO NEW CUSTOMERS

In addition to the ongoing water system debt assessment costs and water use fees, there will be several “one-time” costs associated with new customers connecting to the water system. The one-time costs to each property will vary considerably, depending on the requested service tap size and the distance from the home to the meter pit at the water main. These connection costs are the responsibility of the property owner and are not eligible to be paid with state grants or loans, but may be eligible for RUS program grants and loans. It is estimated for new customers that these costs could range from $1,500 to $3,000. A summary of the primary one-time connection costs is given below.

- Ten Sleep Water System Investment Charge – Typically, water districts charge a “tap” fee for installing a water service line and meter pit from the water main to the customer’s property line. The tap fee typically consists of two components: 1) the District’s installation fee, plus 2) a water system investment charge (SIC) assessed by the wholesale water provider. It is not certain that the Town of Ten Sleep has established a system investment charge, and this will need to be researched. Typical tap fees in rural water districts range from $2,500 to $4,000 for a ¾-inch tap. For those new South Circle customers wanting taps prior to the water system construction, a customer will only be required to pay the system investment charge; no installation charge will be required since the District’s installation costs will be included in the total project construction cost. It is assumed the Ten Sleep SIC will be in the range of $300 to $500 for a ¾-inch tap, although this needs to be verified with the Town. Any District property owner wanting to delay receiving a tap past the time of construction will be required to pay the District’s installation tap fee plus the Town of Ten Sleep SIC. The total tap fee for a customer receiving a tap after construction of the water system is expected to be approximately $3,500.

- Service Line Installation – The property owner will need to install the water service line from the meter pit to the house. The size of the service line will depend on the pressure and volume of flow needed at the house. Estimated construction costs for service line installation range from $6 to $8 per lineal foot of 1-inch service line. For a home located within 100 feet of the meter pit, the service line installation cost is estimated to be
between $600 and $800. This cost will also depend on the disturbance to the property, and the type of rehabilitation (i.e. sod, concrete replacement etc.) needed to restore the property after construction.

- House Plumbing Conversion – The existing house plumbing system will need to be connected to the new water service, and the irrigation well piping disconnected. The irrigation well may be used for yard and livestock watering etc., but the irrigation system piping cannot be connected to the water system piping. Plumbing costs will vary depending upon each individual building and specific plumbing system, and are estimated to be around $500. The District and Town of Ten Sleep will inspect the plumbing conversion to ensure a complete separation of the systems, and a nominal fee may be charged. A summary of project costs is given in Table 7-4.

**IMPLEMENTATION**

The WWDC program consists of three levels: Level I is Reconnaissance; Level II is Feasibility; and Level III is Design and Construction. This Level I Reconnaissance Study provides the preliminary design and cost estimates needed for the District to determine whether the project should be moved forward to Level II or III. In order for the proposed project to move to Level III, several steps will need to be successfully completed.

The first step is the successful adoption of a resolution authorizing the debt assessment to repay the construction loans or a bond election. The District Board must notify the property owners in the District of its intent to adopt a resolution giving the District authority to incur debt to construct the water system improvements, and to repay the debt through assessments on those properties which receive a benefit from the project, or the sale of bonds.

The assessment resolution or bond election must be successfully adopted by the District Board before the District can expect to be seriously considered for state or federal funding assistance. WWDC funding applications for ongoing projects are accepted once a year, on or before October 1, and are reviewed through December. RUS funding applications may be submitted at any time. If WWDC funding is approved, it is done so by the Wyoming State Legislature in the upcoming legislative session. The RUS application process should be started as soon as possible.
Assuming the debt assessment resolution is successfully adopted and or the bond election passes, and the District’s funding applications are accepted and approved, the Level III process can be initiated in the summer of 2011. The District can then begin the process of hiring a consultant to design the water project, provide easement and land acquisition services, and prepare bidding and construction documents. The design phase is expected to require 4 to 6 months. Once the bidding and construction documents are approved by the funding and regulatory agencies, the project can be advertised for bids. The bidding process normally requires 45 to 60 days before a construction contract is executed. Once a Contractor is hired, the construction process can begin, and should be completed within 4 to 6 months. A typical implementation schedule is presented in Table 7-4 below.

**TABLE 7-4 – TENTATIVE IMPLEMENTATION SCHEDULE**

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 1, 2010</td>
<td>Apply for Level III WWDC and RUS Funding and Funding Approval</td>
</tr>
<tr>
<td>March 2011</td>
<td>Design and Easement Acquisition</td>
</tr>
<tr>
<td>July 2011 – November 2011</td>
<td>Obtain DEQ and Other Permits</td>
</tr>
<tr>
<td>December 15, 2011</td>
<td>Bidding Process</td>
</tr>
<tr>
<td>January 2011</td>
<td>Construction</td>
</tr>
<tr>
<td>March 2012 – September 2012</td>
<td></td>
</tr>
</tbody>
</table>
SECTION 8 – REVISED FINAL CONCEPTUAL DESIGN, COST ESTIMATES AND ECONOMIC ANALYSES

This section of the Study presents the revised conceptual design, cost estimates and economic analyses for the preferred water supply system option, the Ten Sleep Water Supply Option.

REVISIONS TO THE PREFERRED WATER SUPPLY ALTERNATIVE

In mid-August, 2010, it was learned that the Town of Ten Sleep was preparing an application for funding to the WWDC for construction of a new water storage tank. Once the proposed tank location and dimensions were made available by the Town, it became apparent that the preferred alternative for the South Circle water supply system presented in Section 6 would need to be revised accordingly. The new tank location is not planned to be located northwest of Town along the Hyattville Highway, but rather northeast of Town, very near the proposed location of the South Circle water storage facility. Therefore, the alignment for the supply line from the Town to South Circle is affected, as well as the need for water storage. The remainder of this section is dedicated to presenting the revised water system configuration, cost estimates and economic analyses resulting from the Town of Ten Sleep’s plan to construct a new water storage tank. Construction of the new tank is expected to begin early in 2012, and be completed by late fall 2012.

REVISED CONCEPTUAL DESIGN

The same engineering and design considerations were taken into account for preparing the conceptual design for the South Circle water supply system as discussed previously in Section 6. The conceptual design for the proposed water supply system is presented in Figure 8-1. The proposed locations for the new Ten Sleep water storage tank and water transmission pipelines are shown on the figure based on information provided by the Town of Ten Sleep’s engineering consultant. The pipeline alignments are approximate and will need to be verified during the design process. The proposed location for the new tank is nearly the same as the previously planned location for the District’s water storage facility. This location eliminates the need for a long supply pipeline aligned along the Hyattville Highway. It will also eliminate the need for a water storage facility for the District.
PROPOSED WATER SUPPLY SYSTEM
SOUTH CIRCLE ESTATES I & S DISTRICT
OCTOBER 25, 2010
The goal of the conceptual design is to locate and align the new water mains so that every property can be served in very close proximity to the service line currently serving the residence. By doing so, the cost to the property owner for connecting to the new water system will be minimized. Some of the significant design elements and features of the conceptual design are highlighted below:

- The connection to the Town of Ten Sleep’s water system is now planned to be made directly to the 12-inch discharge piping leaving the Town’s new water storage tank.
- The 6-inch transmission pipeline from the tank to the District will be aligned along the tank access road that will be constructed to access the tank site. The access road and pipeline will be on BLM property and will need to be permitted.
- A buried concrete meter vault will be constructed on the 6-inch pipeline near the point of connection to the 12-inch transmission pipeline. The meter will be used to measure the District’s usage, and for billing purposes by the Town. A typical water meter vault design was previously provided in Figure 6-2.
- An ultra violet light (UV) disinfection facility will be constructed on the 6-inch supply pipeline prior to the first service connection to ensure that all the water going to the District users is disinfected. The house will be a small prefabricated insulated and heated building that will allow easy access to the UV system for maintenance and replacement.
- A pressure reducing valve may be required to control pressures below 90 psi in the District, if the Towns tank is constructed with an overflow height above the elevation of 4620. If required, the PRV can be installed in the disinfection facility, and will be easily accessible for maintenance.
- The 6-inch transmission pipeline will be routed through the northern part of the District from Lot 5 to Lot 1 in the same location as the current domestic service pipeline. A flushing hydrant will be installed at the end of the 6-inch transmission pipeline to allow for occasional flushing and maintenance. Easements may be required for this alignment since the existing domestic pipeline does not appear to be located in the platted easement.
- A new 4-inch pipeline is planned to be constructed from Lot 1 along the existing roadway to serve Lots 17, 16, 8 and 9, and will be looped back into the 6-inch supply line to provide circulation and good flows and pressures.
• A new 3-inch pipeline will be constructed southward from the 4-inch line to serve Lots 10-15 and Lot 18. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Seven new meter pits will be installed to serve the properties along this pipeline. An easement will be needed between Lot 13 and 14 to extend the pipeline to the Hyattville Highway right-of-way.

• A new 4-inch pipeline will be constructed from the 6-inch supply pipeline at Lot 5 to the Beth No. 1 well site to serve the existing customers, and 3 to 4 new services planned by the property owner. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Up to 8 new meter pits will be constructed at the property lines to serve the properties. This pipeline will be constructed in the existing platted water line easement.

• A new 2-inch pipeline will be constructed to serve Lots 7 and 8. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Two new meter pits will be constructed at the property lines to serve the properties.

• The water main piping is planned to be gasketed-joint class 160 PVC because it is easier to repair and find parts for. Fittings should be PVC push-on fittings because it eliminates the need for metal fittings and bolts that can corrode and fail. Any metal fittings, valves, hydrants and accessories should be protected with sacrificial anodes. All water line piping should be installed with tracer wire and metallic detector tape.

• The location of all fittings, valves, and road under-crossings will be marked with 4-inch painted steel posts with information stenciled on the post. All meter pit locations will also be marked with similar posts and the readouts for the touch read system will be attached to the posts for easy access.

• Air-vacuum release valves will be installed at the tops of hills to relieve the air that can build up in the pipeline and reduce capacity.

• Isolation valves are located to minimize service disruptions during maintenance.

• All paved roadway areas disturbed by pipeline construction will be re-paved and restored to pre-existing condition.

• All areas along the graveled roadways that are disturbed by construction will be re-graveled and restored to pre-existing condition.
• All areas within the easements for water lines across private property will be seeded or graveled and returned to pre-existing condition to satisfy the property owner.

• The new water meters will be located in buried “meter pits” that will be located in public rights-of-way or easements dedicated to the District, and as close to the existing water service lines as possible. A touch read meter system will be provided to allow efficient meter reading for the District operator. A typical water meter pit was shown previously in Figure 6-4.

LAND AND RIGHT-OF-WAY ACQUISITION NEEDS

Nearly all of the proposed water lines are planned to be located in established public road rights-of-way. However, the proposed pipeline alignments will cross private property to serve Lots 1-5 and the pipeline running between Lots 13 and 14. In these areas, a right-of-way must be obtained from the property owner in the form of an easement agreement. An easement agreement contains a legal description of the property to be granted to the District for the right-of-way. Once the parties have executed the easement agreement, it is filed with the County Clerks Office, and the right-of-way becomes recorded as an integral part of the property.

In addition to the need for easements, a lease will be required from the BLM for the pipeline and access road to the Town’s new water storage tank site. Initial requirements include an archeological survey and an environmental assessment for any proposed disturbance on the BLM property.

PERMITTING AND LICENSING NEEDS

In order to design and construct the water system, several permits will need to be acquired. The primary permitting needs for the project are highlighted below:

• All water mains and meter pits aligned within the County road rights-of-way require a permit from the Washakie County Road and Bridge Department. The permit will define how the roadways and borrow ditches will be restored.

• A DEQ Permit to Construct will be required prior to construction of the water system.

• The US Army Corps of Engineers (ACOE) usually requires a permit for a water main to cross under a surface water or drainage ditch. Conversations with ACOE representatives indicate the ditch crossings are covered under the “nationwide” permit, and a project
specific permit is not required. However, ACOE notification, and coordination are required under the existing nationwide permit.

ENVIRONMENTAL MITIGATION

As a part of this Study, an Environmental Assessment (EA) was performed. The EA is required when federal funding agencies such as the State Revolving Loan Fund (SRF) are involved. Results of the EA are highlighted below. The Environmental Report is included in its entirety in the Appendix.

- A cultural resource survey must be conducted prior to the ground disturbance activities, primarily in those areas not previously disturbed by development, road construction, etc.
- A wetland delineation must be conducted to determine the acreage and boundaries of wetlands, if any, impacted by construction of the project, and appropriate US Army Corps of Engineers permits obtained prior to commencing construction.
- A survey for threatened, endangered, and candidate species, as well as for raptor nests will need to be conducted prior to any construction activities. If any listed species or raptor nests are found that might be impacted by the project, a mitigation plan coordinated through the US Fish and Wildlife Service will need to be developed to mitigate any impacts.
- Mitigation efforts will need to be planned for and executed during construction to limit runoff and erosion, control dust, and re-vegetate disturbed lands.

COST ESTIMATES

Cost estimates for the proposed water system are shown in Table 8-1. The total project cost is estimated to be $851,650 and is based on year 2012 construction costs. The estimate was prepared using costs from recent similar work on rural water system construction. Right-of-way costs where needed for the pipelines were estimated at $2.50 per linear foot. The engineering and contingency cost formulas shown are as required by the WWDC. Project component eligibility and financing plans are discussed in the next section.
### TABLE 8-1 Project Cost Estimate

**Preferred Water Supply Option - Ten Sleep Water Supply**

<table>
<thead>
<tr>
<th>WWDC ELIGIBLE COMPONENTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Final Design and Specifications</td>
<td>$30,000</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
<td>$20,000</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>$10,000</td>
</tr>
<tr>
<td>Districts Share of Ten Sleep Water Storage Tank</td>
<td>$50,000</td>
</tr>
<tr>
<td>Acquisition of Access and Right-of-way</td>
<td>$10,000</td>
</tr>
</tbody>
</table>

#### Construction Costs

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilization and Bonds</td>
<td>1</td>
<td>LS</td>
<td>$12,000</td>
<td>$12,000</td>
</tr>
<tr>
<td>Traffic Control</td>
<td>1</td>
<td>LS</td>
<td>$2,000</td>
<td>$2,000</td>
</tr>
<tr>
<td>Connect to Ten Sleep 12-inch Pipeline</td>
<td>1</td>
<td>LS</td>
<td>$5,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>Building w/PRV and UV Disinfection</td>
<td>1</td>
<td>LS</td>
<td>$35,000</td>
<td>$35,000</td>
</tr>
<tr>
<td>Master Meter Vault</td>
<td>1</td>
<td>LS</td>
<td>$20,000</td>
<td>$20,000</td>
</tr>
<tr>
<td>6-inch Piping and Fittings</td>
<td>4,000</td>
<td>LF</td>
<td>$19</td>
<td>$76,000</td>
</tr>
<tr>
<td>6-inch Isolation Valve</td>
<td>4</td>
<td>EA</td>
<td>$2,000</td>
<td>$8,000</td>
</tr>
<tr>
<td>Flush Hydrant Assembly</td>
<td>2</td>
<td>EA</td>
<td>$3,500</td>
<td>$7,000</td>
</tr>
<tr>
<td>Air/Vac Relief Valve</td>
<td>1</td>
<td>EA</td>
<td>$4,000</td>
<td>$4,000</td>
</tr>
<tr>
<td>Water Line ID Posts</td>
<td>20</td>
<td>EA</td>
<td>$200</td>
<td>$4,000</td>
</tr>
<tr>
<td>Gravelled Roadway to Tank Site</td>
<td>2,200</td>
<td>LF</td>
<td>$20</td>
<td>$44,000</td>
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<tr>
<td>Asphalt Repair</td>
<td>500</td>
<td>SY</td>
<td>$40</td>
<td>$20,000</td>
</tr>
<tr>
<td>Gravel Resurfacing</td>
<td>200</td>
<td>Ton</td>
<td>$30</td>
<td>$6,000</td>
</tr>
<tr>
<td>Select Fill</td>
<td>500</td>
<td>CY</td>
<td>$15</td>
<td>$7,500</td>
</tr>
<tr>
<td>Foundation Material</td>
<td>100</td>
<td>CY</td>
<td>$25</td>
<td>$2,500</td>
</tr>
<tr>
<td>Power to PRV/Disinfection Building</td>
<td>1</td>
<td>LS</td>
<td>$10,000</td>
<td>$10,000</td>
</tr>
<tr>
<td>Seeding and Mulching</td>
<td>1</td>
<td>Acre</td>
<td>$2,000</td>
<td>$2,000</td>
</tr>
<tr>
<td>Materials Testing</td>
<td>1</td>
<td>LS</td>
<td>$5,000</td>
<td>$5,000</td>
</tr>
</tbody>
</table>

**Construction Cost Subtotal No. 1 (CCS No. 1)**

270,000

**CCS No. 1 Inflated 5% for Year 2012**

283,500

**Engineering Services During Construction (10% CCS No. 1))**

28,350

**Construction Cost Subtotal No. 2 (CCS No. 2)**

311,850

**Contingency (15% of CCS No. 2)**

$46,778

**Construction Cost Total (CCT)**

$358,628

**TOTAL ESTIMATED PROJECT COST - WWDC Eligible(2012)**

$478,628

<table>
<thead>
<tr>
<th>WWDC NON-ELIGIBLE COMPONENTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Final Design and Specifications</td>
<td>$28,000</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
<td>$10,000</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>$5,000</td>
</tr>
<tr>
<td>Acquisition of Access and Right-of-way</td>
<td>$5,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilization and Bonds</td>
<td>1</td>
<td>LS</td>
<td>$15,000</td>
<td>$15,000.00</td>
</tr>
<tr>
<td>Traffic Control</td>
<td>1</td>
<td>LS</td>
<td>$3,000</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>4-inch Piping and Fittings</td>
<td>3,750</td>
<td>LF</td>
<td>$15</td>
<td>$56,250.00</td>
</tr>
<tr>
<td>4-inch Isolation Valve</td>
<td>2</td>
<td>EA</td>
<td>$1,500</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>3-inch Piping and Fittings</td>
<td>1,150</td>
<td>LF</td>
<td>$14</td>
<td>$16,100.00</td>
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<tr>
<td>3-inch Isolation Valve</td>
<td>2</td>
<td>LS</td>
<td>$1,500</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>2-inch Piping and Fittings</td>
<td>600</td>
<td>LF</td>
<td>$12</td>
<td>$7,200.00</td>
</tr>
<tr>
<td>2-inch Isolation Valve</td>
<td>2</td>
<td>EA</td>
<td>$1,200</td>
<td>$2,400.00</td>
</tr>
<tr>
<td>Flush Hydrant Assembly</td>
<td>3</td>
<td>EA</td>
<td>$3,500</td>
<td>$10,500.00</td>
</tr>
<tr>
<td>Air/Vac Relief Valve</td>
<td>1</td>
<td>EA</td>
<td>$4,000</td>
<td>$4,000</td>
</tr>
<tr>
<td>Service Lines and Meter Pits</td>
<td>24</td>
<td>EA</td>
<td>$2,500</td>
<td>$60,000.00</td>
</tr>
<tr>
<td>Touch Read System and Software</td>
<td>1</td>
<td>LS</td>
<td>$12,000</td>
<td>$12,000.00</td>
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<tr>
<td>Asphalt Repair</td>
<td>800</td>
<td>SY</td>
<td>$40</td>
<td>$32,000.00</td>
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<tr>
<td>Gravel Resurfacing</td>
<td>300</td>
<td>Ton</td>
<td>$30</td>
<td>$9,000.00</td>
</tr>
<tr>
<td>Select Fill</td>
<td>200</td>
<td>CY</td>
<td>$15</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>Foundation Material</td>
<td>50</td>
<td>CY</td>
<td>$25</td>
<td>$1,250.00</td>
</tr>
<tr>
<td>Seeding and Mulching</td>
<td>1</td>
<td>Acre</td>
<td>$2,000</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>Materials Testing</td>
<td>1</td>
<td>LS</td>
<td>$5,000</td>
<td>$5,000.00</td>
</tr>
</tbody>
</table>

**Construction Cost Subtotal No.1 (CCS No. 1)**

$244,700

**CCS No. 1 Inflated 5% for Year 2012**

256,935

**Engineering Services During Construction (10% CCS No. 1))**

25,694

**Construction Cost Subtotal No. 2 (CCS No. 2)**

282,629

**Contingency (15% of CCS No. 2)**

$42,394

**Construction Cost Total (CCT)**

$325,023

**TOTAL ESTIMATED PROJECT COST - WWDC Non-Eligible (2012)**

$373,023

**COMBINED PROJECT COSTS - WWDC ELIGIBLE + WWDC NON ELIGIBLE**

Total Project Cost - WWDC Eligible + Non-Eligible

$851,650
REVISED DEBT FINANCING PLAN

Typically, four sources of financing have been available for cooperatively financing the design and construction of rural water supply projects. The four funding agencies were described previously in Section 7. The total project is estimated to cost $851,651 as shown in Table 8-1 previously. The WWDC eligible project cost is $478,628, and the non-eligible portion of the project cost is $373,023. There are a number of scenarios that could be developed for funding construction of the project. This Section 8 presents four options ranging from conservative to optimistic, and each varies depending on the level of grant monies obtainable. Some of the scenarios appear to be cost prohibitive. All scenarios assume 24 customers responsible for paying the project costs. It is also assumed that any scenario that results in a total cost per property that exceeds $7,500 is cost prohibitive. Each scenario is discussed below:

FUNDING SCENARIO NO. 1 – CONSERVATIVE.

This scenario is the most conservative, and is considered as the worst case scenario. This scenario assumes the WWDC eligible portions of the project will be funded at a level of 67% grant and 33% loan, and the non-eligible portions of the project must be funded through a SLIB loan. The resulting cost per property is $22,124, or an annual assessment of $1,412, as shown in Table 8-2. This funding scenario is cost prohibitive.

<table>
<thead>
<tr>
<th>WWDC Eligible Components</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT(2012)</td>
<td>$478,628</td>
</tr>
<tr>
<td>WWDC Grant (67% of CCT)</td>
<td>$320,681</td>
</tr>
<tr>
<td>WWDC Loan (33% of CCT)</td>
<td>$157,947</td>
</tr>
<tr>
<td>Total Cost Per Property (CCT/24 Properties)</td>
<td>$6,581</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Property</td>
<td>$380</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WWDC Non-Eligible Components - Loan Only</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT(2012)</td>
<td>$373,023</td>
</tr>
<tr>
<td>SLIB Grant</td>
<td>$0</td>
</tr>
<tr>
<td>SLIB Loan (100% of CCT)</td>
<td>$373,023</td>
</tr>
<tr>
<td>Total Cost Per Property (CCT/24 Properties)</td>
<td>$15,543</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Property</td>
<td>$1,032</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Combined Debt Assessment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Combined Cost per Property</td>
<td>$22,124</td>
</tr>
<tr>
<td>Combined Annual Assessment Cost per Property</td>
<td>$1,412</td>
</tr>
</tbody>
</table>
FUNDING SCENARIO NO. 2 – TRADITIONAL.
This scenario is the traditional funding scenario used by most communities to finance water projects. This scenario assumes the WWDC eligible portions of the project will be funded at a level of 67% grant and 33% loan, and the non-eligible portions of the project will be funded through a 50% SLIB grant and 50% SLIB loan. The resulting cost per property is $14,352, or an annual assessment of $896, as shown in Table 8-3. This funding scenario is also considered to be cost prohibitive.

TABLE 8-3 – PRELIMINARY FUNDING SCENARIO NO. 2 - TRADITIONAL

<table>
<thead>
<tr>
<th>WWDC Eligible Components</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT(2012)</td>
<td>$478,628</td>
</tr>
<tr>
<td>WWDC Grant (67% of CCT)</td>
<td>$320,681</td>
</tr>
<tr>
<td>WWDC Loan (33% of CCT)</td>
<td>$157,947</td>
</tr>
<tr>
<td>Total Cost Per Property (CCT/24 Properties)</td>
<td>$6,581</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Property</td>
<td>$380</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WWDC Non-Eligible Components - Loan and Grant</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT(2012)</td>
<td>$373,023</td>
</tr>
<tr>
<td>SLIB Grant (50% of CCT)</td>
<td>$186,512</td>
</tr>
<tr>
<td>SLIB Loan (50% of CCT)</td>
<td>$186,512</td>
</tr>
<tr>
<td>Total Cost Per Property (CCT/24 Properties)</td>
<td>$7,771</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Property</td>
<td>$516</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Combined Debt Assessment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Combined Cost per Property</td>
<td>$14,352</td>
</tr>
<tr>
<td>Combined Annual Assessment Cost per Property</td>
<td>$896</td>
</tr>
</tbody>
</table>

FUNDING SCENARIO NO. 3 – PROBABLE.
This scenario is considered probable following conversations with representatives of SLIB and SRF. This scenario assumes the WWDC eligible portions of the project will be funded at a level of 67% grant and 33% loan, and the non-eligible portions of the project will be funded through a 50% SLIB grant and 50% SRF Loan which would be forgivable, rendering it as a grant. Although this funding is not guaranteed, the forgivable SRF loans have recently been made to low income communities, when there is a dramatic need. The District appears to meet the need and low income criteria. Also, in order to qualify for the SRF funding, the District must be placed on the SRF intended use plan, and this cannot occur until June of 2011. However, SRF representatives have indicated a willingness to work with the District, and the funding may be
available in June 2001. The resulting cost per property is $6,581, or an annual assessment of $380 as shown in Table 8-4. This scenario appears to be feasible.

### TABLE 8-4 – PRELIMINARY FUNDING SCENARIO NO. 3 - PROBABLE

<table>
<thead>
<tr>
<th>WWDC Eligible Components</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT(2012)</td>
<td>$478,628</td>
</tr>
<tr>
<td>WWDC Grant (67% of CCT)</td>
<td>$320,681</td>
</tr>
<tr>
<td>WWDC Loan (33% of CCT)</td>
<td>$157,947</td>
</tr>
<tr>
<td>Total Cost Per Property (CCT/24 Properties)</td>
<td>$6,581</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Property</td>
<td>$380</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WWDC Non-Eligible Components - Loan and Grant</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT(2012)</td>
<td>$373,023</td>
</tr>
<tr>
<td>SLIB Grant (50% of CCT)</td>
<td>$186,512</td>
</tr>
<tr>
<td>SRF Forgivable Loan (50% of CCT)</td>
<td>$186,512</td>
</tr>
<tr>
<td>Total Cost Per Property (CCT/24 Properties)</td>
<td>$0</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Property</td>
<td>$0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Combined Debt Assessment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Combined Cost per Property</td>
<td>$6,581</td>
</tr>
<tr>
<td>Combined Annual Assessment Cost per Property</td>
<td>$380</td>
</tr>
</tbody>
</table>

### FUNDING SCENARIO NO. 4 – OPTIMISTIC.

This scenario is to be the most optimistic scenario, but would be the most complicated and cumbersome scenario because of the large number of agencies needed to be involved. This scenario assumes the WWDC eligible portions of the project will be funded at a level of 67% grant, and the 33% loan portion would be funded with a 16.5% WWDC loan and a 16.5% grant either from SLIB or RUS, or a forgivable loan from SRF. The non-eligible portions of the project will be funded through a 50% SLIB grant and 50% SRF Loan which would be forgivable, which would render it as a grant. The resulting cost per property is $3,291, or an annual assessment of $190 as shown in Table 8-5. This scenario appears to be the most attractive funding scenario, but will be the most cumbersome to manage.

### REVISED WATER USER RATES

The water user rates presented previously in Section 7 have been revised for several reasons. Discussions with the Ten Sleep Town Council in August of 2010 indicated the Town was willing to provide operation and maintenance of the District’s domestic water system, and to treat the District as an out-of-town retail customer. The Town also indicated that the out-of-town retail
rate for water would be approximately $23.00 per month per customer for unlimited use. These
decisions will eliminate the need for the District to hire its own licensed water operators, or to do
decision. Meter reading, billing or maintenance functions, as these operations will be performed by the

TABLE 8-5 – PRELIMINARY FUNDING SCENARIO NO. 4 - OPTIMISTIC

<table>
<thead>
<tr>
<th>WWDC Eligible Components</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT(2012)</td>
<td>$478,628</td>
</tr>
<tr>
<td>WWDC Grant (67% of CCT)</td>
<td>$320,681</td>
</tr>
<tr>
<td>WWDC Loan (16.5% of CCT)</td>
<td>$78,974</td>
</tr>
<tr>
<td>SRF No Interest Loan (16.5% of CCT)</td>
<td>$78,974</td>
</tr>
<tr>
<td>Total Cost Per Property (CCT/24 Properties)</td>
<td>$3,291</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Property</td>
<td>$190</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WWDC Non-Eligible Components - Loan and Grant</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT(2012)</td>
<td>$373,023</td>
</tr>
<tr>
<td>SLIB Grant (50% of CCT)</td>
<td>$186,512</td>
</tr>
<tr>
<td>SRF Forgivable Loan (50% of CCT)</td>
<td>$186,512</td>
</tr>
<tr>
<td>Total Cost Per Property (CCT/24 Properties)</td>
<td>$0</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Property</td>
<td>$0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Combined Debt Assessment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Combined Cost per Property</td>
<td>$3,291</td>
</tr>
<tr>
<td>Combined Annual Assessment Cost per Property</td>
<td>$190</td>
</tr>
</tbody>
</table>

Town’s personnel. The Town has not yet established a customer use rate for in-town customers.
The intention is that for the next few years the Town would evaluate local use and set rates and
use limits once usage patterns had been determined. The Town currently has no limit on the
amount of water that a customer can use for the base rate of $17.00 per month.

The District will need to establish a water user rate that not only accounts for the payment of the
Town’s water usage fee, but include the other water system operating costs of the District. The
use of water by each customer will be measured by the individual water meter installed in a
buried meter pit at each property. The water user rate set by the District must be adequate to
account for all the operating expenses of the District’s water system and perhaps the debt
assessment if RUS provides the loan funding. Table 8-6 presents the revised estimated operation
and maintenance (O&M) costs for the proposed system with 24 taps, and does not include the
construction debt assessment. The revised annual operating budget is estimated to be $12,914,
which equates to a monthly user fee of about $45 per month. This budget assumes a monthly
water usage of 10,000 gallons, and will vary depending on the actual water consumption for each residence.

TABLE 8-6 – O&M COSTS FOR USER RATES - AS TEN SLEEP OUT-OF-TOWN CUSTOMER

<table>
<thead>
<tr>
<th>Description</th>
<th>Monthly Unit</th>
<th>Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator Wages</td>
<td>N/A</td>
<td>$0</td>
</tr>
<tr>
<td>Materials and Supplies</td>
<td>$25</td>
<td>$300</td>
</tr>
<tr>
<td>Water Purchase (10,000 gal/mo/home)</td>
<td>$23</td>
<td>$6,624</td>
</tr>
<tr>
<td>Water Sampling (Quarterly)</td>
<td>$100</td>
<td>$400</td>
</tr>
<tr>
<td>Bookeeping</td>
<td>$50</td>
<td>$600</td>
</tr>
<tr>
<td>Repair Fund</td>
<td>N/A</td>
<td>$500</td>
</tr>
<tr>
<td>Emergency Fund</td>
<td>N/A</td>
<td>$500</td>
</tr>
<tr>
<td>Sinking Fund ($50K@4%/30yr.)</td>
<td>N/A</td>
<td>$890</td>
</tr>
<tr>
<td>Bonding</td>
<td>N/A</td>
<td>$200</td>
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<tr>
<td>Liability Insurance</td>
<td>N/A</td>
<td>$700</td>
</tr>
<tr>
<td>Legal Services</td>
<td>N/A</td>
<td>$500</td>
</tr>
<tr>
<td>Advertising</td>
<td>N/A</td>
<td>$200</td>
</tr>
<tr>
<td>Engineering Services</td>
<td>N/A</td>
<td>$500</td>
</tr>
<tr>
<td>Stamps/Mailings</td>
<td>N/A</td>
<td>$0</td>
</tr>
<tr>
<td>Audit</td>
<td>N/A</td>
<td>$1,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$12,914</strong></td>
</tr>
</tbody>
</table>

Avg. cost per user/month $44.84

ONE-TIME CONNECTION COSTS TO NEW CUSTOMERS

In addition to the ongoing water system debt assessment costs and water use fees, there will be several “one-time” costs associated with new customers connecting to the water system. The one-time costs to each property were presented previously in Section 7, and have not changed and are expected to cost in a range of $1,500 and $3,000 and are not eligible for funding from any of the state or federal funding programs.

SUMMARY OF TYPICAL WATER SYSTEM COSTS

A summary of the total costs for the new water system are provided in Table 8-7 and Table 8-8, assuming costs established for Funding Scenario No. 3, Probable.

TABLE 8-7 – SUMMARY OF TYPICAL WATER SYSTEM MONTHLY COSTS

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
<th>Monthly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt Assessment Cost</td>
<td>$380/year</td>
<td>$31.67</td>
</tr>
<tr>
<td>Water User Cost</td>
<td>$45/month</td>
<td>$45.00</td>
</tr>
</tbody>
</table>

Avg. Cost Per User/Month $76.67
### TABLE 8-8 – SUMMARY OF TYPICAL ONE-TIME CAPITAL COSTS

<table>
<thead>
<tr>
<th>Description</th>
<th>One-Time Connection Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ten Sleep System Investment Charge (SIC)</td>
<td>$500.00</td>
</tr>
<tr>
<td>Service Line Installation</td>
<td>$800.00</td>
</tr>
<tr>
<td>House Plumbing Conversion</td>
<td>$500.00</td>
</tr>
<tr>
<td><strong>Total One-Time Connection Costs Per User</strong></td>
<td><strong>$1,800.00</strong></td>
</tr>
</tbody>
</table>

### IMPLEMENTATION

The implementation schedule for the proposed water supply project was presented previously in Section 7. The schedule has been modified slightly to include the application dates for the SLIB and SRF funding agencies, and is shown in Table 8-9.

### TABLE 8-9 – REVISED IMPLEMENTATION SCHEDULE

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 15, 2010</td>
<td>Apply for SLIB Grant and Loan Funding</td>
</tr>
<tr>
<td>October 1, 2010</td>
<td>Apply for Level III WWDC and RUS Funding</td>
</tr>
<tr>
<td>January 15, 2011</td>
<td>SLIB Funding Approval</td>
</tr>
<tr>
<td>February 15, 2011</td>
<td>Apply for SRF Funding</td>
</tr>
<tr>
<td>March 2011</td>
<td>WWDC Funding Approval</td>
</tr>
<tr>
<td>June 2011</td>
<td>SLIB and SRF Funding Approval</td>
</tr>
<tr>
<td>July 2011 - November 2011</td>
<td>Design and Easement Acquisition</td>
</tr>
<tr>
<td>December 15, 2011</td>
<td>Obtain DEQ and Other Permits</td>
</tr>
<tr>
<td>January 2012</td>
<td>Bidding Process</td>
</tr>
<tr>
<td>March 2012 – September 2012</td>
<td>Construction</td>
</tr>
</tbody>
</table>
APPENDIX A – GENERAL DISTRICT INFORMATION, HISTORY
PETITION FOR ESTABLISHMENT OF
AN IMPROVEMENT AND SERVICE DISTRICT

T. BOARD OF COUNTY COMMISSIONERS
Washakie County, Wyoming

ACCORDING TO Section 18-12-101 through 18-12-139, Wyoming Statutes 1977, we, the undersigned, being more than sixty (60%) percent of the property owners and in excess of sixty (60%) percent of the assessed valuation of the area in the proposed District, petition the Washakie County Commissioners for the establishment of an Improvement and Service District to be known as South Circle Estates Improvement and Service District, one and two.

1. The description of the land to be included in the proposed District is those lands included in the Subdivision Plat as recorded in Plat Book 1, Page 53, of the records of the Clerk of Washakie County, Wyoming.

2. The name of the proposed District is "South Circle Estates Improvement and Service District".

3. It is requested that a District be formed according to Section 18-12-101 through 18-12-139, Wyoming Statutes 1977.

4. The District is to provide water facilities to the District and maintain the same and other improvements as deemed necessary.

5. The District is to be financed from grants and assessments to the District.

6. The proposed directors of the District are Dolores Schilling (3 yrs.), John Biggs (4 yrs.), Virginia M. Largent (5 yrs.).

TEN SLEEP, WYOMING 82442
8-22-86

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WORLAND, WYOMING 82401
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TEN SLEEP, WYOMING 82442
8-22-86
LEGAL DESCRIPTION AMENDMENT

South Circle Estates Improvement and Service District.
Lots 5 through 18 inclusive, of the First Addition to South Circle Estates Subdivision as platted in Book 1, Page 53, Plat Records, plus Lots 1 through 4 inclusive, of South Circle Estates Subdivision as platted in Book 1, Page 46, Plat Records, all of the Washakie County Clerks Records.

Dated at Worland, Wyoming this 3rd day of September, 1986.

Marion Barngrover
Washakie County Clerk

8-4, 86
FOR THE FORMATION & CREATION OF
THE SOUTH CIRCLE ESTATES IMPROVEMENT DISTRICT
THE COUNTY COMMISSIONERS HAVE RECEIVED THE FOLLOWING:

To: Name --------------------------------- Check No. Amount

W. PATRICIA HANDBRD 1232 20.00
1/4 RANCH INC. (George Wood) 5081 40.00
VIRGINIA LARGENT 1278 30.00
DEE SCHILLING 1706 10.00
ANN SWEENEY 329 20.00
SUSAN E. BIGGS 481 20.00

This is to notify you that you have paid Washakie in the amount of $200.00 for the
following: Establishment S Circle Est. Improvement & Service Dist.

DEE SCHILLING 1703 20.00
MERLE F. BLAKELY 435 20.00
KAREN L. MAYALL 1415 20.00

This has been remitted to the County Treasurer and demand a receipt.

Very truly yours,

[Signature]
Chairman

Attest:
[Signature]
County Clerk
The following legal description encompasses all lands of both subdivisions, George Woods and Ten Sleep Cattle Company:
T47N, R88W of the 6th P.M.
Tracts 85E, F, H, G, and J
Tract 84K
Area which includes irrigated area of Ten Sleep Cattle Co.
Approximate area of South Circle Estates
Approximate area of George Woods prop.
Approximate area of First Addition to South Circle Estates
NOTICE

The Board of County Commissioners of Washakie County have received a petition from residents of Washakie County for the creation of an improvement and service district to be called "SOUTH CIRCLE ESTATES "FIRST ADDITION" IMPROVEMENT AND SERVICE DISTRICT.

The district is organized under Wyoming Statutes 1977, 18-12-101 through 18-12-139. The district will provide water facilities to the district and maintain the same and other improvements as deemed necessary.

The petition for the establishment of the district is on file at the office of the county commissioner's and is available during regular business hours, by contacting the county clerk.

It is proposed that improvements will be financed from grants and assessments to the district.

The names of Dolores Schilling, John Biggs, and Virginia M. Largent have been nominated as directors for the district.

A hearing will be held on Tuesday, September 23, 1986, at the hour of 2:00 p.m., at the Commissioner Room, Courthouse, Worland, Wyoming. At this time the Commissioners will hear all interested persons. Written requests for exclusion from or inclusion of land in the proposed district shall be heard and considered.

The legal description is as follows:

- Lots 5 through 18 inclusive of the First Addition to South Circle Estates Subdivision, which subdivision is situated in the NE ¼ SE ¼, NW ¼ SE ¼ and SW ¼ SE ¼ of Section 16, T. 44 N., R. 98 W., of the Sixth Principal Meridian, Original Government Survey, Washakie County, Wyoming, which are described as Tracts 85-1, 85-2, and 85-3, T. 44 N., R. 98 W. of the Resurvey, the boundary of said subdivision being described as follows: Beginning at the southeast corner of said SW ¼ SE ¼, Section 8; thence S. 89° 39' 41" W., 130.42 feet, along the south line of said SW ¼ SE ¼, Section 8, to the southwest corner of said SW ¼ SE ¼, Section 8, thence N. 0° 49' 27" W., 100.34 feet, along the west line of said SW ¼ SE ¼, Section 8, to a point on the westerly right of way line of the Washakie County road from Ten Sleep to Hyattville; thence N. 77° 24' 24" E., 61.29 feet, to a point on the easterly right of way line of said county road, said point being on the boundary of the South Circle Estates Subdivision, as shown on a plat filed for record in the office of the County Clerk of Washakie County, Wyoming, in Book 1, Plat Records, on Page 6; thence N. 0° 49' 27" W., 313.40 feet; thence S. 0° 49' 27" E., 313.40 feet; thence S. 79° 42' 50" E., 114.83 feet, along said boundary; thence along said boundary on a curve to the right having a radius of 263.35 feet, for a distance of 104.61 feet, through a total angle of 22° 43' 31"

- thence S. 66° 07' 23" E., 517.45 feet; said boundary; thence along said boundary on a curve to the left having a radius of 193.70 feet, for a distance of 133.24 feet, through a total angle of 45° 19' 43"

- thence along said boundary on a curve to the right having a radius of 179.34 feet, for a distance of 162.49 feet, through a total angle of 32° 44' 36"

- thence S. 79° 42' 50" E., 114.83 feet, along said boundary; thence along said boundary on a curve to the left having a radius of 220.90 feet, for a distance of 184.70 feet, through a total angle of 34° 30' 13"

- thence N. 65° 41' 17" E., 141.90 feet; along said boundary; thence along said boundary on a curve to the right having a radius of 256.48 feet, for a distance of 10.34 feet, through a total angle of 2° 18' 36"

- thence N. 0° 00' 48" W., 647.53 feet; along said boundary; thence to the northeast corner of said South Circle Estates Subdivision; thence N. 89° 31' 23" E., 277.40 feet; thence S. 59° 55' E., 735.99 feet, to a point on the westerly boundary of 11,459 acre parcel of land described in a warranty deed filed for a record in the Office of the County Clerk of Washakie County, Wyoming, in Book 31, Microfilm Records on Page 114; thence S. 29° 33' 44" E., 165.22 feet, along said westerly boundary; thence along said boundary on a curve to the right having a radius of 157.37 feet, for a distance of 192.81 feet, through a total angle of 89° 59' 13"

- thence S. 11° 40' 26" E., 239.40 feet, along said boundary, to the southwest corner of said 11,459 acre parcel, said corner being on the south line of said NE ¼ SE ¼, Section 8; thence E. 89° 34' 06" W., 656.22 feet, along the south line of said NE ¼ SE ¼, Section 8; to the southwest corner of said NE ¼ SE ¼, Section 8; thence S. 0° 11' 29" E., 1323.43 feet, along the east line of said NE ¼ SE ¼, Section 8, to the point of beginning; that the owners have caused said lands to be surveyed and platted as Lots 5 through 18 inclusive, of the First Addition to South Circle Estates Subdivision.

DATED at Worland, Wyoming this 2nd day of September, 1986.

Marion Barngrover
Washakie County Clerk

U.S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Cheyenne, Wyoming. Notice is here 17,746.67 acres of land in 75 parcels of public domain land and land in 1 parcel of acquired land will be offered for competitive leasing through sealed bids, to the qualified bidder of the amount at $8.00 a.m., Wednesday, October 1, 1986, when the Reading of the bids will begin at 8:30 a.m. All bids must be in our office no later than 4:30 p.m., September 30, 1986. The leasing will be conducted on an "as received" basis. The lease will be for a period of 10 years, the last and most favorable lease will be awarded. The leases will be subject to reasonable conditions.
OFFICIAL CANVASS

South Circle Estates Improvement and Service District

THE STATE OF WYOMING    )
COUNTY OF WASHAKIE      ) ss.

We, the undersigned, County Commissioners of the County above named, were this day taken to the assistance of the County Clerk of said County, and the poll books for the aforesaid election were opened, and the foregoing canvass made in our presence, at the Clerk's office at Worland, Wyoming in said County, this ___ day of November, 1986.

Edward Schmutzler, Chairman
Tom Bosch, Member
(Absent)
David H. Petty, Member

I, Marion Barngrover, County Clerk, within and for the county and State aforesaid, do certify that the foregoing abstract of the votes is a full, true and correct copy of the canvass of the returns of all votes cast in the county for the persons therein set forth in the South Circle Estates Improvement and Service District held at the Ten Sleep Library in the county of Washakie in said state on Tuesday, the 4th day of November, 1986, and I hereby certify that the returns in said county have been received and have been counted and are embodied in such abstract.

IN TESTIMONY WHEREOF, I hereunto set my hand and affix the seal of said County, at my office in Worland, Wyoming in said County, this 6th day of November, 1986.

Marion Barngrover, County Clerk
OFFICIAL CANVASS

CERTIFICATION OF ELECTION RESULTS
SOUTH CIRCLE ESTATES IMPROVEMENT AND SERVICE DISTRICT
WASHAKIE COUNTY, WORLAND, WYOMING

NOVEMBER 4, 1986

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<th>RPO</th>
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<tr>
<td>Number of People Voting AGAINST the ESTABLISHMENT of the District</td>
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TOTAL NUMBER OF VOTES

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<tr>
<th>Director</th>
<th>DOLORES SCHILLING</th>
<th>RPO</th>
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<tr>
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RPO==RESIDENT PROPERTY OWNERS
NRPO==NON-RESIDENT PROPERTY OWNERS
RNP==RESIDENT NON-PROPERTY OWNERS
Commissioners Edward Schmeltzer and Thomas K. Bosch, together with County Clerk Marion Barngrover canvassed the election for the South Circle Estates Improvement and Service District on the 6th day of November 1986, and the results are as follows:

**OFFICIAL CANVASS**

**CERTIFICATION OF ELECTION RESULTS**

**SOUTH CIRCLE ESTATES IMPROVEMENT AND SERVICE DISTRICT**

**WASHAKIE COUNTY, WORLAND, WYOMING**

**NOVEMBER 4, 1986**

<table>
<thead>
<tr>
<th>TOTAL Number of People Voting was</th>
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<th>NRPO</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>Number of People Voting FOR the</td>
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<td>2</td>
<td>12</td>
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<tr>
<td>ESTABLISHMENT of the District</td>
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<tr>
<td>Number of People Voting AGAINST the ESTABLISHMENT of the District</td>
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<td>2</td>
<td>12</td>
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<tr>
<td>TOTAL NUMBER OF VOTES</td>
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<td>Director 3 yr. Term—DOLORES SCHILLING</td>
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<td>Director 4 yr. Term—JOHN BIGGS</td>
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<tr>
<td>Director 5 yr. Term—VIRGINIA LARGENT</td>
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RPO—RESIDENT PROPERTY OWNERS
NRPO—NON-RESIDENT PROPERTY OWNERS
RNP—RESIDENT NON-PROPERTY OWNERS

Thereupon, the following Resolution was introduced by Commissioner Bosch.

**RESOLUTION NO. 17**

WHEREAS, on November 4, 1986, an election was held for the South Circle Estates Improvement and Service District;

AND, WHEREAS, legal notice was given in the Northern Wyoming Daily News on October 2, 1986 that an election would be held for the organization of the district and the election of three directors;

NOW, THEREFORE, be it resolved that said district is created and that Dolores Schilling is a Director for a three year term, John Biggs for a four year term, and Virginia Largent for a five year term.

The motion for the adoption of the Resolution was then made by Commissioner Bosch, and seconded by Commissioner Schmeltzer. The question being upon the adoption of the Resolution, the roll was called with the following result:

Those Voting Aye: Chairman Edward Schmeltzer; Thomas K. Bosch Commissioner. Those Voting Nay: None. Those Absent: Commissioner Petty. The Chairman thereupon declared that two members of the Board of County Commissioners had voted in favor of the Resolution, and that the motion was carried and that the Resolution had been adopted.

Dated at Worland, Wyoming this 18th day of November, 1986.

Commissioner Edward Schmeltzer and Thomas K. Bosch, together with County Clerk Marion Barngrover canvassed the results of the election held, on November 14, 1986 for the Ponderosa Improvement and Service District.
THEREUPON, the following Resolution was introduced by Commissioner Bosch.

RESOLUTION #15

WHEREAS, on September 23, 1986 the Washakie County Commissioners declare that it would serve the public interest to establish the "SOUTH CIRCLE ESTATES "ONE AND TWO" IMPROVEMENT AND SERVICE DISTRICT":

AND, WHEREAS, legal notice was given in the Northern Wyoming Daily News on September 3, 1986, that such hearing should be held;

NOW THEREFORE, be it resolved that said district be created, and that the county clerk be instructed to call for an election on the organization of the district.

Said Resolution was read in full and the motion for the adoption of the resolution was then made by Commissioner Bosch, seconded by Commissioner Schmeltzer. The question being upon the adoption of the resolution, the roll was called with the following result:

Those Voting Aye:  
Chairman Edward Schmeltzer  
Member Tom Bosch

Those Voting Nay:  
NONE

Those Absent:  
Commissioner David Petty

The Chairman thereupon declared that two members of the Board of County Commissioners had voted in favor of the resolution, and that the motion was carried and that the resolution had been adopted.
DECLARATION OF PROTECTIVE COVENANTS

SOUTH CIRCLE ESTATES

HESS PRESENTS, That

The undersigned, TEN SLEEP CATTLE CO. is the present owner of all the lots and blocks in the South Circle Estates, Washakie County, Wyoming, and does hereby covenant and agree that all of the lots in the said blocks now owned by it are held subject to and with the benefit of all restrictions, conditions, charges and agreements contained in the within Declaration of Covenants, and it does further hereby covenant and agree that any subsequent grants of any of said lots now owned by it shall be subject to the following covenants and restrictions:

1. DEFINITIONS: The following terms and phrases used in these covenants shall be defined as follows:

(a) "Common Road" shall mean the private roadway within the property which provides access to individual lot lines.

(b) "Common Services" shall mean the roadway maintenance and snow removal services, and the utility line maintenance or repair services for the Common Road and Shared Access Road and the utility lines located in the rights of way of such roads or across the said property.

(c) "Home Owners Association" shall mean the committee responsible for the administration and enforcement of these covenants, as created in paragraph 4 hereof.

(d) "Development" shall mean any alteration of the natural land surface, and all buildings, structures, or other site improvements placed on the land to accommodate the use of a lot.

(e) "Lot" shall mean any portion of the property as shown on a recorded plat and described as such.

(f) "Owner" shall mean the record owner of a lot, including a contract purchaser, but excluding anyone having interest in a lot as security for the performance of an obligation.

(g) "Principal Residence" shall mean the single family residential structure, constructed on any lot of the property, which is the principal use of such lot, and to which other authorized structures on such lot are accessory.

(h) "Property" shall mean the real property described in the Plat of South Circle Estates.

(i) "Structure" shall mean anything built or placed on the ground.

2. DEVELOPMENT AND USE RESTRICTIONS: All development
and use shall conform to the following requirements:

(a) Authorized Use. Only single family residential use shall be permitted, together with the maintenance and use of domestic livestock as hereinafter set forth.

(b) Prohibited Uses. No commercial, industrial or other non single-family residential use whatsoever shall be permitted, however the premises may be used for a studio, or workshop, for artistic pursuits, recreational and such other endeavors not requiring access to the premises by the general public nor requiring the employment of labor other than the owner. But no other manufacturing or commercial enterprise shall be maintained upon the premises.

(c) Authorized Structures. No building or other structure shall be constructed, placed, or maintained on any lot, except one single family residence, one guest house, garage facilities, and structures incidental to ranch type use.

(d) Construction. No used, prefabricated structures, nor mobile homes shall be permitted for the main residential building. Unless otherwise permitted by the Home Owners Association no guest house, garage, stable or corral facility or other outbuildings shall be prefabricated or constructed from used materials. All construction shall be completed within one year from the commencement date of construction, unless the Home Owners Association approves an extension for good cause, not to exceed six months in length.

(e) Height Limitations, Setbacks, Floor Area Requirements. No building shall be greater than 30 feet in height. Building height shall be measured from existing grade to the highest point of the roof structure, but shall not include chimneys, vents or antennas. All structures shall be set back from all property lines a minimum of 30 feet. The principal residential structure shall have a minimum floor area of 1000 square feet.

(f) Temporary Structures Prohibited. No temporary structures, such as trailers, shacks or other similar buildings shall be permitted on any lot.

(g) Maintenance. Each lot and all improvements thereon shall be maintained in a clean, safe and sightly condition. Boats, tractors, vehicles other than automobiles, campers, whether or not on a truck, snow removal equipment, and garden or maintenance equipment shall be kept at all times, except when in actual use, screened from view. No junk or inoperative cars shall be visually parked on the property. Refuse, garbage and trash shall be kept at all times in a covered container, and any such container shall be kept within an enclosed structure or appropriately screened from view. No lumber, grass, shrub or tree clippings or plant waste, bulk materials or scraps or refuse or
trash shall be kept, stored, or allowed to accumulate on any lot.

(h) Livestock. No livestock shall be kept or maintained on any lot except as provided herein. Cattle and horses are permitted, but no more than two (2) animals per acre as a maximum are allowed. Any animals or livestock permitted to be kept on a lot shall be restrained and controlled at all times so that they do not cause a nuisance to neighboring lot owners.

(i) Signs. No signs or advertising devices shall be erected or maintained on any lot, except signs which either identify the owner or advertise the lot for sale. All such ownership signs shall be of native wood design.

(j) Water Systems. Each residential structure shall be connected to a water supply system, run by the Home Owners Association, at the sole expense of the owner, and such system shall conform to all applicable standards of the State of Wyoming, Washakie County or any other regulatory agency.

(k) Sewage Disposal. Each residential building shall be connected to a private sewage disposal system at the owner's sole expense, and such sewage disposal system shall conform to all applicable standards of the State of Wyoming, Washakie County or other regulatory agency. No outdoor toilets shall be permitted.

(l) Common Access Road. The Common access roads on the property shall be private road at all times, and each lot owner shall be responsible for an equal portion of the maintenance costs for said roads, as costs are incurred at the initiation of the Home Owners Association. Example: Maintenance and or snow removal cost shall be prorated to owners by dividing costs by number of lots to which access is provided.

(m) Mineral Activities Prohibited. No mining or other mineral extraction or development activities shall be permitted on any lot, including the removal of gravel.

3. HOME OWNERS ASSOCIATION: All holders of fee title to residential lots must be members of the Home Owners Association of South Circle Estates of Washakie County, and each member shall be entitled to a certificate of membership therein. Each and every fee owner shall be entitled to the benefits and the obligations of said organization. For this purpose one membership has been allotted to each residential lot. Upon the sale, transfer, devise, or other conveyance of any lot, the purchaser or purchasers, transferee, or devisee thereof shall have transferred to him, or them, said certificate of membership duly endorsed thereon.

(a) Authority and Duties. The Home Owners Association shall be responsible for the enforcement and administration of the requirements of these covenants and shall issue
building permits, contract and supervise common services, enforce the development and use regulations and take all other actions necessary to administer and enforce these covenants.

(b) Meetings. The Home Owners Association shall meet from time to time as necessary to administer and enforce these covenants.

(c) Common Services. The Home Owners Association shall contract for periodic maintenance services on the Common Access Roads. The Home Owners Association shall bill each lot owner for his share of the maintenance costs for the Common Roads. The Home Owners Association shall submit billings for common services to each lot owner on a regular basis as determined by the Home Owners Association. Billings for common services shall be paid by lot owners within 30 days of the billing date. This is further explained in paragraph 3 (m).

(d) Domestic Water Service. The Home Owners Association shall contract with Ten Sleep Cattle Co., a Wyoming corporation, for water from the well existing on the property which is owned by Ten Sleep Cattle Co. The Home Owners Association shall be responsible for the treatment of the water and the distribution thereof. The cost of the water service shall be divided among the land owners who are using the water.

(e) Limitation of Liability. Neither the Home Owners Association nor any member thereof shall be liable to any party for any action or inaction with respect to any provision of these covenants, provided that such Home Owners Association or member thereof has acted in good faith.

4. VIOLATIONS-ENFORCEMENT-COSTS: The limitations and requirements for land use and development set forth in these covenants shall be enforceable by the Home Owners Association on any owner of a lot within the property. Every owner of a lot within the property hereby consents to the entry of an injunction, judgment or lien against him or her or his or her tenants or guests, to terminate and restrain any violation of these covenants or for the nonpayment of assessments due. Any lot owner who uses or allows his or her lot to be used or developed in violation of these covenants further agrees to pay all costs incurred by the Home Owners Association or other lot owner in enforcing these covenants, including reasonable attorney's fees.

5. AMENDMENT-VARIANCE: These covenants may be amended by the written consent of 75% of the lot owners of the property.

6. DURATION OF COVENANTS: All of the covenants, conditions and restrictions set forth herein shall continue and remain in full force and effect at all times against the property and the owners and purchasers of any portion thereof, subject to the right of amendment as set forth in paragraph 6 hereof.

7. SEVERABILITY: Any decision by a Court or compe-
tent jurisdiction invalidating any part or paragraph of these covenants shall be limited to the part or paragraph effected by the decision of the Court, and the remaining paragraphs and the covenants, conditions and restrictions there remain in full force and effect.

IN WITNESS WHEREOF, the undersigned has executed these presents this ___ day of June, 1980.

ATTEST:

---

TEN SLEEP CATTLE CO.

By: ____________________________
    President

______________________________
Secretary

STATE OF WYOMING  
County of Washakie

The foregoing instrument was acknowledged by ___________, President of and for Ten Sleep Cattle Co., before me this ___ day of June, 1980. Witness my hand and official seal.

______________________________
J. M. Thielmon
Notary Public

My commission expires: ____________
    July 24, 1983
This Policy does not insure against loss or damage by reason of the following:

1. Rights or claims of parties in possession not shown by the public records.
2. Easements, or claims of easements, not shown by the public records.
3. Discrepancies, conflicts in boundary lines, shortage in area, encroachments, and any facts which a correct survey and inspection of the premises would disclose and which are not shown by the public records.
4. Any lien, or right to a lien, for services, labor, or material theretofore or hereafter furnished, imposed by law and not shown by the public records.
5. Unpatented mining claims; reservations or exceptions in patents or in acts authorizing the issuance thereof; water rights, claims or title to water.
6. Ownership or title to any mineral interest and the effect on the surface of the exercise of the mineral right.
7. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the public records. Taxes for the year 1983 and subsequent years.
9. Covenants, conditions and restrictions in the declaration of restrictions executed by Ten Sleep Cattle Company and recorded November 4, 1981 in Book Micro 35, Page 867, but deleting restrictions, if any, based on race, color, religion or national origin.
PROTECTIVE COVENANTS FOR THE FIRST ADDITION
TO SOUTH CIRCLE ESTATES

KNOW ALL MEN BY THESE PRESENTS, THAT

TEN SLEEP CATTLE CO., a Wyoming corporation, is the owner of property in Washakie County hereinafter referred to as "THE FIRST ADDITION TO SOUTH CIRCLE ESTATES".

TEN SLEEP CATTLE CO., a Wyoming corporation, does hereby covenant and agree that all of the tracts in said subdivision now owned by them are held to and with the benefit of all the restrictions, conditions, charges and agreements contained within the Declaration of Protective Covenants recorded on the 14th day of July, 1980, in Micro Book 27 at Page 512 in the Office of the County Clerk for Washakie County, Wyoming, which pertain to and are governing of the SOUTH CIRCLE ESTATES Subdivision.

TEN SLEEP CATTLE CO., a Wyoming corporation, does hereby further covenant and agree that any subsequent grants of any of the said tracts now owned by it shall be subject to the above described covenants and restrictions.

IN WITNESS WHEREOF, the undersigned have executed this Covenant on the _____ day of ________, 1981.

ATTEST: TEN SLEEP CATTLE CO., a Wyoming corporation

Secretary

President

STATE OF WYOMING )

) ss.

County of Washakie

The foregoing instrument was acknowledged by Mark J. Carter, President of Ten Sleep Cattle Company, a Wyoming corporation, before me this 29th day of November, 1981.

Witness my hand and official seal.

My commission expires:

"04-9, 1983" 

William R. Shelley, Jr.
AGREEMENT FOR WATER

THIS AGREEMENT made and entered into this day of July, 1980, by and between TEN SLEEP CATTLE CO., a Wyoming corporation, hereinafter referred to as "Ten Sleep" and the HOME OWNERS ASSOCIATION OF the First Addition to South Circle Estate, hereinafter referred to as "Home Owners",

WITNESSETH:

WHEREAS, Ten Sleep owns an artesian well located near the First Addition to South Circle Estate; and

WHEREAS, Home Owners desires to use the water from the well;

IT IS, THEREFORE, mutually agreed and understood as follows:

1. Ten Sleep shall allow Home Owners a minimum of two (2) gallons per minute per lot, using water according to the terms and conditions contained herein from the existing well, and shall retain ownership of the well.

2. Ten Sleep shall have no responsibility for the condition of the water, nor the amount of the flow, except Ten Sleep shall not use any of the water for irrigation purposes if the minimum in Paragraph 1 above cannot be met.

3. Home Owners shall be responsible for all costs incurred in the maintenance of the well and shall not by their use of the water interfere with Ten Sleep's right to use the water for irrigation.

4. This contract shall inure to the benefit of and shall bind the parties hereto and their assigns.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement for Water as of the day and year first above written.

ATTEST:

TEN SLEEP CATTLE CO.

a Wyoming corporation

President

SECRETARY

HOME OWNERS ASSOCIATION of the First Addition to South Circle Estates

By:

STATE OF WYOMING

COUNTY OF WASHAKIE

The foregoing instrument was acknowledged by Mark J. Carter, President of the Ten Sleep Cattle Company, a Wyoming corporation, and individually before me this 3rd day of November, 1981.

Witness my hand and official seal.

My commission expires:

Notary Public
BYLAWS OF SOUTH CIRCLE ESTATES IMPROVEMENT AND SERVICE DISTRICT
(Water and Sewer District)

September 1, 1987

A. The above Water and Sewer District will abide to the best of their ability and knowledge by all the Laws concerning Water and Sewer Districts of the State of Wyoming.

B. The Officers of the above Water and Sewer District will abide to the best of their ability and knowledge by all the Laws concerning Officers of Water and Sewer Districts in the State of Wyoming.

C. Rules and Regulations set by the Officers of the above Water and Sewer District for the above Water and Sewer District.

1) There will be no more lines other than existing as of this date (September 1, 1987) from the Water and Sewer District Well (Beth No.1).

2) Irrigation by sprinklers only. No open lines for irrigation purposes.

3) Each water right user will only use one hydrant at a time.

4) No water user will have more than the existing hookup(s) for each lot off of or from the main line that exist at this date, (September 1, 1987).

5) Maximum size sprinkler head nozzles of 5/32 inch will be used. Sets are to be a minimum of 60 feet apart at each move if shape and size of lot will accommodate the distance. Sets will be moved once in every 24 hour period.

6) Each water right owner will be responsible financially in proportion to the amount of water right for all expenses accrued in connection with the Water District. (Per state statute listed in Water Commissioner's letter)

7) Maintenance: Any lines within a lot owners' boundaries that are not part of the Main Lines of Water District will be maintained by the water right owner.

8) Waste Water: Will be controlled by the individual water right owner for each user's property and they will be responsible financially for any damages incurred by the individual's waste water.

9) Yearly Fee: $10.00 per month for each water right owner. Interest checking account at First National Bank will be maintained by the Treasurer of the Water and Sewer District. $120.00 per year will be the total fee for each water right user and it will be payable by the 10th of each month to the Water and Sewer District Treasurer at no less than $10.00 per month and can be paid in advance. This will start as of October 1, 1987. A maximum of $3000.00 will be accrued.

10) Water Commissioner of the above will be appointed by Water and Sewer District Officers for a period to be determined by the Officers of said Water and Sewer District and will enforce the listed rules and regulations to the best of his/her knowledge the laws concerning Water and Sewer Districts of the State of Wyoming.

CONTINUED ON PAGE TWO
11) Water District Officers have the authority to:
   a. Schedule irrigating times.
   b. Authorize the appointed District Water Commissioner to regulate the well.
      No one else will have the authority or permission to regulate the well
      except in case of an emergency. The Water District Officers and/or
      the appointed Water Commissioner will be notified as soon as possible after
      any other person(s) have turned the well up or down or off for any reason.

12) The Well and (2) Main Lines in utility easements will be maintained by Water
    and Sewer District according to listed rules and regulations contained herein.

13) The Fire Hydrant adaptor will be put in a location accessible to the Fire
    Department.

14) The Agreement for water signed by Mark and Beth Carter will be abided by and
    will be considered Attachment No. 1 of the ByLaws, (July 1980)

15) There will be no padlocks on any of the hydrants.

Unseal part of no 1 of latter agreement.
AGREEMENT FOR WATER

THIS AGREEMENT made and entered into this day of July, 1980, by and between TEN SLEEP CATTLE CO., a Wyoming corporation, hereinafter referred to as "Ten Sleep" and the HOME OWNERS ASSOCIATION of South Circle Estates Two, hereinafter referred to as "Home Owners".

WITNESSETH:

WHEREAS, Ten Sleep owns an artesian well located near the South Circle Estates Two; and

WHEREAS, Home Owners desires to use the water from the well;

IT IS, THEREFORE, mutually agreed and understood as follows:

1. Ten Sleep shall allow Home Owners a minimum of two (2) gallons per minute per lot, using water according to the terms and conditions contained herein from the existing well, and shall retain ownership of the well.

2. Ten Sleep shall have no responsibility for the condition of the water, nor the amount of the flow, except Ten Sleep shall not use any of the water for irrigation purposes if the minimum in Paragraph 1 above cannot be met.

3. Home Owners shall be responsible for all costs incurred in the maintenance of the well and shall not by their use of the water interfere with Ten Sleep's right to use the water for irrigation.

4. This contract shall inure to the benefit of and shall bind the parties hereto and their assigns.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement for Water as of the day and year first above written.

ATTEST:

TEN SLEEP CATTLE CO.
a Wyoming corporation

[Signature]
President

[Signature]
Secretary

HOME OWNERS ASSOCIATION OF South Circle Estates Two

By: [Signature]
September 6, 1990

To: Joe Sterling, John Biggs, Richard Misomelius, Jerry Kienlen, Bill Smith,
Ginger Largent, Ann Sweeny, Merle Blakely, Sheldon Schilling, Jim Mayer,
Marvin Davis, and George Wood

From: John Biggs, Ginger Largent and Joe Sterling
Officers South Circle Estates Improvement and Service District
Water and Sewer District

Subject: Proper use of Beth No. 1 well and scheduled irrigation times.

As a result of a Water and Sewer District meeting on Wednesday, September 6,
1990, at the Sterling residence, the following irrigation guidelines were established
and will be maintained.

1. The maximum size for any one sprinkler head would still be 5/32" (Bylaw 
   #5)
2. The minimum distance for each set would be 60' (Bylaw #5).
3. Sets will be moved once every 24 hours. (Bylaw #5).

In addition, the members of South Circle Estates Improvement and Service District
which attended this meeting, established the following irrigation scheme.

Starting Monday, September 10, 1990, at 6 p.m., George Wood will have sole use
of the irrigation water. Irrigation water is considered what is available after
household or domestic requirements have been met. George Wood will have this
use for 20 days (480 hours). After this period, irrigation water would go to
the Subdivision water users for 10 days (240 hours). Then rotate back to George
Wood. This rotation period will stay in effect until Marvin Davis wants to
water then a 15 day for Marvin, 15 day for George, and 10 day for Subdivision
will be administered. This rotation scheme will be added to the Water and Sewer
District Bylaws.

Members' Signatures

Lot #1 Joe Sterling
Lot #2 ___________________ John Biggs
Lot #3 ___________________ Richard Misomelius
Lot #4 ___________________ Ben Vigil
Lots #5, 6, 7: Jerry Kienlen
Lot #8 ___________________ Bill Smith
Lot #9 ___________________ Ann Sweeny
Lot #10 ___________________ Ginger Largent
Lot #11 ___________________ Joe Fabian
Lot #12 ___________________ C. James Mayer
Lots #14, 15: Sheldon Schilling
Lots #16, 17: Merle Blakely
Lots #12, 13, 18 and Tract 85G: Marvin Davis
Home and Tract 85G: George Wood

CONTINUED ON PAGE TWO
No proposed public
no public maintenance
all emergency vehi-
total area including
total area of road
natural drainage
obstructed by build-
structures, other-
shall be constructed
for adequate drain-
utilities to be all
irrigation restriction
irrigation only
APPENDIX B – WATER QUALITY ANALYSES
December 29, 2008

609 Consulting LLC
5830 E 2nd St
Casper, WY 82609

Workorder No.: C08101078
Project Name: South Circle Estates

Energy Laboratories, Inc. received the following 1 sample for 609 Consulting LLC on 10/24/2008 for analysis.

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<th>Receive Date</th>
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<td>10/24/08</td>
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As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By: Signature

STEVE CARLSTON
# LABORATORY ANALYTICAL REPORT

**Client:** 609 Consulting LLC  
**Project:** South Circle Estates  
**Lab ID:** C08101078-001  
**Client Sample ID:** Beth Well No. 1  
**Report Date:** 12/29/08  
**Collection Date:** 10/23/08 16:00  
**Date Received:** 10/24/08  
**Matrix:** Drinking Water

### MAJOR IONS

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### PHYSICAL PROPERTIES

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### METALS - TOTAL

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### INORGANIC COMPOUNDS

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### Definitions:

- **RL** - Analyte reporting limit.  
- **QCL** - Quality control limit.  
- **MCL** - Maximum contaminant level.  
- **ND** - Not detected at the reporting limit.  
- **MDC** - Minimum detectable concentration  
- ***** - The result exceeds the MCL.  
- **U** - Not detected at minimum detectable concentration.
**LABORATORY ANALYTICAL REPORT**

Client: 609 Consulting LLC  
Project: South Circle Estates  
Lab ID: C08101078-001  
Client Sample ID: Beth Well No. 1  
Report Date: 12/29/08  
Collection Date: 10/23/08 16:00  
Date Received: 10/24/08  
Matrix: Drinking Water  

### INORGANIC COMPOUNDS

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<th>MCL/QCL</th>
<th>Method</th>
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### VOLATILE ORGANIC COMPOUNDS

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**Definitions:**  
RL - Analyte reporting limit.  
MCL - Maximum contaminant level.  
QCL - Quality control limit.  
ND - Not detected at the reporting limit.  
D - RL increased due to sample matrix interference.
# LABORATORY ANALYTICAL REPORT

**Client:** 609 Consulting LLC  
**Project:** South Circle Estates  
**Lab ID:** C08101078-001  
**Client Sample ID:** Beth Well No. 1  
**Report Date:** 12/29/08  
**Collection Date:** 10/23/08 16:00  
**Date Received:** 10/24/08  
**Matrix:** Drinking Water

## VOLATILE ORGANIC COMPOUNDS

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<th>Substance</th>
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<th>Qualifiers</th>
<th>RL</th>
<th>MCL/QCL</th>
<th>Method</th>
<th>Analysis Date/By</th>
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## SYNTHETIC ORGANIC COMPOUNDS - HERBICIDES

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<tr>
<td>Dicamba</td>
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<td>2,4,5-TP (Silvex)</td>
<td>ND</td>
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<td>%REC</td>
<td>S1 70-130</td>
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</table>

**Definitions:**  
- RL - Analyte reporting limit.  
- QCL - Quality control limit.  
- MCL - Maximum contaminant level.  
- ND - Not detected at the reporting limit.  
- MDC - Minimum detectable concentration  
- S - Spike recovery outside of advisory limits.  
- D - RL increased due to sample matrix interference.
# LABORATORY ANALYTICAL REPORT

Client: 609 Consulting LLC  
Project: South Circle Estates  
Lab ID: CO8101076-001  
Client Sample ID: Beth Well No. 1  

### SYNTHETIC ORGANIC COMPOUNDS - HERBICIDES

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>Units</th>
<th>Qualifiers</th>
<th>RL</th>
<th>MCL/ QCL</th>
<th>Method</th>
<th>Analysis Date / By</th>
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<tbody>
<tr>
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<td>bis(2-ethylhexyl) Adipate</td>
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<td>0.10</td>
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<td>E525.2</td>
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<td>10/01/08 10:16 / eli-b</td>
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<td>0.10</td>
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<tr>
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<td>Simazine</td>
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<tr>
<td>Surr: 1,3-Dimethyl-2-nitrobenzene</td>
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**Report Definitions:**
- RL - Analyte reporting limit.
- MCL - Maximum contaminant level.
- QCL - Quality control limit.
- ND - Not detected at the reporting limit.
# LABORATORY ANALYTICAL REPORT

**Client:** 609 Consulting LLC  
**Project:** South Circle Estates  
**Lab ID:** C08101078-001  
**Client Sample ID:** Beth Well No. 1  
**Report Date:** 12/29/08  
**Collection Date:** 10/23/08 16:00  
**Date Received:** 10/24/08  
**Matrix:** Drinking Water

## SYNTHETIC ORGANIC COMPOUNDS - PESTICIDES

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<th>Qualifiers</th>
<th>RL</th>
<th>Method</th>
<th>Analysis Date / By</th>
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</thead>
<tbody>
<tr>
<td>Perylene-d12</td>
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<tr>
<td>Pyrene-d10</td>
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<tr>
<td>Triphenylphosphate</td>
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## SYNTHETIC ORGANIC COMPOUNDS - PESTICIDES, CARBAMATES

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<th>Qualifiers</th>
<th>RL</th>
<th>Method</th>
<th>Analysis Date / By</th>
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</thead>
<tbody>
<tr>
<td>Aldicarb</td>
<td>ND</td>
<td>ug/L</td>
<td>0.40</td>
<td>3</td>
<td>E531.1</td>
<td>10/28/08 06:20 / evm</td>
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<tr>
<td>Aldicarb sulfoxide</td>
<td>ND</td>
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<tr>
<td>Carbaryl</td>
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<td>ug/L</td>
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<td>40</td>
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<td>10/28/08 06:20 / evm</td>
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<tr>
<td>Carbofuran</td>
<td>ND</td>
<td>ug/L</td>
<td>0.40</td>
<td>4</td>
<td>E531.1</td>
<td>10/28/08 06:20 / evm</td>
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<tr>
<td>3-Hydroxycarbofuran</td>
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<td>Methiocarb</td>
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<td>ug/L</td>
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<td>Methomyl</td>
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<tr>
<td>Surr. BDMC</td>
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<td>70-130</td>
<td>E531.1</td>
<td>10/28/08 06:20 / evm</td>
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**Report Definitions:**  
RL - Analyte reporting limit.  
QCL - Quality control limit.  
MDC - Minimum detectable concentration  
ND - Not detected at the reporting limit.
LABORATORY ANALYTICAL REPORT

Client: 609 Consulting LLC  
Project: South Circle Estates  
Client Sample ID: Beth Well No. 1  
Sampled By: Not Provided  
Lab ID: C08101078-001K  
Report Date: 12/29/08  
Collection Date: 10/23/08 16:00  
Received Date: 10/24/08 07:25  
Matrix: Drinking Water

<table>
<thead>
<tr>
<th>Analyses</th>
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<th>Qualifier</th>
<th>Method</th>
<th>Analysis Date / By</th>
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<tbody>
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<td>Bacteria, Total Coliform</td>
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<td>SAFE</td>
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<td>A9221 D</td>
<td>10/24/08 09:45 / dkh</td>
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</tbody>
</table>

Comments: The notation "SAFE" indicates that the water was bacteriologically SAFE when sampled.
The notation "UNSAFE" indicates that the water was bacteriologically UNSAFE when sampled.

Method Reference: E - EPA / MCAWW Methodology  
A - Standard Methods 19th Ed.
LABORATORY ANALYTICAL REPORT

Client: South Circle Estates  
Project: Not Indicated  
Lab ID: C09040600-001  
Client Sample ID: House Water  
Report Date: 05/12/09  
Collection Date: 04/16/09 10:05  
Date Received: 04/17/09  
Matrix: Drinking Water

<table>
<thead>
<tr>
<th>Analyses</th>
<th>Result</th>
<th>Units</th>
<th>Qualifiers</th>
<th>RL</th>
<th>MCL/ QCL</th>
<th>Method</th>
<th>Analysis Date / By</th>
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</thead>
<tbody>
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</tr>
<tr>
<td>Uranium</td>
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<td>0.03</td>
<td>E200.8</td>
<td>04/22/09 00:10 / ts</td>
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<tr>
<td>Uranium, Activity</td>
<td>0.9</td>
<td>pCi/L</td>
<td></td>
<td>0.7</td>
<td>20</td>
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<tr>
<td>Gross Alpha</td>
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<td>pCi/L</td>
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<tr>
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</tr>
<tr>
<td>Gross Alpha MDC</td>
<td>0.8</td>
<td>pCi/L</td>
<td></td>
<td></td>
<td>E903.0</td>
<td>E903.0</td>
<td>05/04/09 23:51 / jah</td>
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<tr>
<td>Radium 226</td>
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<tr>
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<tr>
<td>Radium 228</td>
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<td>04/28/09 11:06 / plj</td>
</tr>
<tr>
<td>Radium 228 precision (±)</td>
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<td>pCi/L</td>
<td></td>
<td></td>
<td>RA-05</td>
<td>RA-05</td>
<td>04/28/09 11:06 / plj</td>
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<tr>
<td>Radium 228 MDC</td>
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<td>pCi/L</td>
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<td>RA-05</td>
<td>04/28/09 11:06 / plj</td>
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<tr>
<td>Radium 226 + Radium 228</td>
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<td>05/08/09 16:51 / res</td>
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<td>Radium 226 + Radium 228 precision (±)</td>
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<td>Radium 226 + Radium 228 MDC</td>
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<td>A7500-RA</td>
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Report Definitions:  
RL - Analyte reporting limit.  
MCL - Maximum contaminant level.  
QCL - Quality control limit.  
ND - Not detected at the reporting limit.  
MDC - Minimum detectable concentration  
* - The result exceeds the MCL.  
U - Not detected at minimum detectable concentration
# LABORATORY ANALYTICAL REPORT

**Client:** South Circle Estates  
**Project:** Not Indicated  
**Lab ID:** C09040600-002  
**Client Sample ID:** Hydrant Water  
**Report Date:** 05/12/09  
**Collection Date:** 04/16/09 10:05  
**Date Received:** 04/17/09  
**Matrix:** Drinking Water

## METALS

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<th>Result</th>
<th>Units</th>
<th>Qualifiers</th>
<th>RL</th>
<th>MCL/QCL</th>
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<tbody>
<tr>
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## RADIONUCLIDES - TOTAL

<table>
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<th>Units</th>
<th>Qualifiers</th>
<th>RL</th>
<th>MCL/QCL</th>
<th>Method</th>
<th>Analysis Date / By</th>
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<tbody>
<tr>
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<tr>
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<tr>
<td>Radium 226 + Radium 228 precision (±)</td>
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</table>

### Definitions:
- **RL** - Analyte reporting limit.  
- **MCL** - Maximum contaminant level.  
- **QCL** - Quality control limit.  
- **ND** - Not detected at the reporting limit.  
- **MDC** - Minimum detectable concentration  
- **U** - Not detected at minimum detectable concentration  
- * - The result exceeds the MCL.
ANALYTICAL SUMMARY REPORT

August 14, 2009

609 Consulting LLC
5830 E 2nd St
Casper, WY 82609

Workorder No.: C09070996
Project Name: Not Indicated

Energy Laboratories, Inc. received the following 1 sample for 609 Consulting LLC on 7/23/2009 for analysis.

<table>
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<th>Sample ID</th>
<th>Client Sample ID</th>
<th>Collect Date</th>
<th>Receive Date</th>
<th>Matrix</th>
<th>Test</th>
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<td></td>
<td>Aqueous</td>
<td>Total Uranium Metals Preparation by EPA 200.2 Gross Alpha, Gross Beta Radium 226 + Radium 228 Radium 226, Total Radium 228, Total</td>
</tr>
</tbody>
</table>

As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By: 

Stephanie D. Waldrop
Reporting Supervisor
LABORATORY ANALYTICAL REPORT

Client: 609 Consulting LLC
Project: Not Indicated
Lab ID: C09070996-001
Client Sample ID: Water Sample

Report Date: 08/14/09
Collection Date: Not Provided
Date Received: 07/23/09
Matrix: Aqueous

<table>
<thead>
<tr>
<th>Analyses</th>
<th>Result</th>
<th>Units</th>
<th>Qualifiers</th>
<th>RL</th>
<th>MCL/ QCL</th>
<th>Method</th>
<th>Analysis Date / By</th>
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<td><strong>METALS</strong></td>
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<tr>
<td>Uranium</td>
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<td>mg/L</td>
<td>0.001</td>
<td>0.03</td>
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<td>07/29/09 23:41 / ts</td>
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<tr>
<td>Uranium, Activity</td>
<td>0.9</td>
<td>pCi/L</td>
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<td>20</td>
<td>E200.8</td>
<td></td>
<td>07/29/09 23:41 / ts</td>
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</tbody>
</table>

| **RADIONUCLIDES - TOTAL**          |        |       |            |     |          |        |                   |
| Gross Alpha                        | 10.9   | pCi/L | 15         |     | E900.0   |        | 08/12/09 10:10 / cgr |
| Gross Alpha precision (±)          | 1.7    | pCi/L | 5          |     | E900.0   |        | 08/12/09 10:10 / cgr |
| Gross Alpha MDC                    | 1.2    | pCi/L |           |     | E900.0   |        | 08/12/09 10:10 / cgr |
| Radium 226                         | 6.3    | pCi/L |           | 5   | E903.0   |        | 08/05/09 15:29 / jah |
| Radium 226 precision (±)           | 0.5    | pCi/L |           | 5   | E903.0   |        | 08/05/09 15:29 / jah |
| Radium 226 MDC                     | 0.1    | pCi/L | U          | 5   | RA-05    |        | 07/31/09 13:11 / plj |
| Radium 228                         | 0.4    | pCi/L |           |     | RA-05    |        | 07/31/09 13:11 / plj |
| Radium 228 precision (±)           | 0.8    | pCi/L |           | 5   | RA-05    |        | 07/31/09 13:11 / plj |
| Radium 228 MDC                     | 0.8    | pCi/L |           |     | RA-05    |        | 07/31/09 13:11 / plj |
| Radium 226 + Radium 228            | 6.7    | pCi/L |           | 5   | A7500-RA |        | 08/10/09 12:11 / res |
| Radium 226 + Radium 228 precision (±) | 1     | pCi/L |           |     | A7500-RA |        | 08/10/09 12:11 / res |
| Radium 226 + Radium 228 MDC        | 0.8    | pCi/L |           |     | A7500-RA |        | 08/10/09 12:11 / res |

Report Definitions:
- RL - Analyte reporting limit.
- QCL - Quality control limit.
- MDC - Minimum detectable concentration.
- U - Not detected at minimum detectable concentration.
- MCL - Maximum contaminant level.
- ND - Not detected at the reporting limit.
- * - The result exceeds the MCL.
## QA/QC Summary Report

### Client: 609 Consulting LLC
### Project: Not Indicated

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Count</th>
<th>Result</th>
<th>Units</th>
<th>RL</th>
<th>%REC</th>
<th>Low Limit</th>
<th>High Limit</th>
<th>RPD</th>
<th>RPD Limit</th>
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<td><strong>E200.8</strong></td>
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<td>8E-06</td>
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<td><strong>LRB</strong></td>
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<td>Laboratory Fortified Blank</td>
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<tr>
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<td>Sample Matrix Spike</td>
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<td><strong>C09070984-001BMSD</strong></td>
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<td><strong>E900.0</strong></td>
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<td><strong>E903.0</strong></td>
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<td><strong>C09070963-001AMSD</strong></td>
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<td>16</td>
<td>pCi/L</td>
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<td>Method Blank</td>
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<tr>
<td><strong>LCS-RA226-3865</strong></td>
<td>Laboratory Control Sample</td>
<td>8.5</td>
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</tbody>
</table>

### Qualifiers:
- **RL**: Analyte reporting limit.
- **ND**: Not detected at the reporting limit.
- **MDC**: Minimum detectable concentration.
- **U**: Not detected at minimum detectable concentration.
<table>
<thead>
<tr>
<th>Analyte</th>
<th>Count</th>
<th>Result</th>
<th>Units</th>
<th>RL</th>
<th>%REC</th>
<th>Low Limit</th>
<th>High Limit</th>
<th>RPD</th>
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<td>Sample ID: LCS-228-RA226-3865</td>
<td>Laboratory Control Sample</td>
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<tr>
<td>Radium 228</td>
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<td>Radium 228</td>
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<tr>
<td>Radium 228 precision (σ)</td>
<td>0.7</td>
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<td>Radium 228 MDC</td>
<td>0.8</td>
<td>pCi/L</td>
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<td>pCi/L</td>
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<td>37.1</td>
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</table>

**Qualifiers:**

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration
**Chain of Custody and Analytical Request Record**

**Company Name:** Erie Consulting, LLC

**Report Mail Address:** 5830 East 2nd Street

**Invoice Address:** Casper, WY 82609

**Special Report/Formats – ELI must be notified prior to sample submittal for the following:**

- DW
- GSA
- POTW/WWTP
- State: LEVEL IV
- Other: NELAC

**Sample Identification (Name, Location, Interval, etc.)**

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<th>Collection Date</th>
<th>Collection Time</th>
<th>MATRIX</th>
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</table>

**ANALYSIS REQUESTED**

- **Number of Containers:** A 2
- **Sample Type:** A W & S V B 0
- **Format:** A2LA

**RUSH**

- **Contact ELI prior to RUSH sample submittal for charges and scheduling – See Instruction Page**

**Comments:**

- **Normal Turnaround (TAT):**
- **Special Instructions:**
- **Laboratory USE ONLY**

**Custody Record MUST be Signed**

- **Relinquished by (print):** Claire Venn
- **Date/Time:** 7-8-09
- **Signature:**

- **Received by (print):**
- **Date/Time:**
- **Signature:**

- **Sample Disposal:** Return to Client
- **Lab Disposal:**

**In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report. Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.**
<table>
<thead>
<tr>
<th>Category</th>
<th>Status</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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<tr>
<td>Custody seals intact on shipping container/cool</td>
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</tr>
<tr>
<td>Custody seals intact on sample bottles?</td>
<td>Yes</td>
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</tr>
<tr>
<td>Chain of custody present?</td>
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<td></td>
</tr>
<tr>
<td>Chain of custody signed when relinquished and</td>
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</tr>
<tr>
<td>received?</td>
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<tr>
<td>Chain of custody agrees with sample labels?</td>
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<tr>
<td>Samples in proper container/bottle?</td>
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<tr>
<td>Sample containers intact?</td>
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<tr>
<td>Sufficient sample volume for indicated test?</td>
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<tr>
<td>All samples received within holding time?</td>
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<tr>
<td>Container/Temp Blank temperature:</td>
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<tr>
<td>Water - VOA vials have zero headspace?</td>
<td>No</td>
<td>No VOA vials submitted</td>
</tr>
<tr>
<td>Water - pH acceptable upon receipt?</td>
<td>Yes</td>
<td>Not Applicable</td>
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</table>

Contact and Corrective Action Comments:

None
CASE NARRATIVE

ORIGINAL SAMPLE SUBMITTAL(S)
All original sample submittals have been returned with the data package.

SAMPLE TEMPERATURE COMPLIANCE: 4°C (±2°C)
Temperature of samples received may not be considered properly preserved by accepted standards. Samples that are hand delivered immediately after collection shall be considered acceptable if there is evidence that the chilling process has begun.

GROSS ALPHA ANALYSIS
Method 900.0 for gross alpha and gross beta is intended as a drinking water method for low TDS waters. Data provided by this method for non-potable waters should be viewed as inconsistent.

RADON IN AIR ANALYSIS
The desired exposure time is 48 hours (2 days). The time delay in returning the canister to the laboratory for processing should be as short as possible to avoid excessive decay. Maximum recommended delay between end of exposure to beginning of counting should not exceed 8 days.

SOIL/SOLID SAMPLES
All samples reported on an as received basis unless otherwise indicated.

ATRAZINE, SIMAZINE AND PCB ANALYSIS USING EPA 505
Data for Atrazine and Simazine are reported from EPA 525.2, not from EPA 505. Data reported by ELI using EPA method 505 reflects the results for seven individual Aroclors. When the results for all seven are ND (not detected), the sample meets EPA compliance criteria for PCB monitoring.

SUBCONTRACTING ANALYSIS
Subcontracting of sample analyses to an outside laboratory may be required. If so, ENERGY LABORATORIES will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.

BRANCH LABORATORY LOCATIONS
eli-b - Energy Laboratories, Inc. - Billings, MT
eli-g - Energy Laboratories, Inc. - Gillette, WY
eli-h - Energy Laboratories, Inc. - Helena, MT
eli-r - Energy Laboratories, Inc. - Rapid City, SD
eli-t - Energy Laboratories, Inc. - College Station, TX

CERTIFICATIONS:
USEPA: WY00029, Radiochemical WY00937; FL-DOH NELAC: E87641, Radiochemical E871017; California: 02118CA; Oregon: WY200099; Utah: 3072350515; Virginia: 00057; Washington: C1903

ISO 17025 DISCLAIMER:
The results of this Analytical Report relate only to the items submitted for analysis.

ENERGY LABORATORIES, Inc. - CASPER, WY certifies that certain method selections contained in this report meet requirements as set forth by the above accrediting authorities. Some results requested by the client may not be covered under these certifications. All analysis data to be submitted for regulatory enforcement should be certified in the sample state of origin. Please verify ELI’s certification coverage by visiting www.energylab.com

ELI appreciates the opportunity to provide you with this analytical service. For additional information and services visit our web page www.energylab.com.

THIS IS THE FINAL PAGE OF THE LABORATORY ANALYTICAL REPORT
## LABORATORY ANALYTICAL REPORT

**Client:** South Circle Estates  
**Project:** Not Indicated  
**Lab ID:** C09040800-001  
**Client Sample ID:** House Water  

### METALS

<table>
<thead>
<tr>
<th>Analyses</th>
<th>Result</th>
<th>Units</th>
<th>Qualifiers</th>
<th>RL</th>
<th>MCL/ QCL</th>
<th>Method</th>
<th>Analysis Date / By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uranium</td>
<td>0.001</td>
<td>mg/L</td>
<td>0.001</td>
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### RADIONUCLIDES - TOTAL

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<th>MCL/ QCL</th>
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<th>Analysis Date / By</th>
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**Definitions:**  
- RL - Analyte reporting limit.  
- QCL - Quality control limit.  
- MDL - Minimum detectable concentration.  
- U - Not detected at minimum detectable concentration.  
- ND - Not detected at the reporting limit.  
- * - The result exceeds the MCL.
**LABORATORY ANALYTICAL REPORT**

- **Client:** South Circle Estates  
- **Project:** Not Indicated  
- **Lab ID:** C09040600-002  
- **Client Sample ID:** Hydrant Water  
- **Report Date:** 05/12/09  
- **Collection Date:** 04/16/09 10:05  
- **Date Received:** 04/17/09  
- **Matrix:** Drinking Water  

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### RADIONUCLIDES - TOTAL

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**Report Definitions:**
- RL - Analyte reporting limit.
- QCL - Quality control limit.
- MCL - Maximum contaminant level.
- ND - Not detected at the reporting limit.
- MDC - Minimum detectable concentration
- U - Not detected at minimum detectable concentration
- * - The result exceeds the MCL.
December 29, 2008

609 Consulting LLC
5830 E 2nd St
Casper, WY 82609

Workorder No.: C08101078
Project Name: South Circle Estates

Energy Laboratories, Inc. received the following 1 sample for 609 Consulting LLC on 10/24/2008 for analysis.

<table>
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<tr>
<th>Sample ID</th>
<th>Client Sample ID</th>
<th>Collect Date</th>
<th>Receive Date</th>
<th>Matrix</th>
<th>Test</th>
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| C08101078-001 | Beth Well No. 1  | 10/23/08 16:00 | 10/24/08     | Drinking Water | Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Drinking Water Bacteria, Total Coliform Cyanide, SDWA Sample Filtering Fluoride E515.1 Chlorinated Herbicides Hardness Nitrogen, Nitrite Nitrogen, Nitrate + Nitrite Metals Preparation by EPA 200.2 504 sample microextraction E504 Pesticides 505 sample microextraction E505 Pesticides Pesticides, Carbamates SDWA Gross Alpha, Gross Beta Radium 226 + Radium 228 Radium 226, Total Radium 228, Total Solids, Total Dissolved Sulfate 525-Semi-Volatile Organic Compounds, SDWA E524.2 SDWA VOCs

As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By: STEVE CARLSTON
LABORATORY ANALYTICAL REPORT

Client: 609 Consulting LLC  
Project: South Circle Estates  
Lab ID: C08101078-001  
Client Sample ID: Beth Well No. 1  

Report Date: 12/29/08  
Collection Date: 10/23/08 16:00  
Date Received: 10/24/08  
Matrix: Drinking Water

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**Definitions:**  
- RL - Analyte reporting limit.  
- QCL - Quality control limit.  
- MCL - Maximum contaminant level.  
- ND - Not detected at the reporting limit.  
- MDC - Minimum detectable concentration.  
- * - The result exceeds the MCL.  
- D - RL increased due to sample matrix interference.  
- U - Not detected at minimum detectable concentration.
**LABORATORY ANALYTICAL REPORT**

**Client:** 609 Consulting LLC  
**Project:** South Circle Estates  
**Lab ID:** C08101078-001  
**Client Sample ID:** Beth Well No. 1

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**Definitions:**  
- **RL** - Analyte reporting limit.  
- **MCL** - Maximum contaminant level.  
- **QCL** - Quality control limit.  
- **ND** - Not detected at the reporting limit.  
- **D** - RL increased due to sample matrix interference.  
- **MDC** - Minimum detectable concentration.
# LABORATORY ANALYTICAL REPORT

**Client:** 609 Consulting LLC  
**Project:** South Circle Estates  
**Lab ID:** C08101078-001  
**Client Sample ID:** Beth Well No. 1

## VOLATILE ORGANIC COMPOUNDS

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<th>Units</th>
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<th>RL</th>
<th>Analysis Date / By</th>
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## SYNTHETIC ORGANIC COMPOUNDS - HERBICIDES

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**Definitions:**
- **RL** - Analyte reporting limit.
- **QCL** - Quality control limit.
- **MCL** - Maximum contaminant level.
- **ND** - Not detected at the reporting limit.
- **MDC** - Minimum detectable concentration.
- **S** - Spike recovery outside of advisory limits.
### LABORATORY ANALYTICAL REPORT

**Client:** 609 Consulting LLC  
**Project:** South Circle Estates  
**Lab ID:** C08101078-001  
**Client Sample ID:** Beth Well No. 1  
**Report Date:** 12/29/08  
**Collection Date:** 10/23/08  
**Date Received:** 10/24/08  
**Matrix:** Drinking Water

#### SYNTHETIC ORGANIC COMPOUNDS - HERBICIDES

1. **Atrazine**  
   - **Result:** ND  
   - **Units:** ug/L  
   - **Qualifiers:**  
   - **RL:** 0.10  
   - **%REC:** 2  
   - **Method:** E504.1  
   - **Analysis Date / By:** 10/29/08 02:56 / wen

#### SYNTHETIC ORGANIC COMPOUNDS - PESTICIDES

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<tr>
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<th>%REC</th>
<th>Method</th>
<th>Analysis Date / By</th>
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**SYNTHETIC ORGANIC COMPOUNDS - PESTICIDES**

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<td>Metribuzin</td>
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<td>11/01/08 10:16 / eli-b</td>
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**Definitions:**

- **RL** - Analyte reporting limit.
- **QCL** - Quality control limit.
- **MDC** - Minimum detectable concentration
- **ND** - Not detected at the reporting limit.
- **MCL** - Maximum contaminant level.
- **QCL** - Quality control limit.
LABORATORY ANALYTICAL REPORT

Client: 609 Consulting LLC
Project: South Circle Estates
Lab ID: C08101078-001
Client Sample ID: Beth Well No. 1

Report Date: 12/29/08
Collection Date: 10/23/08 16:00
Date Received: 10/24/08
Matrix: Drinking Water

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| SYNTHETIC ORGANIC COMPOUNDS - PESTICIDES, CARBAMATES |        |       |            |      |         |        |                   |
| Aldicarb                          | ND     | ug/L  | 0.40       | 3    | E531.1  |        | 10/28/08 06:20 / evm |
| Aldicarb sulfoxide                | ND     | ug/L  | 0.40       | 2    | E531.1  |        | 10/28/08 06:20 / evm |
| Aldicarb sulfoxide                | ND     | ug/L  | 0.40       | 4    | E531.1  |        | 10/28/08 06:20 / evm |
| Carbaryl                          | ND     | ug/L  | 0.40       | 40   | E531.1  |        | 10/28/08 06:20 / evm |
| Carbofuran                        | ND     | ug/L  | 0.40       | 4    | E531.1  |        | 10/28/08 06:20 / evm |
| 3-Hydroxycarbofuran               | ND     | ug/L  | 0.40       | 40   | E531.1  |        | 10/28/08 06:20 / evm |
| Methiocarb                        | ND     | ug/L  | 0.40       | 4    | E531.1  |        | 10/28/08 06:20 / evm |
| Methomyl                          | ND     | ug/L  | 0.40       | 200  | E531.1  |        | 10/28/08 06:20 / evm |
| Oxamyl                            | ND     | ug/L  | 0.40       | 2    | E531.1  |        | 10/28/08 06:20 / evm |
| Baygon                            | ND     | ug/L  | 0.40       | 200  | E531.1  |        | 10/28/08 06:20 / evm |
| Surr: BDMC                        | 92.0   | %REC  | 70-130     |      |         | E531.1 | 10/28/08 06:20 / evm |

Report Definitions:
- RL - Analyte reporting limit.
- QCL - Quality control limit.
- MCL - Maximum contaminant level.
- ND - Not detected at the reporting limit.
- MDC - Minimum detectable concentration
LABORATORY ANALYTICAL REPORT

Client: 609 Consulting LLC  
Project: South Circle Estates  
Client Sample ID: Beth Well No. 1  
Sampled By: Not Provided  
Lab ID: C08101078-001K  

Report Date: 12/29/08  
Collection Date: 10/23/08 16:00  
Received Date: 10/24/08 07:25  
Matrix: Drinking Water

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<td>SAFE</td>
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<td>A9221 D</td>
<td>10/24/08 09:45 / dkh</td>
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Comments: The notation "SAFE" indicates that the water was bacteriologically SAFE when sampled.

The notation "UNSAFE" indicates that the water was bacteriologically UNSAFE when sampled.

Method Reference: E - EPA / MCAWW Methodology  
A - Standard Methods 19th Ed.
APPENDIX C – WATER RIGHTS INFORMATION
AGREEMENT FOR WATER

THIS AGREEMENT made and entered into this 21st day of July, 1955, by and between TEN SLEEP CATTLE CO., a Wyoming Corporation, hereinafter referred to as "Ten Sleep" and the HOME OWNERS ASSOCIATION OF THE FIRST ADDITION TO SOUTH CIRCLE ESTATE, hereinafter referred to as "Home Owners",

WITNESSETH:

WHEREAS, Ten Sleep owns an existing well located near the First Addition to South Circle Estate; and

WHEREAS, Home Owners desires to use the water from the well;

IT IS, THEREFORE, mutually agreed and understood as follows:

1. Ten Sleep shall allow Home Owners a minimum of two (2) gallons per minute per lot, using water according to the terms and conditions contained herein from the existing well, and shall retain ownership of the well.

2. Ten Sleep shall have no responsibility for the condition of the water, nor the amount of the flow, except Ten Sleep shall not use any of the water for irrigation purposes if the minimum in Paragraph 1 above cannot be met.

3. Home Owners shall be responsible for all costs incurred in the maintenance of the well and shall not by their use of the water interfere with Ten Sleep's right to use the water for irrigation.

4. This contract shall inure to the benefit of and shall bind the parties hereto and their assignees.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement for Water as of the day and year first above written.

TEN SLEEP CATTLE CO.,
A Wyoming Corporation

[Signature]
President

[Signature]
Secretary

HOME OWNERS ASSOCIATION of the First Addition to South Circle Estate

[Signature]
BETH NO. 1 WELL WATER ROTATION AGREEMENT

THIS AGREEMENT is made between the SOUTH CIRCLE ESTATES IMPROVEMENT AND SERVICE DISTRICT of Washakie County, Wyoming, 1/4 RANCH, INC. of Washakie County, Wyoming and TERESA M. McELHINNY of Washakie County, Wyoming, hereinafter the "Parties." The Parties are all users of the BETH NO. 1 WELL, located in Washakie County, Wyoming, hereinafter the "Well."

RECITALS

1. The Parties have certain adjudicated water rights with respect to Beth No. 1 Well located in Washakie County, Wyoming, attached to the following described real property:

See Exhibits "A," "B," and "C"

2. The Parties wish to form a partnership named the BETH NO. 1 WELL WATER USERS consisting of the Parties, their heirs and/or assigns, for the purpose of managing the irrigation water use rotation schedule established by this Agreement to provide funds to perform maintenance on the Well, appurtenant fixtures (out to and including the first valve on each main line), and the well house; and, to initiate and oversee any future enhancements of the Well's production.

3. The Parties agree that it is in each of the Parties best interest to participate in a water rotation schedule for the irrigation of their adjudicated lands.

4. The Parties agree that it is in the Parties best interest to be subject to assessments to provide funds for the maintenance of the Well, and production enhancements.

For the reasons recited above, and in consideration of the mutual covenants contained in this Agreement, the Parties agree as follows:

SECTION I. ROTATION

1. Schedule

The Parties agree that the Rotation of irrigation water from the Well shall be divided equally among theParties based upon a 30 day rotation cycle as follows:

a. Teresa McElhenny 10 days;
b. 1/4 Ranch Inc. 10 days; and,
c. South Circle Estates Improvement and Services District 10 days.
The rotation of ten (10) day periods shall be prioritized so that in 1996 McElhinny has the right to start irrigating first, 1/4 Ranch Inc. has the second right, and the South Circle Estates Improvement and Services District has the third right. This right to be the first Party to begin irrigating shall rotate each irrigation season so that in 1997 the 1/4 Ranch Inc. has the first right, the South Circle Estates Improvement and Services District second, and McElhinny third. The annual rotation of the right to irrigate first shall be done so that each Party to this original Agreement has the right to irrigate first every third year.

2. **Season**

The rotation schedule shall begin the first day of May of each irrigation season. However, it may begin earlier if any one of the Parties choose to begin irrigating prior to May 1st, subject to the following requirements. If the first Party to begin irrigating is not the Party who has the right to irrigate first as described in the preceding paragraph, then said Party must obtain a written waiver from those Parties ahead of them who have a superior right to begin irrigating for the season in question.

If any party chooses not to irrigate during their scheduled rotation period, then the rotation will advance to the next party in line. If in the event of an emergency a Party in rotation cannot irrigate during a portion of his rotation period, then said Party may "trade" irrigation days with another Party, so long as written consent of all the Parties is first obtained. If as allowed above, the "trading" of irrigation days occurs, the State Hydrographer-Commissioner who is assigned to Districts 6 and 12 shall be notified.

3. **Transferred Lands**

Should any Party sell, assign or otherwise transfer their interest in the adjudicated lands subject to this Agreement, then such transferee shall be bound by the terms of this Agreement. If adjudicated lands subject to this Agreement are sold, assigned or otherwise transferred, then the new holder of the lands transferred must share the ten (10) day rotation period as provided by this Agreement, on a pro rata basis (based on the number of adjudicated acres) with the transferor. Furthermore, the transferee of adjudicated lands subject to this Agreement must share, on a pro rata basis (based on the number of adjudicated acres), the ten (10) day rotation period with any other person or entity who has received adjudicated lands from an original Party to this Agreement.

In the event that the adjudicated lands held by Theresa McElhinny and the 1/4 Ranch Inc. (as Original parties to this Agreement) are transferred so that one person or entity has complete ownership of said lands, then the rotation schedule shall be modified as follows. The thirty (30) day rotation period shall remain in effect; however, the South Circle Estates
Improvement and Services District shall have the irrigation water for 15 days, then the holder of the aforesaid combined lands shall have the irrigation water for 15 days. The holder of the aforesaid combined lands shall not be limited to using his 15 days of irrigation water to irrigate the lands currently held by the 1/4 Ranch Inc, for 7 1/2 days, and to irrigate the lands currently held by Theresa McElhirmy, for 7 1/2 days. Said holder shall be able to use his water during the 15 days he is in rotation on whatever adjudicated lands as he deems appropriate.

All other provisions of this Agreement shall remain in effect in the event that the adjudicated lands held by Theresa McElhirmy and the 1/4 Ranch Inc. are transferred to one person or entity, except that the right to irrigate first as directed in Section I, sub-section 2 of this Agreement shall be modified to the extent that the South Circle Estates Improvement and Service District shall have first right to begin irrigating on odd numbered years and the holder of the aforesaid combined lands shall have first right to begin irrigating on even numbered years.

SECTION II. REGULATION OF WELL

Regulation of the Well will be done by the Water Master, who shall be appointed annually on or before the 1st day of April of each irrigation season. The Water Master shall be appointed with a two-thirds (2/3) vote of the original Parties to this Agreement, or their heirs and assigns. When appointing a Water Master, each Party, and its respective heirs and/or assigns, shall have only one vote, regardless of the number of individuals that comprise an original Party to this Agreement, or its heirs and assigns. The Water Master must be an owner of adjudicated lands served by the Well.

In the event that the adjudicated lands held by Theresa McElhirmy and the 1/4 Ranch Inc. (as original Parties to this Agreement) are transferred so that one person or entity has complete ownership of said lands, then such holder shall have only one vote -- not two for purposes of appointing a Water Master. In such event, the Water Master shall be appointed with an unanimous vote.

When the Water Master makes adjustment to the Well, he is to inform the Parties in advance, when possible, and in all other cases, as soon as possible. It is the Parties intent that the Water Master keep the Parties to this Agreement informed so as to prevent all disputes and complications that may arise due to mis-communication.

Should there be a need to seek outside help to resolve a damaging or dangerous situation regarding the operation of the Well, a professional geotechnical expert will be
engaged to advise and/or assist the Parties with eliminating said situation.

**SECTION III. DISSOLUTION OF THIS AGREEMENT**

If this rotation agreement is found to be unworkable by the State Board of Control it shall be dissolved by Court Order.

If the Well is enhanced so that production is great enough to eliminate the need for this Agreement, then this Agreement shall be dissolved by a written agreement signed by the Parties hereto, their heirs and/or assigns, and approved by the State Board of Control.

**SECTION IV. ASSESSMENTS**

1. Generally

The Parties agree to be assessed for irrigation use at a rate of $6.66 per acre. This assessment is to be applied to all acreage served by the Well that has an adjudicated water right. Currently, there are adjudicated 141.9 adjudicated acres being served by the Well. Water assessments to be paid under this agreement shall begin with the 1996 irrigation season. Any assessments that may have been levied prior to January 1, 1996 are not subject to the terms and conditions of this agreement.

2. Notice

Assessments will be made each year prior to the start of the irrigation season and shall be mailed on or before the first day of February of the year in which the assessment is being made. The assessments shall be due on or before the first day of March of the year in which the assessment is made.

3. Late Payment - Interest and Penalty

Interest, at the rate of 1.5% per month, will be charged on all overdue assessments, with the interest starting to accrue on the second day of March of the year that the assessment is due.

If any person or entity subject to an assessment fails to pay the assessment by the first day of May of the year in which the assessment is due, then that person or entity shall be denied irrigation water by the Beth No. 1 Well Water Users. Said water shall be denied until the delinquent assessment, plus interest, is paid in full.

4. Accounting

Monies collected from the assessments, as of January 1, 1996, along with any
from this account shall require the signatures of two of the three parties that comprise the
Beth No. 1 Well Water Users. The signatories on the account shall consist of one
representative from each of the parties that comprise the Beth No. 1 Well Water Users.

An annual accounting of revenues and expenditures shall be provided to each person
or entity each year who is subject to an assessment. This annual accounting shall
accompany the annual assessment notice, if feasible. If it is not feasible to mail the
accounting with the assessment, then a notice shall accompany the assessment, explaining
where a copy of an annual accounting may be viewed and at which times it is available.

Assessments shall continue as described above until such time that the balance of
the funds in the Beth No. 1 Well users' checking account reaches the sum of $10,000.00,
at which time the assessments shall cease until the balance of said account drops below the
sum of $8,500.00.

5. Use of Monies

Monies collected from assessments shall be used, exclusively, for the maintenance
of the Well and appurtenant fixtures and improvements extending from the well along the
lines to and including the first valve on each main line, and the well house itself. These
monies may also be used for the enhancement of the Well's production.

All of the parties to this Agreement must be notified in advance of any maintenance
or enhancement efforts, except in emergency situations in which case notice shall be given
as soon as practical.

SECTION V. FILING WITH STATE BOARD OF CONTROL

The parties agree that this agreement will be filed with the State Board of Control.
Sections I through III of this agreement shall be enforced by the State Board of Control;
however, Section IV shall not be enforced by the State Board of Control, and must be
enforced by the Parties through the use of private action.

SECTION VI. FILING WITH COUNTY CLERK

This Agreement shall be filed with the Washable County Clerk, and is to be
included in the chain of title to all real property affected.

SECTION VII. NUMBER OF COPIES

This Agreement is executed by the parties in quadruplicate. Each copy shall have
the same force and effect as the original.
SECTION VIII. THIS DOCUMENT IS THE ENTIRE AGREEMENT

This document embodies the whole agreement of the parties concerning assessments and water rotation. There are no promises, terms, conditions or obligations other than those contained herein. This Agreement shall supersede all previous communications, representations or agreements, either verbal or written between the parties with respect to water rotation for the Well.

This document shall inure to the benefit of and shall bind the parties hereto and their Heirs and/or assigns.

Jay Lynham
1/4 Ranch, Inc.
7-19-96
Joy Lynham, Attorney in Fact for
Date
Robert Woods, President of the 1/4 Ranch, Inc.

Jay Lynham
1/4 Ranch, Inc.
7-19-96
Date
Secretary/Treasurer of the 1/4 Ranch, Inc.

Teresa M. McMinn
1/4 Ranch, Inc.
7-18-96
Date
César de la Mora
Mayor, PIC
1/4 Ranch, Inc.

James Mayer
South Circle Estates Improvement
1/10/96
Date
and Service District

Alan Fuller
South Circle Estates Improvement
1/10/96
Date
and Service District

Katherine A. Vlem
South Circle Estates Improvement
1/10/96
Date
and Service District

6
BYLAWS OF SOUTH CIRCLE ESTATES IMPROVEMENT AND SERVICE DISTRICT
(Water and Sewer District)
September 1, 1987

A. The above Water and Sewer District will abide to the best of their ability and knowledge by all the laws concerning Water and Sewer Districts of the State of Wyoming.

B. The Officers of the above Water and Sewer District will abide to the best of their ability and knowledge by all the laws concerning Officers of Water and Sewer Districts in the State of Wyoming.

C. Rules and Regulations set by the Officers of the above Water and Sewer District for the above Water and Sewer District are the following:

1) There will be no more lines other than existing as of this date (September 1, 1987) from the Water and Sewer District Well (Beth No 1.)

2) No water user will have more than the existing hookup(s) for each lot off of or from the main line(s) that exist as this date, (September 1, 1987).

3) Irrigation by sprinklers only. No open lines for irrigation purposes.

4) Each water right user will only use one hydrant at a time for irrigation.

5) Maximum size sprinkler head nozzles of 5/32 will be used. Sets are to be a minimum of 60 feet apart at each move if shape and size of lot will accommodate the distance. Sets will be moved once in every 24 hour period.

6) Each water right owner will be responsible financially in proportion to the amount of water right for all expenses accrued in connection with the Water District. By State Statute.

7) Maintenance: Any lines within a lot owners boundaries that are not part of the Main Lines of Water District will be maintained by the water right owner.

8) Waste Water: Will be controlled by the individual water right owner for each user's property and they will be responsible financially for any damages incurred by their individual waste water.
South Circle Estates Improvement and Service District

9) Fee: $5.00 per month for each domestic hookup and an annual fee to be assessed to the users of irrigation water based upon the water right adjudicated or under permit to each property owner. A maximum amount will be fixed annually by the members at an annual meeting. A checking account will be maintained by the Treasurer of the Water and Sewer District. These fees will be paid by the 10th of each month starting October 1, 1987 to the Water and Sewer District Treasurer. This account will have a signature card signed by all three Officers of the District and will require two signatures for all check payments.

10) Water Master of the above will be appointed by Water and Sewer District Officers for a period to be determined by the Officers of said Water and Sewer District and will enforce the listed rules and regulations to the best of his/her knowledge the laws concerning Water and Sewer Districts of the State of Wyoming. There will be an Assistant Water Master appointed by the Officers to be available when the Water Master is unavailable. His/her duties will be the same as the Water Master.

11) Water District Officers have the authority to:
   a. Schedule irrigating times.
   b. Authorize the appointed Water Master and Assistant to regulate the well. No one else will have the authority or permission to regulate the well except in case of an emergency. The Water District Officers and/or the appointed Water Master and/or Assistant will be notified as soon as possible after any other person(s) have turned the well up or down or off for any reason.

12) The Well and (2) Main Lines in utility easements will be maintained by Water and Sewer District according to listed rules and regulations contained herein.

13) The Fire Hydrant adaptor will be put in a location accessible to the Fire Department.

14) A minimum of two (2) gallons per minute per household for domestic use will be guaranteed over and above any agriculture use.

15) There will be no padlocks on any of the hydrants.

11-13-87
**THE STATE OF WYOMING**

**Certificate of Appropriation of Ground Water**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PROOF NO.</th>
<th>W.</th>
<th>D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificate Record No. U.W.</td>
<td>690</td>
<td>5</td>
<td>166</td>
</tr>
<tr>
<td>Water Division No.</td>
<td>3</td>
<td>District No.</td>
<td>6</td>
</tr>
</tbody>
</table>

**AMENDED**

WHEREAS, Tensleep Cattle Company has presented to the Board of Control of the State of Wyoming proof of the appropriation of ground water from the 1st No. 1 well located in the Tract 85G of Section 88 W., Resurvey, under Permit No. U.W. 7136, for irrigation of the lands herein described, lying and being in Washakie County, Wyoming, under Interlocutory Decree of the District Court.

NOW KNOW YE, That the State Board of Control, under the provisions of the Statutes of Wyoming, has, by an order duly made and entered on the 28th day of February, A. D. 1974, in Order Record No. __________ Page _______ determined and established the priority and amount of such appropriation as follows:

**Certificate Record No. U.W. 690**

**Name of Appropriator:** Tensleep Cattle Company

**Address:** Tensleep, Wyoming 82442, Wyoming

**Date of Appropriation:** October 1, 1970

**Total Acreage:** One hundred fifty (150) acres

**Amount of Appropriation:** 575 gallons per minute; Description of land to be irrigated and for which this appropriation is determined and established:

<table>
<thead>
<tr>
<th>TWF Range</th>
<th>Sec.</th>
<th>NE1/4</th>
<th>NW1/4</th>
<th>SW1/4</th>
<th>SE1/4</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Survey</td>
<td>47N 88W 8</td>
<td>19.7</td>
<td>20.8</td>
<td>22.3</td>
<td>35.4</td>
<td>23.4</td>
</tr>
</tbody>
</table>

This Amended Certificate is issued in lieu of the original certificate of appropriation of record in certificate record U.W. 2, page 192, and amends the order of adjudication of record in order record 20, page 485 proof no. U.W. 690.

The right to water hereby confirmed and established is limited to irrigation of the lands herein described, lying and being in Washakie County, Wyoming, under Interlocutory Decree of the District Court, First Judicial District dated February 28, 1974, See Interlocutory Decree Book 1 page 392.

For elimination and enhancement of use of a person to store and convey water, see section 10-1-1 of the Wyoming Groundwater Act.

IN TESTIMONY WHEREOF, I, Gordon W. Fassett, President of the State Board of Control, have hereunto set my hand this 28th day of July, A. D. 1974 and caused the seal of said Board to be hereunto affixed.

**Attest:**

**Secretary:**

**Adjudication Officer**

President
THE STATE OF WYOMING
Certificate of Appropriation of Ground Water

WHEREAS, Teresa M. McElhinny has presented to the Board of Control of the State of Wyoming proof of the appropriation of ground water from the Bath No. 1 Well

T. 47 N., R. 88 W., Resurvey, under Permit No. U.W. 7134, for

NOW KNOW YE, that the State Board of Control, under the provisions of the Statutes of Wyoming, has, by an Interlocutory Decree of the District Court

Name of Appropriator: Teresa M. McElhinny

Date of Appropriation (Priority): October 1, 1970

Amount of Appropriation: 6.0 gallons per minute.

DESCRIPTION OF LAND FOR WHICH THIS APPROPRIATION IS DETERMINED AND ESTABLISHED

<table>
<thead>
<tr>
<th>TWP</th>
<th>RANGE</th>
<th>SEC</th>
<th>NE ¼</th>
<th>NW ¼</th>
<th>SW ¼</th>
<th>SE ¼</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>NE¼</td>
<td>NW¼</td>
<td>SW¼</td>
<td>SE¼</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resurvey</td>
<td>47 N.</td>
<td>88 W.</td>
<td>Tract 85-F:</td>
<td>1- single family dwelling</td>
<td>2 - stock tanks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NE¼</td>
<td>NW¼</td>
<td>SW¼</td>
<td>SE¼</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resurvey</td>
<td>47 N.</td>
<td>88 W.</td>
<td>Tract 85-F:</td>
<td>1- single family dwelling</td>
<td>2 - stock tanks</td>
<td></td>
</tr>
</tbody>
</table>

The right to water hereby confirmed and established is limited to stock and domestic purposes and the use is restricted to the place where acquired and to the purpose for which acquired and shall not exceed the amount of the appropriation stated above. The total water withdrawn in any one year is limited to the amount necessary for the beneficial use established by this appropriation.

IN TESTIMONY WHEREOF, I, GORDON W. FASSETT, President of the State Board of Control, have hereunto set my hand this 8th day of July, A.D. 1996, and caused the seal of said Board to be hereunto affixed.

Attest: Allen Cunningham, Ex-officio Secretary

President.
CONSUMPTIVE USE REPORT

Wells for runoff irrigation to be exchanged for domestic and stock use.

Determine the consumptive use requirement (CU), which is the water use of a specified unit-summer crop under optimum growing conditions.

References: Consumptive Use and Consumptive Irrigation Revisions, Wyoming, October 1994, by

T. W. H. Publication 99-91

See definitions, pages 1 and 2.

Table 9, Page 48

T. W. H.

Wells: Henry, Inox CU = 36.1 inches/year

Volume = 8.1 x 32.0 = 8.1 x 2.08 = 3,839,579.876 gallons/year

This is all consumptive use, with no return flow. Precipitation would produce water losses.

water available for domestic and stock use =

3,839,576 / 1440 = 5.548 gallons per minute, or 82.528 gallons per hour

client says this will be sufficient, because the four stock tanks will have automatic shut-off valves, and the four horses will be limited to water consumption only.

Member American Consulting Engineers Council and
Wyoming Association of Consulting Engineers and Surveyors
Supporting Excellence in Engineering and Surveying
STATE OF WYOMING

COUNTY OF WASHAKIE

IN THE DISTRICT COURT

FIFTH JUDICIAL DISTRICT

CIVIL NO. 4993-86-0012

IN RE THE GENERAL APPLIATION
OF ALL RIGHTS TO USE WATER IN
THE BIG HORN RIVER SYSTEM AND
ALL OTHER SOURCES, STATE OF
WYOMING:

PETITION FOR CHANGE OF USE FROM
IRRIGATION TO DOMESTIC AND
STOCK OF A PORTION OF THE
TENSLAEP CATTLE COMPANY
APPROPRIATION, PERMIT NO. U.W.
7114, THE BETH NO. 2 WALL, WITH
A TRIALITY OF OCTOBER 1, 1970.

I.D. 1, P. 157; C.R. U.W. 5, P. 166; PROBY NO. U.W. 650

INTERLOCUTORY DEED

The above entitled matter came on to be heard on the report of
the Wyoming State Board of Control pursuant to the Order of the
Court dated January 21, 1986. The Court being duly advised, it is
hereby ORDERED, ADJOURNED, and DECLARED:

1. THAT the said report is confirmed in all respects and
the findings of fact and conclusions of the Board of Control are
hereby adopted as the findings of fact and conclusions of the
Court.

2. THAT the petition filed herein be, and the same is
GRANTED in part and DENIED in part.

3. THAT the petitioner be allowed a change of use of a
portion of the Tenslap Cattle Company Appropriation, Permit No.
U.W. 7114, the Beth No. 1 wall, by detaching water from the
following described land:

Township 47 North, Range 68 West, Resurvey
Tract 85-2
8.4 acres
Total
8.4 acres (31.0 g.p.m.)

4. THAT the 8.4 acres are, through this action, eliminated
from the irrigation portion of this water right permanently, and
may not be irrigated in the future, and that the certificate of
appropriation for Permit No. U.W. 7114 be endorsed to reflect the
same.

5. THAT this water right, as detached, be changed from
seasonal irrigation to year-round stock and domestic purposes
specifically for two horses and four stock watering tanks at a
maximum rate of 5.0 g.p.m., but to exceed 3.0 acre-feet in any one
year.
4. THAT the water right, as changed, is to be used in the following location:

Township 47 North, Range 28 West, Resurvey
Tract 85-E
Tract 85-F

7. THAT if the construction of the McElhinny's stock and domestic water line is such that more than 6.0 g.p.m. or 3.0 acre-feet per year is being delivered to stock and domestic use, the superintendent of Water Division Number Three shall cause to be installed, an in-line totalizing flow meter for measurement and subsequent line restrictions to enforce the requirements of the decree.

8. THAT a rotation schedule of water use which includes all users of irrigation water from the well is hereby ordered. As the rotation schedule which would be implemented based on Wyoming law (as described in Paragraph No. 12 of Findings of Fact) is different from the one proposed by the users themselves (as described in Paragraph No. 13 of Findings of Fact), all three entities using the well are hereby ordered to provide the superintendent of Water Division No. 111, within two weeks of receipt of this decree, a signed rotation agreement reflecting the rotation proposed in Paragraph No. 14 of Findings of Fact. Failure to do so may result in the Board implementing the legal rotation based on relative number of water right acres described in Paragraph Nos. 11 and 12 of Findings of Fact.

9. THAT no sharing of rotation periods is authorized.

10. THAT failure to adhere to the scheduled rotation by any party is an unauthorized use of water, a misdemeanor, which may result in penalties pursuant to W.S. 41-3-614.

11. THAT float valves are to be installed on each one of the stock tanks to keep the water right from being used in excess of the appropriated amount.

12. THAT a certificate of appropriation be issued to the petitioner for stock purposes at four (4) stock tanks and domestic purposes at two (2) single-family dwellings at a rate of six (6) gallons per minute and not to exceed 3.0 acre-feet in any one year. The points of use for these uses are described as follows:

Township 47 North, Range 28 West, Resurvey
Tract 85-E One (1) Single-family dwelling
Two (2) Stock tanks
Tract 85-F One (1) Single-family dwelling
Two (2) Stock tanks

Dated this ___ day of ___ , 1974.

[Signature]

JUDG
MEMORANDUM

FROM: JISA LINDEMANN, ADMINISTRATOR, GROUND WATER DIVISION
DATE: DECEMBER 15, 2006
SUBJECT: APPROVAL OF NEW PERMITS FOR MUNICIPALITIES, SERVICE AND IMPROVEMENT DISTRICTS, SUBDIVISIONS, AND OTHER LARGE WATER USERS, AND SERVICE AREA UPDATES

Approval of New Permits

The State Engineer has approved a large number of ground water rights that are subject to compliance with certain conditions and limitations, and have normally been attached to water rights that will appropriate large amounts of ground water in high ground water use areas. These conditions and limitations typically require the appropriator to provide data on their water use, and to collect other ground water level data that is used by the State Engineer to quantify the impact to the ground water resource caused by the exercise of these ground water rights. While it is imperative that these appropriators provide the required information if they expect to continue to enjoy uninterrupted use of their ground water rights, it has often been difficult to compel the holders of these ground water rights to provide the required information to remain in compliance.

As the State Engineer has the responsibility to manage the ground water resource for all of the users, it does not seem prudent to continue to issue new ground water rights to those appropriators who have elected to not provide the information that the State Engineer has required, or are otherwise out of compliance with their current ground water rights. Therefore, it is the intent of the Ground Water Division to forego approval of new ground water rights for Municipalities, Service and Improvement Districts, and other large ground water users that have the greatest impact on the ground water resource, until such time as these entities come into compliance with the requirements of any ground water right(s) which they currently hold for the same use or area of use.

Prior to the submission of a new application for any of the types of water use referenced above for approval, the technician responsible for processing the application should determine, through consultation with the Permit Compliance Coordinator, whether the potential ground water user is in compliance regarding any ground water right(s) that they currently hold. If the ground water user is in compliance, the application should be submitted for approval. If the ground water user is not in compliance, the Permit
Memorandum
Page 2

Compliance Coordinator should notify the ground water user of any deficiencies through written correspondence, and the application should be placed in a pending status until such time as any subject associated ground water right(s) are brought into compliance. Common reasons why these types of ground water right(s) could fail to be within compliance include, but are not limited to:

1. Failure to regularly submit data related to overall ground water use and/or ground water levels.

2. Failure to submit the Statement of Completion document within 30 days of setting the well pump.

3. Failure to submit the Map to Accompany Proof of Appropriation and Beneficial Use of Ground Water within 180 days of submission of the Proof of Appropriation and Beneficial Use of Ground Water Part I form.

4. Failure to submit an updated Service Area map for those Municipalities and Service and Improvement Districts that have expanded their Service Areas since the last permit action with this office.

Service Area Updates

For the purposes of this memorandum, the term Service and Improvement District is defined as any political subdivision with taxing and bonding authority, a right of which is the ability to levy taxes and issue bonds for the construction and operation of community water systems.

The Service Areas supplied under water rights for Municipalities and Service and Improvement Districts tend to expand over time, and many older water rights, whether adjudicated or unadjudicated, may not authorize delivery of water to portions of the Service Area currently supplied by a Municipal or Service and Improvement District water system.

The current policy of the State Engineer is to not require enlargements of any existing water right(s) to recognize the authority of the Municipality or Service and Improvement District to serve lands outside of their previously recognized Service Area. The authority of these entities to supply an expanded Service Area with all of their pertinent water sources will be recognized upon the submission of a proper map showing the new Service Area. This map will need to be Certified by a Professional Engineer or Professional Land Surveyor licensed to practice in the State of Wyoming and should include all of the sources of water supplying the Service Area, and a listing of the pertinent water right(s), including both adjudicated and unadjudicated surface and ground water rights, so that all of the water right records can be updated upon the submission of the new map.
Memorandum
Page 3

The Certificates of Appropriation for adjudicated water rights will not be modified unless a proper petition to the Board of Control is submitted that requests that the Certificates of Appropriation be updated to recognize the authority to serve a larger Service Area under these adjudicated water rights. When a new ground water application is received for a water delivery system where all of the water rights are adjudicated, the application should be submitted for approval if all of the other aspects of the water rights serving the system are in compliance. When the Map to Accompany Proof of Appropriation and Beneficial Use of Ground Water is received for the latest ground water right, an addendum will be attached to the permits for the adjudicated water rights which recognizes the authority to serve the Service Area shown on the new map, and shall include a reference to where the new map showing the new Service Area is located.

In those instances where there are unadjudicated ground water rights supplying a water delivery system and a new Map to Accompany Proof of Appropriation and Beneficial Use of Ground Water is received, the Service Area shown on the new map will be recognized to be authorized to be supplied by the unadjudicated ground water rights. An addendum will be attached to the permits for the unadjudicated ground water rights which recognizes the authority to serve the Service Area shown on the new map, and shall include a reference to where the new map showing the new Service Area is located. The new Service Area shall be recognized and shown on the Proof of Appropriation and Beneficial Use of Ground Water Part III form and the Certificate of Appropriation at the time of adjudication of the unadjudicated ground water rights.
improved that she is entitled to a separate, 10-acre tract of land.

The property is described as follows: a 10-acre tract located on the north side of the county line, west of the road, and south of the railroad.

The petitioner states that she is entitled to this land as a result of a legal proceeding. She claims that the boundary lines of the land are clearly marked and that she has been using the land for agricultural purposes for many years.

The respondent argues that the petitioner is not entitled to the land and that it belongs to the state. The respondent cites a previous court case where similar claims were made and denied.

The court will hear evidence on this matter and render a decision at a later date.

[End of letter]

---
that the approximate annual transferable consumptive use should not exceed 1.0 acre-feet in any one year. However, once changed, this volume should be adequate to allow the petitioners sufficient water to supply the houses and stock tanks.

10. THAT testimony was uncontroverted that certain users from the well system have run out of water in the past because the well cannot supply all irrigation, stock, and domestic demands if all these uses are made at the same time. Testimony was also uncontroverted and the Board of Control's file in this matter indicated that a rotation agreement is necessary so that in sharing the water for irrigation purposes, the pressure and volume from the system will not drop off to a point where some water users will not be getting their legal proportionate share of stock, domestic, and irrigation water from the Bath No. 1 Well.

11. THAT by elimination of the 5.1 acres, this petition changes the relative percentages of ownership by the three entities involved in the well to the following permits, irrigated acreage.

| South Circle Estates | 49.54% | (74.7 acres) |
| Teresa McElhinny    | 25.79% | (36.6 acres) |
| Roberta Wood        | 24.66% | (35.0 acres) |
| Total               | 100%   | 146.3 acres |

12. In this case, pursuant to Wyoming Statutes 41-3-612 and the Board of Control's regulations and based on a 30-day rotation schedule and the relative number of adjudicated water rights from Paragraph No. 12 of Findings of Fact above, the proper rotation is:

| South Circle Estates | 49.54% x 30 days = 15.00 days |
| Teresa McElhinny    | 25.79% x 30 days = 7.73 days |
| Roberta Wood        | 24.66% x 30 days = 7.25 days |

13. THAT presentation of evidence at the hearing and a portion of South Circle Estates Homeowner's Association Exhibit 1 documented that an acceptable rotation scheme is the following:

| South Circle Estates | 10 days |
| Teresa McElhinny    | 10 days |
| Roberta Wood        | 10 days |

14. THAT the petitioner is the owner of the lands for which the water right is being detached as evidenced by a Certificate of Ownership from the County Clerk of Washakie County, Wyoming.

15. THAT the granting of this petition will not cause injury to any other appropriators.

CONCLUSIONS OF LAW

1. To the extent any of the foregoing Findings of Fact constitute Conclusions of Law, they are hereby incorporated herein.

2. The Wyoming State Board of Control has jurisdiction to consider this matter pursuant to Wyoming Statutes 1-7-106 and 41-3-114, W.S. 1977.

3. Upon the initiation of proper proceedings, a holder or holder of a water right may change the use of it, or a portion of it, at any time, as long as no other water rights are injured thereby.
4. Due and legal notice of the time and the place of the hearing was given in all respects, as required by law.

5. Wyoming Statute 41-3-617 and Board of Control regulations require that legal water right rotation schedules be based on the relative number of permitted water right acres irrigated by each party to the rotation.

6. The Board of Control has no jurisdiction over various issues which were presented at the hearing, i.e. enforcement of subdivision contracts and covenants, non-payment of alleged proportionate assessments, claims to the wellhead, and whether or not certain parties were legally bound to be members of water service organizations in the area.

RECOMMENDED INTERLOCUTORY DECREE

The above-entitled matter came on to be heard on the report of the Wyoming State Board of Control pursuant to the Order of the Court dated January 22, 1986. The Court having fully advised, it is hereby ORDERED, ADJUDGED, AND DECREE:

1. THAT this said report is confirmed in all respects and the findings of Fact and Conclusions of the Board of Control are hereby adopted as the findings of Fact and Conclusions of the Court.

2. THAT the petition filed herein be, and the same is GRANTED in part and DENIED in part.

3. THAT the petitioner be allowed a change of use of a portion of the Tensleep Cattle Company appropriation, Permit No. U.W. 7114, the Beth No. 1 Well, by detaching water from the following described land:

   Township 47 North, Range 89 West, Resurvey
   Tract 85-F 8.1 acres
   Total 8.1 acres (21.0 g.p.m.)

4. THAT the 8.1 acres are, through this action, eliminated from the irrigation portion of this water right permanently, and may not be irrigated in the future, and that the certificate of appropriation for Permit No. U.W. 7114 be endorsed to reflect the same.

5. THAT this water right, as detached, be changed from seasonal irrigation to year-round stock and domestic purposes specifically for two horses and four stock watering tanks at a maximum rate of 6.0 g.p.m. not to exceed 1.0 acre-feet in any one year.

6. THAT the water right, as changed, is to be used in the following location:

   Township 47 North, Range 89 West, Resurvey
   Tract 85-E
   Tract 85-F

7. THAT if the construction of the Miculina's stock and domestic water line is such that more than 6.0 g.p.m. or 1.0 acre-foot per year is being delivered to stock and domestic use, the superintendent of Water Division Number Three shall cause to be installed an in line totalizing flow meter for measurement and subsequent line restrictions to enforce the requirements of the decree.
3. THAT a rotation schedule of water use which includes all
users of irrigation water from the well is hereby ordered. As the
rotation schedule which would be implemented based on Wyoming law
(as described in Paragraph No. 2 of Findings of Fact; is different
from the one proposed by the users themselves as described in
Paragraph No. 13 of Findings of Fact), all those parties using the
well are hereby ordered to provide the superintendent of Water
Division No. III, within two weeks of receipt of this decree, a
signed rotation agreement reflecting the rotation proposed in
Paragraph No. 13 of Findings of Fact. Failure to do so may result
in the Board implementing the legal rotation based on relative
number of water right acres described in Paragraph Nos. 11 and 12
of Findings of Fact.

9. THAT no sharing of rotation periods is authorized.

10. THAT failure to adhere to the scheduled rotation by any
party is an unexcused use of water, a misdemeanor, which may
result in penalties pursuant to W.S. 41-1-114.

11. THAT float valves are to be installed on each one of the
stock tanks to keep the water right from being used in excess of
the appropriated amount.

12. THAT a certificate of appropriation be issued to the
petitioner for stock purposes at four (4) stock tanks and domestic
purposes at two (2) single-family dwellings at a rate of six (6)
gallons per minute and not to exceed 1.0 acre-foot in any one year.
The points of use for these uses are described as follows:

   Township 17 North, Range 65 West, Re survey
   Tract 82 F One (1) single-family dwelling
     Two (2) stock tanks
   Tract 85 F One (1) single-family dwelling
     Two (2) stock tanks

This report, including Findings of Fact, Conclusions of Law,
and recommended interlocutory decree is respectfully submitted this
28th day of __________, 1974.

[Signature]
GORDON W. FARNELL, PRESIDENT
WYOMING STATE BOARD OF CONTROL

PETITION:

[Signature]
FRANCIS A. CANK, EX-OFFICIO SECRETARY
WYOMING STATE BOARD OF CONTROL
Questions from the South Circle Estates Subdivision:

Beth No. 1 Well Water Rotation Agreement

1. What is the procedure to make changes to this agreement? The subdivision would like to have considered a slight modification that would equalize usage during the rotation period, therefore eliminating the shortages that appear when the subdivision is irrigating.

Since the rotation agreement was accepted by the Board of Control and entered into the Report of the Board of Control as part of the decision and ultimately becoming of record in Judge Hartman's Interlocutory Decree regarding the petition of Theresa McKinnon III et al., the only way to alter that agreement would be to petition the State Board of Control to Modify the Order. All three parties will need to be involved either through being co-petitioners or through verified letters of consent to the petition.

2. This question is regarding Section 1. Rotation and Subsection 2. Season

The schedule is clear from May 1 through October 1. The agreement outlines what is required for any of the irrigators to irrigate that prior to May 1. However, this period has been referred to as the "free-for-all" period, in which all irrigators have the opportunity to irrigate prior to the start of the rotation period. Likewise, the same assumption has existed after October 1, as the agreement is silent on how this time period should be handled. Obviously, it does not work if everyone chooses to irrigate at the same time.

The Pre-May 1 irrigation is specifically outlined in the agreement and shall be enforced. "If the first Party to begin irrigating is not the Party who has the right to irrigate first as described in the preceding paragraph, then said Party must obtain a written waiver from those Parties ahead of them who have a superior right to begin irrigating for the season in question." Under the hard line interpretation of the agreement this period of Pre-May 1 irrigation could conceivably be extended to the first of October since that is the beginning of the Water Year as recognized by the State of Wyoming. If a Party wants to irrigate beginning October 1, then they would have to follow the process outlined in paragraph 2 of the agreement as stated above. This solution requires no amendment of the existing agreement, stays consistent with the Agreement and the intent of the Agreement. There is no mention anywhere in the Agreement of a "free-for-all" period. If any amendment of the existing agreement is to occur it should probably be considered to address this time period by just continuing the rotation through the end of September.
The problem of planning became more real or what we call the interconnection of the performance and the information into the planning process. This is because the information system needs to be developed and maintained, and the information must be used in the planning process. The information system needs to be developed and maintained. If an information system is not developed and maintained, the planning process will not work.

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Decree could not be located in the files of the State Engineer's Office, although it may or may not be found in the records of the Water Division III Superintendent. Review of the Order at FOF9, indicates that in the Board deliberations it was decided that the requested 16.0 g.p.m. exceeded the historic consumptive use and that the 16.0 g.p.m. should be cut back to approximately 6.0 g.p.m. and that the approximate annual transferable consumptive use should not exceed 30 acre-feet in any one year. This works out to about 118 days at 6 g.p.m.

4. During the month of October, 609 Consulting installed a valve which allows us to measure the well usage at any given time. Stress testing the well indicated that the well produces approximately 400 gallons per minute, which is well below the 675 adjudicated gallons. Would it be possible to add a pump to enhance the pressures during the peak irrigating times?

Yes this is possible. The well is adjudicated for 675 g.p.m. as long as that is not exceeded. If it is anticipated that the 675 g.p.m. threshold may be exceeded it is important to file an enlargement application with the State Engineer and receive an enlargement permit, prior to commencing the construction activities. This would be the most advisable route to take.

**Water District**

5. Were all Beth No. 1 Well users originally members of the South Circle Improvement District? When did the non-subdivision members leave the district?

It doesn't appear that anyone outside of the subdivision lots 1-18 were included in the improvement district but we have not found any documentation regarding this matter.

**Questions from 609 and Hinckley Consulting:**

**Barry Ven"s Questions:**

6. Who owns the well, the rights, the building and the piping and the land it sits on? This needs to be clear if state or federal funding is going to be used for improvements. I am not sure funding is available if it is privately or jointly owned.

Well ownership – A document entitled “Agreement For Water” (copy enclosed) dated July 2, 1980 between Ten Sleep Cattle Co. and the Home Owners Association of the First Addition to South Circle Estate indicates that Ten Sleep Cattle Co. owned the well at that time. There could be any number of subsequent documents wherein a transfer of ownership of the well and associated water delivery facilities has occurred, however, if such documents exist, they could not be located in the files of the State Engineer’s Office.

7. What defines precedence for domestic versus irrigation use, is it the agreement? or is their state law that gives precedence. We may recommend flow and pressure controls in
the well discharge piping to ensure there is always 20 psi in the domestic system thru all operating conditions.

Water use preference - From a State water right perspective, the priority date of the water right, when multiple water rights divert from the same source, governs the preference. The earlier water right has preference, regardless of use type. The water right allowing irrigation of approximately 142 acres of land from this well has a 1970 priority date, while the earliest water right allowing water to serve the majority of the homes has a 1981 priority date. There are also two homes and four stock tanks located north of the subdivision authorized to be supplied water from the well under the 1970 priority date. In 1996, a petition was submitted to the Wyoming State Board of Control by Teresa McElhinney for a change in use from irrigation use to domestic and stock use. This petition was later approved and recorded as Interlocutory Decree Book 6, Pages 199-205 (copy enclosed). The approval of this request allows an instantaneous rate of six gallons per minute to be supplied year round in a total amount not to exceed three acre-feet per year from this well to supply two single family dwellings and four stock watering tanks located on lands owned by Teresa McElhinney in exchange for the discontinuation of the irrigation of 8.1 acres of her land supplied from this well. A copy of a map showing the locations of the dwellings and stock tanks to be served, as well as the lands which are no longer irrigated is enclosed.

8. What might the ramifications be if Ben recommends installing a pump in the well to improve its capacity? Just need the ShO rep to ensure that it can be done, and if there are any risks.

Pump installation ramifications - The only ramification foreseen is if the pump installed is capable of delivering more than the adjudicated flow rate of 675 gallons per minute, in which case a new water right that would allow the additional instantaneous production rate from the well would need to be obtained before the additional instantaneous production rate could be produced and used.

Bern Hinckley's questions:
9. A useful product for our Level I study would be an appendix of all the relevant paperwork for South Circle, including:

- ShO permits, including enlargements, associated maps, adjudication records, etc., for the well. In preparation for the proposal, I copied what I could find quickly in the SEO files, but we should compare with what Loren has.

Not a whole lot more is in my files except materials associated with the petition of McElhinney and the reams of contacts regarding problems and administration work done over the years.
McElhenny petition process in 1996. It is unknown whether the current Doherty property could be the historic Woods property which was outside the subdivision and allowed to be served by water from the well under the existing water rights.

14. Has the state officially approved the Subdivision-Doherty-Smith agreement? If so, is their official copy the same as is being used by the users?

The official copy of the Agreement is signed by Jay Lyman, Teresa McElhenny, James Mayer, Alan Futter and Katherine Vliem on July 18 and 19 of 1996.

15 Has the state officially approved or been otherwise privy to any intra-subdivision use agreements?

Intra-Subdivision agreements - The only water use agreements which the State Engineer's Office is aware of are the agreement specified in "Agreement for Water and the 1996 agreement addressing rotation of the irrigation schedule between the Home Owners and two separate irrigators. In the latter agreement developed in consultation with the Wyoming State Board of Control, the Home Owners are treated as one distinct group. The Bylaws of the South Circle Estates and Improvement District would seem to indicate that the Officers of the District have the right to schedule irrigation rotations within the subdivision during their term within the broader agreement.

16 The Statement of Completion for the Beth No. 1 well states it flowed 2500 g.p.m. with a shut-in pressure of 280 psi. The well has been adjudicated for 675 g.p.m. Can SEO supply details of the adjudication measurements? E.g. how was the 675 g.p.m. measured? What time of year? Under what present and immediately preceding use conditions? (Since the well currently produces a shut-in pressure of 240 psi and probably produces a maximum flow around 1,000 g.p.m., it is quite unlikely that it flowed 2,500 g.p.m. at 280 psi.)

Flow measurements of the well - The State Engineer's Office is aware of two flow measurements of the well. The first occurred on August 7, 1974 as part of the adjudication field inspection. The use of the well prior to the inspection is not documented. The flow of the well was measured at 660 gallons per minute (rounded to 675 for purposes of adjudication) using a pivot tube inserted into the first sprinkler head below the center pivot sprinkler system in place at the time, and a manometer system. The second occurred on August 19, 1986 and was witnessed by Mr. Sheldon Shilling of the Homeowners Association. According to our records, the well had been used extensively that dry summer, and immediately prior to the measurement. For the measurement, all of the flow of the well was directed into a 6" diameter discharge pipe on the west side of the well house and the flow through the end of the open pipe was measured using a Hoff type current meter. Two successive measurements of 358 and 351 gallons per minute were taken at this time.
17. Is SEO aware of any other flow measurements? (e.g. Boyd refers to someone
measuring a "maximum discharge" of 300 g.p.m. about 10 years ago.)

Other flow measurements - We have no other recorded measurements done by our
agency.

18. The SEO file correspondence associated with this well includes several discussions of
flooding of land at the discharge point of the subdivision system. Has this issue been
resolved?

Subdivision system overflows - There are several references to complaints received
from adjacent property owners alleging damage caused to their land by overflows
from this water system from the 1980's. Enclosed is a copy of a letter from the
subdivision dated November 22, 1987 indicating that the problem had been
corrected. However, also enclosed is a copy of a letter dated January 13, 1998 from
the Water Division III Superintendent indicating that the problem had occurred
and that the flooding problem must be rectified. There is a second letter dated Feb
23, 1998 to Everett Wyman regarding investigations and information gleaned after
Cooper's letter of Jan. 13. Followed by a response dated March 22, 1998 by Mr.
Wyman with his point of view explained. No further explanations or
 correspondence found.

19. Rumor has it that the Town of Ten Sleep will oppose any additional wells within 1
mile of town. Does SEO recognize any sort of 1-mile authority for Ten Sleep? (This
may simply refer to their planning and zoning authority. If so, does it extend to well
drilling?)

Town of Ten Sleep opposition to additional wells - The State Engineer's office is not
aware of the local requirements of the Town of Ten Sleep government which may
contain ordinances, zoning, EPA Sole Source Aquifer designation, or other
limitations on well drilling within a certain radius of their community, which only
the Town could enforce, nor is the State Engineer's Office aware of the opinion of
the Town government regarding additional wells in the immediate area. The State
Engineer has the authority to issue water right permits to drill wells and
appropriate the water of the State of Wyoming anywhere within the state.
However, there are any number of areas in the state where local controls may limit
the types of activities, including well drilling, that can occur within those localities.

Temporary Filing No. 1 W. 40-5-92. Dead horse well #1, an application submitted
by Lester Daugherty in April of 2007 which has yet to be approved, but not due to
any objection from the Town of Ten Sleep. The application, if approved, would
allow the completion of a well within the Madison Formation for the purposes of
supplying two homes and the irrigation of 35 acres of land. While an exact location
is unknown, it is believed that this potential well would be drilled less than 1/2 mile
east of the Beth No. 1 well.
20. Any general policy at SEO regarding additional development of the artesian aquifers in this area? Does SEO recognize the Ten Sleep, Madison, and Flathead as three distinct aquifers, or as one integrated aquifer? If the former, are multiple-completion wells allowed?

Additional artesian aquifer development in the area. Due to the number of competing users and significant head differences between the Ten Sleep and Madison formations, the State Engineer's Office has not allowed wells to be completed in both of these formations within the same well for the last three decades, although it is understood that the practice was condoned prior to that time, and there are many historic wells that produce water from both formations.

Due primarily to the limited number of users of the formations below the Madison formation, the State Engineer's Office has recently allowed the production of water from the Madison formation and older formations, including the Flathead formation, within a single well.

The conditions of approval of new permits for wells in this general area that are intended to be flowing wells and completed in or below the Ten Sleep formation routinely include a caution that the appropriator should construct the well in a manner such that a properly sized pump can be installed at some time in order to obtain their appropriation, as it is understood that the continued development of these confined aquifers is likely to result in decreasing head pressures over time.

21. Are the water rights for the Beth No. 1 well in good order as far as SEO knows? E.g., any lingering adjudication, proof-of-beneficial-use, or reporting requirement issues we should know about?

Water rights status – There are no reporting requirements associated with these water rights due to the time frame in which they were established, and the water rights are adjudicated and finalized for the activities that were observed when the water rights were last inspected as part of the adjudication process on August 14, 1990. Depending on whether or not the current uses are considered to be within the permits now in place, there may or may not be additional water rights that will need to be obtained to authorize use of the water from the well beyond what the current water rights allow. Any additional permitting may carry with it the need for reporting.

22. Should the local Water Commissioner be included in this meeting?

District 6 Hydrographer, Forest Sentinella will be in attendance to familiarize her with the players and the issues of this matter.
DECLARATION OF PROTECTIVE COVENANTS

SOUTH CIRCLE ESTATES

KNOW ALL MEN BY THESE PRESENTS, THAT

The undersigned, TEN SLEEP CATTLE CO., is the present owner of all the lots and blocks in the South Circle Estates, Washakie County, Wyoming, and does hereby covenant and agree that all of the lots in the said blocks now owned by it are held subject to and with the benefit of all restrictions, conditions, charges and agreements contained in the within Declaration of Covenants, and it does further hereby covenant and agree that any subsequent grantee of any of said lots now owned by it shall be subject to the following covenants and restrictions:

1. DEFINITIONS: The following terms and phrases used in these covenants shall be defined as follows:

(a) "Common Road" shall mean the private roadway within the property which provides access to individual lot lines.

(b) "Common Services" shall mean the roadway maintenance and snow removal services, and the utility line maintenance or repair services for the Common Road and Shared Access Road and the utility lines located in the rights of way of such roads or across the said property.

(c) "Board of Directors" shall mean the board of directors responsible for the administration and enforcement of these covenants, as created in paragraph 4 hereof.

(d) "Development" shall mean any alteration of the natural land surface, and all buildings, structures, or other site improvements placed on the land to accommodate the use of a lot.

(e) "Lot" shall mean any portion of the property as shown on a recorded plat and described as such.

(f) "Owner" shall mean the record owner of a lot, including a contract purchaser, but excluding anyone having interest in a lot as security for the performance of an obligation.

(g) "Principal Residence" shall mean the single family residential structure, constructed on any lot of the property, which is the principal use of such lot, and to which other authorized structures on such lot are accessory.

(h) "Property" shall mean the real property described in the Plat of South Circle Estates.

(i) "Structure" shall mean anything built or placed on the ground.

2. DEVELOPMENT AND USE RESTRICTIONS: All development
and use shall conform to the following requirements:

(a) Authorized Use. Only single family residential use shall be permitted, together with the maintenance and use of domestic livestock as hereinafter set forth.

(b) Prohibited Uses. No commercial, industrial or other non single-family residential use whatsoever shall be permitted, however the premises may be used for a studio, or workshop, for artistic pursuits, recreational and such other endeavors not requiring access to the premises by the general public nor requiring the employment of labor other than the owner. But no other manufacturing or commercial enterprise shall be maintained upon the premises.

(c) Authorized Structures. No building or other structure shall be constructed, placed, or maintained on any lot, except one single family residence, one guest house, garage facilities, and structures incidental to ranch type use.

(d) Construction. No used, prefabricated structures, nor mobile homes shall be permitted for the main residential building. Unless otherwise permitted by the Home Owners Association no guest house, garage, stable or corral facility or other outbuildings shall be prefabricated or constructed from used materials. All construction shall be completed within one year from the commencement date of construction, unless the Home Owners Association approves an extension for good cause, not to exceed six months in length.

(e) Height Limitations, Setbacks, Floor Area Requirements. No building shall be greater than 30 feet in height. Building height shall be measured from existing grade to the highest point of the roof structure, but shall not include chimneys, vents or antennas. All structures shall be set back from all property lines a minimum of 30 feet. The principal residential structure shall have a minimum floor area of 1000 square feet.

(f) Temporary Structures Prohibited. No temporary structures, such as trailers, sheds or other similar buildings shall be permitted on any lot.

(g) Maintenance. Each lot and all improvements thereon shall be maintained in a clean, safe and sightly condition. Boats, tractors, vehicles other than automobiles, campers, whether or not on a truck, snow removal equipment, and garden or maintenance equipment shall be kept at all times, except when in actual use, screened from view. No junk or inoperative cars shall be visually parked on the property. Refuse, garbage and trash shall be kept at all times in a covered container, and any such container shall be kept within an enclosed structure or appropriately screened from view. No lumber, grass, shrub or tree clippings or plant waste, bulk materials or scraps or refuse or
trash shall be kept, stored, or allowed to accumulate on any lot.

(h) Livestock. No livestock shall be kept or maintained on any lot except as provided herein. Cattle and horses are permitted, but no more than two (2) animals per acre as a maximum are allowed. Any animals or livestock permitted to be kept on a lot shall be restrained and controlled at all times so that they do not cause a nuisance to neighboring lot owners.

(i) Signs. No signs or advertising devices shall be erected or maintained on any lot, except signs which either identify the owner or advertise the lot for sale. All such ownership signs shall be of native wood design.

(j) Water Systems. Each residential structure shall be connected to a water supply system, run by the Home Owners Association, at the sole expense of the owner, and such system shall conform to all applicable standards of the State of Wyoming, Washakie County or any other regulatory agency.

(k) Sewage Disposal. Each residential building shall be connected to a private sewage disposal system at the owner's sole expense, and such sewage disposal system shall conform to all applicable standards of the State of Wyoming, Washakie County or other regulatory agency. No outdoor toilets shall be permitted.

(l) Common Access Road. The Common access roads on the property shall be private road at all times, and each lot owner shall be responsible for an equal portion of the maintenance costs for said roads, as costs are incurred at the initiation of the Home Owners Association. Example: Maintenance and or some removal cost shall be prorated to owners by dividing costs by number of lots to which access is provided.

(m) Mineral Activities Prohibited. No mining or other mineral extraction or development activities shall be permitted on any lot, including the removal of gravel.

3. HOME OWNERS ASSOCIATION: All holders of fee title to residential lots must be members of the Home Owners Association of South Circle Estates of Washakie County, and each member shall be entitled to a certificate of membership therein. Each and every fee owner shall be entitled to the benefits and the obligations of said organization. For this purpose one membership has been allotted to each residential lot. Upon the sale, transfer, devise, or other conveyance of any lot, the purchaser or purchasers, transferred, or devisee thereof shall have transferred to him, or them, said certificate of membership duly endorsed thereon.

(n) Authority and Duties. The Home Owners Association shall be responsible for the enforcement and administration of the requirements of these covenants and shall issue
building permits, contract and supervise common services, enforce the development and use regulations and take all other actions necessary to administer and enforce these covenants.

(b) Meetings. The Home Owners Association shall meet from time to time as necessary to administer and enforce these covenants.

(c) Common Services. The Home Owners Association shall contract for periodic maintenance services on the Common Access Roads. The Home Owners Association shall bill each lot owner for his share of the maintenance costs for the Common Roads. The Home Owners Association shall submit billings for common services to each lot owner on a regular basis as determined by the Home Owners Association. Billings for common services shall be paid by lot owners within 10 days of the billing date. This is further explained in paragraph 3 (a).

(d) Domestic Water Service. The Home Owners Association shall contract with Ten Sleep Cattle Co., a Wyoming corporation, for water from the well existing on the property which is owned by Ten Sleep Cattle Co. The Home Owners Association shall be responsible for the treatment of the water and the distribution thereof. The cost of the water service shall be divided among the land owners who are using the water.

(e) Limitation of Liability. Neither the Home Owners Association nor any member thereof shall be liable to any party for any action or inaction with respect to any provision of these covenants, provided that such Home Owners Association or member thereof has acted in good faith.

4. VIOLATIONS-ENFORCEMENT-COSTS: The limitations and requirements for land use and development set forth in these covenants shall be enforceable by the Home Owners Association on any owner of a lot within the property. Every owner of a lot within the property hereby consents to the entry of an injunction, judgment or lien against him or her or his or her tenants or guests, to terminate and restrain any violation of these covenants or for the nonpayment of assessments due. Any lot owner who uses or allows his or her lot to be used or developed in violation of these covenants further agrees to pay all costs incurred by the Home Owners Association or other lot owner in enforcing these covenants, including reasonable attorney's fees.

5. AMENDMENT-VARIANCE. These covenants may be amended by the written consent of 75% of the lot owners of the property.

6. DURATION OF COVENANTS: All of the covenants, conditions and restrictions set forth herein shall continue and remain in full force and effect at all times against the property and the owners and purchasers of any portion thereof, subject to the right of amendment as set forth in paragraph 6 hereof.

7. SEVERABILITY: Any decision by a Court or compe-
tent jurisdiction invalidating any part or paragraph of these covenants shall be limited to the part or paragraph effected by the decision of the Court, and the remaining paragraphs and the covenants, conditions and restrictions there remain in full force and effect.

IN WITNESS WHEREOF, the undersigned has executed these presents this ___ day of June, 1980.

TEN SLEEP CATTLE CO.

ATTEST:

Secretary

STATE OF WYOMING } ss.
County of Washakie }

The foregoing instrument was acknowledged by

By: ________________

President

Ten Sleep Cattle Co., before me this ___ day of June, 1980. Witness my hand and official seal.

My commission expires:

Notary Public

- 5 -

349321
SCHEDULE 8

This Policy does not insure against loss or damage by reason of the following:

1. Rights or claims of parties in possession not shown by the public records.
2. Easements or claims of easements, not shown by the public records.
3. Discrepancies, conflicts in boundary lines, shortage in area, encroachments, and any facts which a correct survey and inspection of the premises would disclose and which are not shown by the public records.
4. Any lien, or right to a lien, for services, labor, or material theretofore or hereafter furnished, imposed by law and not shown by the public records.
5. Unpatented mining claims; reservations or exceptions in patents or in acts authorizing the issuance thereof; water rights, claims or title to water.
6. Ownership or title to any mineral interest and the effect on the surface of the exercise of the mineral right.
7. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the public records. Taxes for the year 1982 and subsequent years.
9. Covenants, conditions and restrictions in the declaration of restrictions executed by Ten Sleep Cattle Company and recorded November 4, 1981 in Book Micro 35, Page 867, but deleting restrictions, if any, based on race, color, religion or national origin.
South Circle Estates Homeowners Assn.
Bruce McFlhinney
1/4 Ranch, Inc.
Richard Mullis

FROM: Craig Cooper, Superintendent
Water Division III

DATE: January 13, 1998

SUBJECT: Overflow from Bath No. 1 Well

Once again, I have been informed that overflow from the Bath No. 1 well and possibly other wells in the area is creating a nuisance and potential property damage to the former Marvin Davis property now owned by Everett Wyman. In past letters to you or your predecessors, this office has ordered the correction of this problem, and is now ordering it again.

You may recall that Section 41-3-909(a) of the Wyoming water laws provides that "...the state engineer is authorized and empowered on advice and consent of the board of control:

(vii) To require, whenever practical, all flowing wells to be so capped or equipped that the flow of water can be stopped when the wells are not in use, and to require flowing wells to be so constructed and maintained as to prevent the waste of underground water."

Additionally, Section 41-3-919 requires that "Any person who fails to stop the flow of underground water in violation of any order of the state engineer made pursuant to this act is guilty of a misdemeanor and upon conviction shall be fined."
Finally, Section 41-2-111 of the Wyoming water laws provides that:

"Upon the request of the State Engineer, the attorney general shall bring suit in the name of the State of Wyoming...to enjoin the unlawful use of the waters of the state, or the waste or loss thereof."

I am sure you are aware that there is also the likelihood of civil proceedings being brought for property damage by the party whose property is being damaged by water from your well(s).

As this problem has occurred for many years (my records show as far back as 1987), it seems there has been adequate time and warning to have it resolved by now. Having worked with this area before, I anticipate a lot of finger pointing and blame casting, but instead of that, I suggest you all recognize that the problem needs to be corrected and just go do it. There is no question it is a collective problem that requires collective attention from everyone involved. Mr. Wyman, like his predecessor Mr. Davis, is not involved in the wells so there is no reason for him to have to put up with the problems created.

It is also my understanding that there are some dams constructed across the draws on the Mullis property which are contributing to the potential flooding problem. I have checked the records and found that these reservoirs are unpermitted with this office and are therefore illegal. Section 41-4-501 of Wyoming statutes makes appropriating water without a permit a misdemeanor upon conviction.

I will be meeting with the remainder of the Board of Control the first week of February and I will try to have them find time to determine what action the State will take. Please provide me with a written report by January 30 explaining how you intend to relieve Mr. Wyman’s problem. Thank you.

cc: Attorney General's Office  
    Attn.: Jane Caton
    Jeff Fassett  
    State Engineer
January 21, 1998

Mr. Craig Cooper

Kiverton, WY

Dear Mr. Cooper,

I am writing in response to your recent letter in regards to the water on the former Davis property now owned by Mr. Wyman.

We have been fixing leaks at the well head for the past three years, in fact, ever since I moved to South Circle Estates. We have fixed the main valve and replaced three other valves that had been leaking. We have also fixed any leaks we have found or know of.

We still have a very small leak from a pressure relief valve in the well house we haven't fixed yet. We are trying to get enough money to build a new well house and have a new manifold made which will take care of even that leak. I have caught this water in a gallon pail and it takes four to five hours to fill it every time. It would appear that it is not getting any worse.

I have been up to the well house numerous times this winter. This water leak is above ground and I can find no evidence of our small water leak affecting any ground moisture other than within about five feet of the well house. I walked down the draw, all around the well house area, as well as along the subdivision border and can find no evidence of any other water that would travel the approximate half mile to Mr. Wyman's property! However, as I stated earlier, we are planning to repair even this small leak as soon as possible.

If I can be of further assistance please let me know.

Sincerely,

Doug Vliem
President S.C.E.I.D.
Dear Mr. Wyman:

In response to my letter to the people above you regarding the ice problem you reported to this office, I have now received a response and report from each one of them, and have had my local water commissioner also do an inspection. In each case of your neighbors reporting to me, they all independently expressed some disappointment that you chose to go the State with your complaint rather than talk to them directly—they indicated they thought you could all work together to solve problems if you were communicating with each other, and I agree.

Beyond that, it appears there are a couple of matters that need to be discussed. One is that you are reported to have on your own property a hydrant that has, at times, been free-flowing through an old stock tank and then that water finding its way through a cattail slough and into the draw where your problem is occurring. Wyoming law notes that “one who causes his own problems is not entitled to relief from another party,” and I would point out that this office is not going to spend much time on a situation where that is occurring, if indeed that is the case. If it is not the case, then you can disregard this admonition.

The second matter is that there does not appear to be enough overflow or leakage from the Beth No. 1 well to be causing your problem. Several of the parties reported to me that they had inspected and walked around the wellhead of that well and found no overflow or leakage of enough volume to be moving as far as your property. My water commissioner's inspection verified this. They all committed that what little flow is there would be stopped when they are able to do so. It appears most of the water is coming from springs arising in the draws on the Mullis property. Mr. Mullis was helpful in identifying these springs and offering suggestions as to what might be done to minimize your ice problem. However, the fact that the water most likely comes
from springs somewhat changes the complexion of assigning blame or fault, as natural spring outcroppings are generally not identified as being someone's fault, but rather are natural occurrences in the "acts of God" category. Anyone who wants to assert that damage from a spring is caused by someone else's activities is required to furnish proof of his allegations in the form of independent hydrologic studies, or initiate his damage proceedings through civil law avenues.

Based on the various inspections and reports to me, and on my discussion with the remainder of the Board of Control, the State is not inclined to attempt to prosecute anyone for your ice problems at this time, and it doesn't look like any regulatory action is warranted. It appears that flow from the springs is the source of your problem and that source is most likely not going to stop. Therefore, it is my recommendation that you get together with your neighbors and work with them to alleviate any potential long-term concerns. If your investigations have provided you with information that leads you to believe a regulatory action by this office can solve the problem, please inform me of what that action is, and we will conduct additional follow-up work. Thank you.

Sincerely,

Craig Cooper, Superintendent
Water Division III

cc: South Circle
1/4 Ranch
Bruce McElhinney
Richard Mullis
Don Engler v/encl.
Rod Delker w/encl.
Files
Mr. Doug Vliem
President S.C.E.I.D.
P. O. Box 192
Ten Sleep, WY  82442

1/4 Ranch
c/o Mrs. Joy Lyman
HC 30, Box 2020
Ten Sleep, WY  82442

Mr. Bruce McElhinney
1.7 E. Hyattville Rd.
Ten Sleep, WY  82442

Mr. Richard Mullis
Ten Sleep, WY  82442
Mr. Craig Cooper,

In regards to your letter in which you have requested a response...

There is no water running freely from the location of Well #1.

There is also no water running freely through the two drains that connect through my property and enter into one manhole.

I would also like to comment that I have no stock tank running freely and no open lines running.

My request would be that you or someone from the state would come and view the problem before handling for an expedient closure. I ask Mr. Wyman to now that welcome to come and look at my property as he has done before.

Thank you,

Jessica Melching
March 22, 1998

Craig Cooper
Water Division III
715 East Roosevelt
Riverton, WY 82501

Dear Mr. Cooper,

Here is the follow up letter to our conversation after I received your letter of February 23. I am sorry to be so long in writing but I have been extremely busy calving and the bad weather has not given me much time.

I too, was quite disappointed that your water commissioner would advise me that since he was not being paid and that he did not want to get involved as he had had dealings with "these people" before, he would like for me to get hold of you. I did indeed talk with two of the sub-division people and Mr. McElhinney expressing my concerns on the ice build up that causes extensive spring flooding on my property. Then for your water commissioner to have a meeting at their request and not bother to let me know was indeed a disappointment.

You have received some wrong information according to you letter to me. First, I did talk with my neighbors stating that I had some ice problems. Two of the sub-division people did walk the water line to see if they could find a problem. The third neighbor, not in the subdivision simply ignored it.

Second, the hydrant that you speak of was turned off early fall and was not turned on again until February 10 and by that time the ice was already a problem. Ice is already built up to the very top of the fence crossing the draw in question, and when spring thaws come will definitely flood our property, and thank you, I will disregard the admonition.

The previous owner of our land has documentation of a problem occurring after the Beth #1 Well was drilled. It might be there is a break in the line to the north causing water to arise lower down. Our neighbor got his tractor stuck in his own field because of the water. There was never a natural spring on that property before.

I hired Clay Cheehey and his track hoe to clean the ditch in question because I had no intention of complaining of something that was under my control to fix. Like you stated, if "I cause my own problems I am not entitled to relief from another party" I totally agree! However, I do believe that my neighbors can help take care of problems that include them instead of laying blame elsewhere.

You might suggest that the whole line, including the north portion be thoroughly inspected and not just from the surface. Or perhaps every one could help put a drain through.

Sincerely,

Everette Wyman

[Signatures]
June 26, 1988

TO:  Jim Carter, Sheldon Shilling, John Biggs, Virginia Longent,
      Bob Swander, George Wood

FROM:  Craig Cooper, Water Division III Superintendent

SUBJECT: Proper use of Ruth No. 1 Well

As a result of several calls received in this office regarding
the use of irrigation water from the Ruth No. 1 Well supplying
the South Circle Estates Subdivisions, I have reviewed the water
rights records of this office and the situation on the ground, and
would like to inform you of the following:

The well is adjudicated under permit #GW7134 for the irrigation
of 150 acres at a rate of 6/5 gallons per minute with a priority date
of October 1, 1970. The 150 acres are presently in the following
ownership:

<table>
<thead>
<tr>
<th>Owner</th>
<th>Acres</th>
<th>Ownership</th>
<th>Gallons per minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ten Sleep Cattle Co.</td>
<td>86.2</td>
<td>(57%)</td>
<td>338</td>
</tr>
<tr>
<td>George Wood</td>
<td>6.2</td>
<td>(4.1%)</td>
<td>4</td>
</tr>
<tr>
<td>Bob Swander</td>
<td>6.2</td>
<td>(4.1%)</td>
<td>25</td>
</tr>
<tr>
<td>W. Lewis</td>
<td>6.2</td>
<td>(4.1%)</td>
<td>25</td>
</tr>
<tr>
<td>Fred Hamford</td>
<td>8.2</td>
<td>(5.5%)</td>
<td>37</td>
</tr>
<tr>
<td>John Biggs</td>
<td>10.5</td>
<td>(7.0%)</td>
<td>47</td>
</tr>
<tr>
<td>Bruce Ager</td>
<td>8.9</td>
<td>(5.9%)</td>
<td>40</td>
</tr>
<tr>
<td>Meric Blakely</td>
<td>6.7</td>
<td>(4.5%)</td>
<td>30</td>
</tr>
<tr>
<td>Sheldon Shilling</td>
<td>1.1</td>
<td>(0.7%)</td>
<td>14</td>
</tr>
<tr>
<td>Ian Mayell</td>
<td>.8</td>
<td>(0.5%)</td>
<td>6</td>
</tr>
<tr>
<td>David Longent</td>
<td>.9</td>
<td>(0.6%)</td>
<td>8.5</td>
</tr>
<tr>
<td>Reginald Sweeney</td>
<td>.5</td>
<td>(0.3%)</td>
<td>7</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>150</strong></td>
<td><strong>100%</strong></td>
<td><strong>673</strong></td>
</tr>
</tbody>
</table>

In addition to this water right for irrigation, there are also
domestic rights for household use from the well which must be used
as part of the above entitlements. In other words, there are no
additional amounts for domestic use. However, the priority dates
The problem which has been brought to my attention is that there appears to be no provision for the irrigation use on the Wood's farm of the well water supplied to the house. Mr. Wood's only one of the domestic uses of the right is, incidentally, the rice farm. He has no other use for water on his farm except for the irrigation use on the rice farm. Mr. Wood is in the irrigation use on the rice farm, which is the only use for the well water which is not subject to the regulation of the State. It appears to me that the solution to the problem is a much lower priority for the irrigation use on the rice farm than for the irrigation use on the rice farm, which is the only use for the well water which is not subject to the regulation of the State. It appears to me that the solution to the problem is a much lower priority for the irrigation use on the rice farm than for the irrigation use on the rice farm, which is the only use for the well water which is not subject to the regulation of the State.
4) Under Wyoming law, there is no provision for one appropriator to deny another appropriator the use of the State's water. Water administration personnel of the State are the only ones with authority to do this unless a State approved system has been adopted by all co-owners in the system.

There are several possible legal solutions to the problems being experienced in regard to use of the well.

First, we can order that each lot owner use only his legal gallons per minute entitlement whenever he irrigates. This would be monitored by the local water commissioner, Gay Tharp, and anyone who violates the order would be subject to the penalties prescribed by W.S. 41-3-614 (1977).

Secondly, we could establish a rotation scheme for use of the well (under W.S. 41-3-612, 1977), whereby each user would be entitled to use the collective supply allotted to his and other users' property for a prescribed amount of time (based on proportionate acres) and then relinquish it to the next user and so on until each user has irrigated. This is approximately what has been happening, except that there has been no coordination among users. Under the statute, a scheme must be developed in written form which details which days, how much, and for how long each user is entitled to water. This scheme must be agreed to by each user, accepted by the water commissioner; and then is enforceable under, again, W.S. 41-3-614.

The third option available is to calculate, by trial and error, the number of sprinkler heads that can safely be run without diminishing anyone's domestic supply. The water commissioner can then see to it that the number of sprinklers running anywhere on any of the 150 acres does not exceed that number. If in actuality someone turns on additional sprinklers after the water commissioner has stipulated the number to be run, then the same penalty provisions would apply. Further, if the water commissioner winds up having to spend more than three days taking the system under this type of regulation, then the water users are obligated to pay for the commissioner's services for time spent beyond that, under W.S. 41-5-301 (1977). If the water commissioner has other obligations and cannot devote the necessary time to this regulation, then we have the authority under the same statute to appoint a deputy water commissioner to be paid in full by the water users to carry out the work.

The fourth option available is for all users of the Bunnell No. 2 Well to appoint or elect one single person to be responsible for distribution of water from the well. It would be that person's responsibility to be aware of how best to distribute the water so everyone's benefit, based on his study and knowledge of the system. Anyone who wanted to irrigate then would be obligated to contact this person and ask if there is enough water available to supply them without causing a problem. If so, the contact person could tell them how many sprinklers they could run, etc. based on his knowledge of who all is using water at that time. Anyone who would then use water without having contacted the "watermaster" could be reported
to the water commissioner for enforcement of the penalties under the statutes cited previously.

As you can see, the water laws are constructed so as to force some sort of resolution to water distribution problems. I have discussed this situation with the water commissioner, Gay Tharp, and we are willing to assist with whichever option is decided upon by the water users involved. We are fully prepared to take any enforcement action necessary and will do so at the appropriate time.

I suggest that the water users under this well get together and recommend a course of action to be taken. If you would like to call a meeting of the interested parties, I will be glad to attend and have Gay Tharp present also, if you will notify us in advance. I am convinced that the key to successful operation of the well is communication and the delegation of authority to one person rather than having everyone do his own thing. Please inform me of your thoughts and we will take them into consideration before taking administrative action.

Sincerely,

Craig Cooper, Superintendent
Water Division III

CC: pat

CC: Gay Tharp
Water Commissioner, District 6 & 12
Hyattville, Wyoming 82428
Carrol Lacey
Groundwater Section
State Engineer's Office
Herschler Building
Cheyenne, Wyoming 82002
Frank Carr
Board of Control
State Engineer's Office
Herschler Building
Cheyenne, Wyoming 82002
AGREEMENT FOR WATER

THIS AGREEMENT made and entered into this day of July, 1980, by and between TEN SLEEP CATTLE CO., a Wyoming corporation, hereinafter referred to as "Ten Sleep" and the HOME OWNERS ASSOCIATION OF the First Addition to South Circle Estate, hereinafter referred to as "Home Owners", WITNESSETH:

WHEREAS, Ten Sleep owns an artesian well located near the First Addition to South Circle Estate; and

WHEREAS, Home Owners desires to use the water from the well;

IT IS, THEREFORE, mutually agreed and understood as follows:

1. Ten Sleep shall allow Home Owners a minimum of two (2) gallons per minute per lot, using water according to the terms and conditions contained herein from the existing well, and shall retain ownership of the well.

2. Ten Sleep shall have no responsibility for the condition of the water, nor the amount of the flow, except Ten Sleep shall not use any of the water for irrigation purposes if the minimum in Paragraph 1 above cannot be met.

3. Home Owners shall be responsible for all costs incurred in the maintenance of the well and shall not by their use of the water interfere with Ten Sleep's right to use the water for irrigation.

4. This contract shall inure to the benefit of and shall bind the parties hereto and their assigns.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement for Water as of the day and year first above written.

ATTEST:

SECRETARY

[Signature]

PRESIDENT

TEN SLEEP CATTLE CO.
a Wyoming corporation

HOME OWNERS ASSOCIATION of the First Addition to South Circle Estates

[Signature]
September 6, 1990

To: Joe Sterling, John Biggs, Richard Misocelius, Jerry Kienlen, Bill Smith, Ginger Largent, Ann Sweeney, Merla Blakely, Sheldon Schilling, Jim Mayer, Marvin Davis, and George Wood

From: John Biggs, Ginger Largent and Joe Sterling

Officers South Circle Estates Improvement and Service District
Water and Sewer District

Subject: Proper use of Well No. 1 well and scheduled irrigation times.

As a result of a Water and Sewer District meeting on Wednesday, September 6, 1990, at the Sterling residence, the following irrigation guidelines were established and will be maintained.

1. The maximum size for any one sprinkler head would still be 3/32" (Bylaw #3)
2. The minimum distance for each set would be 60' (Bylaw #45).
3. Sets will be moved once every 24 hours. (Bylaw #5).

In addition, the members of South Circle Estates Improvement and Service District which attended this meeting, established the following irrigation scheme.

Starting Monday, September 10, 1990, at 6 p.m., George Wood will have sole use of the irrigation water. Irrigation water is considered what is available after household or domestic requirements have been met. George Wood will have this use for 20 days (480 hours). After this period, irrigation water would go to the Subdivision water users for 10 days (240 hours). Then rotate back to George Wood. This rotation period will stay in effect until Marvin Davis wants to water then a 15 day for Marvin, 15 day for George, and 10 day for Subdivision will be administered. This rotation scheme will be added to the Water and Sewer District Bylaw.

Members' Signatures

Lot #1: Joe Sterling
Lot #2: John Biggs
Lot #3: Richard Misocelius
Lot #4: Ben Vigil
Lots #5, 6, 7: Jerry Kienlen

Lots #8: Ann Sweeney
Lot #9: Ginger Largent
Lot #10: Joe Fabian
Lot #11: C. James Mayer
Lots #12, 13, 14, 15: Sheldon Schilling
Lots #16, 17: Merla Blakely
Lots #18, 19 and Tract BIG: Marvin Davis

Home and Tract 85G: George Wood
Lot owner list in South Circle Estates, of lots without a name on them.

Lots 6 & 7
Louisa F. Macartney
PO Box 233
Ten Sleep, WY, 82442

Lot 10
Joseph L. Fabian
Earyl K. Fabian
52 South Meyer Court
Des Plaines, IL 60016

Lots 12 & 13
C. James Meyer
Lynda D. Mayer
PO Box 175
Ten Sleep, WY 82442

Lot 14
Sheldon L. Schilling
Colores M. Schilling
PO Box 182
Ten Sleep, WY 82442

Lot 16
Marie F. Blakely
Johanna J. Blakely
PO Box 178
Ten Sleep, WY 82442

Lot 18
Marvin J. Davis
Dorothy J. Davis
PO Box 81
Ten Sleep, WY 82442
TO: South Circle Estates Subdivision
% Jim Mayer

Bruce and Teresa McElhinny

Roberta Wood, % Ranch, Inc.
% Joy Lyman

FROM: Craig Cooper, Superintendent
Water Division III

DATE: July 23, 1996

SUBJECT: Rotation Schedule - Both No. 1 Well

In accordance with Judge Hartman's Interlocutory Decree and the Report of
the Board of Control regarding the petition of Teresa McElhinny for change
in use, this is to advise you that your rotation schedule of ten days each
for the three parties involved is accepted and those parts under our
jurisdiction will be enforced by this office. Although we considered
enforcing a rotation schedule which would coincide with relative amounts
of acreage with water rights as described in paragraph 12 of the Board's
Report (as modified below), the evidence produced at the hearing showed
not only that a 10-10-10 rotation was acceptable to the protesters, but
also that such a rotation would adequately serve the needs of all parties.
The Board's intention is to invoke fairness and equity in the use of
the water from this well and determines that a 10-10-10 rotation accomplishes
that end.

As a side note in that regard, it has been pointed out that the acreage
breakdown in paragraph 11 of the Board's Findings of Fact should be
modified to the following:

South Circle Estates 49.40% (70.1 acres)
Teresa McElhinny 25.79% (36.6 acres)
Roberta Wood 24.81% (35.2 acres)

Paragraph 12 of the Board's Findings is also modified accordingly based on
the change in percentage ownership, however the effect of these changes on
the decree is moot at this point because the Board's enforced rotation is
not based on those figures from those paragraphs.
documents.

In the contract and any follow-up meeting which may result, the issue of the breach is discussed. If the breach is significant, the three parties must be involved in the resolution. It is a call to make to the local professional, who can make an appointment to discuss the matter, and to reach an agreement about the breach number 1. If all three parties agree to the agreement, the breach number 1 will be necessary to the contract, which has been signed by the parties.

are abundantly clear and enforceable.

are abundantly clear and enforceable.

are abundantly clear and enforceable.

are abundantly clear and enforceable.

are abundantly clear and enforceable.

are abundantly clear and enforceable.

are abundantly clear and enforceable.
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1.0 SUMMARY

South Circle Estates is a subdivision located off the Hyattville Highway, approximately 1 mile north of Ten Sleep, Washakie County, Wyoming. The subdivision has 18 lots and is currently served by an artesian well. In addition to providing domestic water to the subdivision, the well also provides irrigation water to the surrounding area. The purpose of this hydraulic analysis is to determine the ability of the Town of Ten Sleep to serve South Circle Estates with domestic water in lieu of obtaining domestic water from the well. The well would continue to provide irrigation water.

An existing WaterCAD model of the Ten Sleep system was modified to model a water transmission and distribution system to serve South Circle Estates, using the Ten Sleep #2 well as the source of water. The system consists of a 6-inch diameter main terminating at a 30,000 gallon buried water storage tank. Three distribution lines branch off the transmission line to distribution mains throughout the subdivision.

Modeling of the system was undertaken using peak hour demands of 643 gpm plus a fire flow of 500 gpm (a fire flow demand placed in the existing WaterCAD model by the Town’s engineer) in the Ten Sleep part of the system. Results indicate that providing a water supply system to South Circle Estates as modeled does not impact the flows and pressures experienced in the Ten Sleep water supply system i.e. the two systems act independent of each other. This statement is true provided the combined demands of the two systems do not exceed the yields of the two Ten Sleep wells. In the event that one well is inactive and the remaining well cannot meet the combined demands, flows to South Circle Estates can be shut off to free up water for Ten Sleep, with the South Circle storage tank providing a minimum of 2 days worth of storage at average day demands.

The system was also modeled for future system growth, using peak hour demands of 723 gpm plus a fire flow of 500 gpm in the Ten Sleep part of the system. The results confirm that there is no impact to the Ten Sleep system in providing a water supply to South Circle Estates, since the predicted future flows do not exceed the yields of the two Ten Sleep wells.

Water age analysis was undertaken on both systems using average day demands to determine how the South Circle system water age would compare to the water age in the Ten Sleep system. Water age within the Town was generally below 10 hours; the highest water age was found to be 85 hours at the Shriver Park subdivision. The water age within the proposed South Circle tank varied between 100 to 160 hours. Within the South Circle system, low water ages are experienced when the system is being fed with water from Ten Sleep #2; when the system is being fed by the water tank, water age tends to vary between 120 to 170 hours. The South Circle system would therefore experience greater water age than the Ten Sleep system.

It is recommended that the flow of water to South Circle Estates from Ten Sleep #2 should be controlled using a flow control valve. Opening and closing of the valve would be controlled based upon the water level in the South Circle storage tank. The well can provide flows well in excess of the expected South Circle demands, and so it is possible to throttle the flows to South Circle while still filling the storage tank. Throttling can be achieved by actuating the valve to maintain a set flow in the transmission line by monitoring a flow meter. The transmission line also requires a pressure reducing valve to prevent excess pressures in the South Circle system when the storage tank is being filled from the well.
2.0 PROJECT OVERVIEW

South Circle Estates is a subdivision located off the Hyattville Highway, located approximately 1 mile north of Ten Sleep, Washakie County, Wyoming, in Section 8, Township 47 North, Range 88 West of the Sixth Principal Meridian. The subdivision has 18 lots and is currently served by a well located slightly to the north of the subdivision. In addition to providing domestic water to the subdivision, the well also provides irrigation water to the surrounding area.

The purpose of this hydraulic analysis is to determine the ability of the Town of Ten Sleep to serve South Circle Estates with domestic water in lieu of obtaining domestic water from the well. The well would continue to provide irrigation water. In providing a domestic water service from Ten Sleep, separate water distribution systems are required for both domestic and irrigation water. A new water distribution system would be installed to provide domestic water from Ten Sleep, while the existing water distribution system would be dedicated to supplying irrigation water. Properties at the subdivision would therefore be disconnected from the existing system and re-connected to the new system.

In order to undertake the hydraulic analysis, an existing Bentley WaterCAD V8i model of the Ten Sleep water distribution system dated 04/22/2010 and developed by Lidstone and Associates, Inc. of Fort Collins, CO was supplied by 609 Consulting, LLC, of Casper, WY. This model was then modified to include an expansion of the Ten Sleep water distribution system to serve the subdivision, and then analyzed to determine the effects on the Ten Sleep system.
3.0 TEN SLEEP WATER SUPPLY SYSTEM OVERVIEW

The following information regarding the Ten Sleep water supply system was obtained from the Town of Ten Sleep Water Supply Project Level II Report produced by Lidstone and Associates, Inc. dated January 12, 2004 on behalf of the Wyoming Water Development Commission.

At the time of the Level II report, Ten Sleep had a residential population of 454. The Town’s water supply is obtained from two artesian wells located in the Madison Aquifer. Both of the wells are located on the northern edge of the Town. Based on the original flow test data, the wells were capable of supplying more than 4,000 gpm of good quality water. Recent stepped-rate flows tests show that the sustainable yields based on short term testing are approximately 500 gpm for Ten Sleep #1 and between 1,000 to 1,500 gpm for Ten Sleep #2. Under uncontrolled open flow conditions, Ten Sleep #1 yields approximately 1,100 gpm, while Ten Sleep #2 yields approximately 3,000 gpm.

As the flows from the artesian wells are under pressure, the wells are piped directly into the water distribution system. Each well has its own transmission line, and each transmission line is equipped with a pressure reducing valve (PRV), a flow control valve and a meter. The wellhead pressures at Ten Sleep #1 and #2 are 120-140 psi and 120-125 psi respectively, and so the pressures are reduced to prevent damage to pipes and plumbing fixtures in the system. The pressures at Ten Sleep #1 are reduced to 60-70 psi, whereas the pressures at Ten Sleep #2 are reduced to 55-60 psi. Gate valves are used to control flows, but they are generally left fully open to provide flow on demand and to keep the system fully pressurized. Despite having the lower yield, Ten Sleep #1 has historically provided the majority of the water supplied to the Town.

The water distribution system consists of a variety of pipe diameters, from 2-inch to 10-inch, and there are 236 service connections; 198 connections within the Town and 38 out-of-town connections. Water meters have recently been installed, but the Town has not yet billed customers based upon meter readings. There system is equipped with fire hydrants. There is no storage tank within the system and the water is un-chlorinated.

Due to the lack of metering within the system and meter failures at the wells, demand data was incomplete and a flow survey was undertaken between January and June 2003. Based on the available data and the flow survey, the average day demand (ADD) was calculated to be 223,815 gpd, which equates to 155 gpm or 493 gallons per capita per day (gpcpd). The high water usage is attributed to a combination of a lack of customer metering to promote conservation, irrigation of the Town’s park and cemetery and relatively high system leakage (estimated to be between 19-30%). The maximum day demand (MDD) was calculated to be 609,971 gpd, which equates to 424 gpm or 1,343 gpcpd. Based on a peak hour demand (PHD) to ADD ratio of 4:1, the PHD was calculated to be 1,972 gpcpd, or 621 gpm. This demand is lower than the sustainable yield of 1,500 – 2,000 gpm from the two wells.

Although the Town’s demands do not exceed the sustainable yields of the wells, there have been instances where significant pressure drops have been experienced within the water distribution system when simultaneous irrigation of both the park and cemetery have taken place. These pressure problems are attributed to the presence of small diameter mains within the water distribution system.
The Level II Report recommended the installation of a storage tank to the water distribution system to provide limited storage for fire flows and redundancy should one of the wells be inoperative, and also provide contact time for any chlorination system required in the future. A storage tank would also eliminate the need for the PRV’s at the wells and provide a system-wide pressure balance. The report also recommended the replacement of several smaller diameter mains with larger diameter mains.
4.0 WATER DEMANDS

The provided WaterCAD model already had the water demand for Ten Sleep populating the model. The sum of the individual demands in the model was 1,121 gpm and represented the PHD of 621 gpm plus a fire flow demand of 500 gpm. The South Circle Estates demands were calculated as below to enable the modified model to be populated with the additional demands.

4.1 South Circle Average Day Demands

Since the existing well at South Circle Estates provides both domestic and irrigation water, the demand for domestic water alone cannot be isolated from the demand for irrigation water; therefore an estimate of the ADD is required to be calculated. The ADD of Ten Sleep is 493 gpcpd and could be used as an estimate of the domestic water demands for South Circle Estates; however there are differences between the two. Domestic water is being used for irrigation in Ten Sleep, but this would not be the case at South Circle Estates. South Circle would also be receiving a new water distribution system, so excessive leakage should not occur and a new water meter can be installed at each property to promote conservation. Because of these differences, using the Ten Sleep’s per capita demand for South Circle would be excessive.

In the absence of records, Wyoming Department of Environmental Quality (WYDEQ) regulations state that per capita water use for the ADD shall be at least 125 gpcpd. There are 18 lots in the subdivision; if the number of persons per household is assumed to be 3.5, the population to be served by the new water distribution system is 63. Using 125 gpcpd, the ADD is estimated to be 7,875 gpd, equivalent to 5.47 gpm or 437.5 gallons per day per lot.

4.2 South Circle Maximum Day Demands

In the absence of records, WYDEQ regulations state that per capita water use for the MDD shall be at least 340 gpcpd. Based upon a population of 63, the MDD is estimated to be 21,420 gpd, equivalent to 14.88 gpm or 1,190 gallons per day per lot.

4.3 South Circle Peak Hour Demands

Based on a PHD to ADD ratio of 4:1, the PHD is estimated to be 31,500 gpd, equivalent to 21.9 gpm or 1,750 gallons per day per lot. Since the demands in the existing model are peak hourly demands, the PHD was used to populate the model to represent the additional demand due to South Circle Estates connecting to the Town’s water distribution system.

4.4 Daily Demand Pattern

In the provided WaterCAD model, the PHD had been distributed throughout the model by assigning demands to various nodes within the model. The fire flow of 500 gpm has been assigned to one node as an additional demand to its assigned PHD. Normally a demand pattern is applied to every demand node in a model to account for the diurnal variation in water usage. In a demand pattern, the daily demand is spread equally over 24 hours, and then an hourly multiplier is applied to each hour’s demand. The sum of the hourly multipliers is 24 to give an average hourly multiplier of one.
In the case of the provided Water CAD model, the demands assigned to the nodes were fixed and there were no demand patterns i.e. the demand does not change throughout the day. The Town’s water distribution system has therefore been modeled as if the peak hourly flow occurs on every hour of the day and not just one peak hour during the day. Together with the fire flow demand, the model represents an extreme demand scenario that in reality would not occur; although a fire flow demand can occur during the peak hour, it is extremely unlikely that a fire flow demand and the peak hour demand would occur each hour within a day.
5.0 WATERCAD MODEL

5.1 Existing WaterCAD Model

The existing WaterCAD model as produced by Lidstone and Associates, Inc. is shown in Figure 5-1.

In the existing WaterCAD model, the two artesian wells are modeled as reservoirs with a fixed hydraulic grade line. Ten Sleep #1 has a ground elevation of 4,457 ft and a hydraulic grade line of 4,729 ft, which provides 272 ft (117.8 psi) of wellhead pressure. Ten Sleep #2 has a ground elevation of 4,471 ft and a hydraulic grade line of 4,736 ft, which provides 265 ft (114.8 psi) of wellhead pressure.

In the model, each well transmission line has a PRV and a flow control valve (FCV). The PRV for Ten Sleep #1 (PRV-1) is set to reduce the downstream hydraulic grade line to 4,630.29 ft, which provides a system static pressure of 75 psi at the PRV. The PRV for Ten Sleep #2 (PRV-2) is set to reduce the downstream hydraulic grade line to 4,625.80 ft, which provides a system static pressure of 67 psi at the PRV. The FCV for The Sleep #1 (FCV-1) is set to limit the maximum flow rate through the valve to 500 gpm. The FCV for Ten Sleep #2 (FCV-2) is set to limit the maximum flow rate through the valve to 1,100 gpm. The model therefore provides a total available flow of 1,600 gpm to the water distribution system, which is within the estimated range of sustainable yield from the two wells (Section 3.0).

From the wells located at the northern edge of the Town, the Town slopes southwards towards Tensleep Creek located south of the Town. The low point in the system (node J-51 in the model) has an elevation of 4,404 ft, meaning that the maximum static pressures in the system are approximately 96-98 psi. The line south of the Town feeds the Shriver Park subdivision and roughly follows Highway 434. The high point in the system (node J-55 in the model) is located in the vicinity of the Washakie County roads maintenance department at an elevation of 4,481 ft, meaning that the minimum static pressures in the system are approximately 63-65 psi.

As stated in Section 4.0, the model contained a fire flow of 500 gpm in addition to a demand of 621 gpm representing the PHD. The fire flow demand had been placed at node J-76 in the model. Of the 101 pipe segments in the model, the large majority of them (93) are either 6-inch or 8-inch diameter. Of the remaining pipe segments, three are 10-inch diameter, two are 4-inch diameter, two are 2-inch diameter and one is 1-inch diameter.

5.2 Expansion of WaterCAD Model to Serve South Circle Estates

The modifications to the WaterCAD model to provide a water distribution service to South Circle are given in Figure 5-2, and are based upon information provided by 609 Consulting, LLC.

Ten Sleep #2 is located approximately 250 ft east of Hyattville Highway, and South Circle Estates is accessed from Hyattville Highway; therefore a route was selected for the installation of a water transmission main based on feeding South Circle Estates from Ten Sleep #2 that followed Hyattville Highway. The size of main selected for modeling was 6-inch diameter. The route of the transmission main heads west from the well for approximately 250 ft to the highway (node J-83 in the model) and turns north. It follows the highway to the start of South
Circle (node J-86 in the model), at which point the main follows the line of South Circle almost to its end (node J-96 in the model). At this point, the main turns south east to leave the subdivision and heads across country to a water storage tank.

Three distribution mains were modeled to feed water from the transmission line to different parts of the subdivision; a 2-inch main to the north west, a 4-inch main to the south and a 3-inch main running north east to the vicinity of the existing well (node J-92 in the model). It is proposed to install two flushing hydrants in the system; one at the end of the 4-inch main and one at the end of the 3-inch main.

In terms of topography, the land initially rises as the main heads north along the highway from the well. The high point on the highway is at node J-99 in the model, where the ground elevation is approximately 4,540 ft, approximately 80 ft above the well elevation. From this point the land falls to a low elevation point of approximately 4,400 ft located at node J-98 in the model, approximately 60 ft below the well elevation. From this point the land rises as the main heads along South Circle to reach an elevation of approximately 4,480 ft at node J-96 in the model.

A water storage tank was installed in the system so that the subdivision could be fed with water in the event that a break in the transmission line or failure of Ten Sleep #2 would result in the loss of a water supply. It was decided that the storage tank should have an overflow elevation of 4,610 ft to match the proposed overflow elevation of the proposed Ten Sleep water storage tank. This would enable the storage tank to be filled from Ten Sleep in the event that it is filled from their storage tank and not directly from the well in the future. The overflow elevation is 70 ft higher than the highest point on the transmission line and 130 ft higher than the highest point in the subdivision. This would provide a maximum static pressure of 30 psi and 56 psi respectively at these points. WYDEQ requires the normal working pressure in the distribution system to be not less than 35 psi. This requirement is met in the subdivision but not at the high point in the system; however at this point the main is purely a transmission line with no users.

It was decided to model the storage tank as a buried tank; therefore a location was chosen where the ground elevation was close to the overflow elevation. One suitable location would be close to the junction of Sections 8,9,16 and 17 of Township 47 North, Range 88 West, which happens to be approximately 3,500 ft due north of the well.

The volume of the storage provided was taken to nominally be 30,000 gallons. This would provide 3.8 days of storage at ADD, or 1.4 days of storage at MDD. This exceeds the WYDEQ requirement to provide system storage capacity equal to the ADD for water systems serving less than 50,000 gpd. It is intended that neither the water distribution system nor the water storage tank be designed to provide fire protection to the subdivision. Given that the tank would be buried, the height of the tank was modeled at 10 ft from overflow, giving a bottom elevation of 4,600 ft. To provide 30,000 gallons of working capacity, the tank was modeled with a diameter of 25 ft.

The difference in elevation between the hydraulic grade line at Ten Sleep #2 (4,736 ft) and the low elevation point in the system (4,400 ft) is 336 ft, which would provide a static pressure of 145 psi at this point. This pressure is excessive and so a PRV (PRV-3) was installed in the model downstream of the well. The hydraulic grade line of the PRV was set at 4,625.80 ft to match the
set point of the existing PRV (PRV-2). This reduced the maximum static pressure in the system to 98 psi.

The PRV set point is above the overflow elevation of the water storage tank. To prevent water overflowing from the tank, a control system is required to shut off flows to the water storage tank before the tank overflow elevation is reached. A control system was therefore added to the model that consisted of a control valve (GPV-3) that would operate in response to the water level in the water storage tank. An operating range was specified for the water storage, with a high water level equal to the overflow elevation (10 ft of water depth, or 4,610 ft elevation) and a low water level of 5 ft of water depth, or 4,605 ft elevation. The following controls were then entered into the model: if the water level in the tank was less than or equal to 5 ft, the control valve would open, and if the water level in the tank was greater than or equal to 10 ft, the control valve would close.

The nodes within the subdivision were populated with the PHD of 21.875 gpm derived in Section 4.3. The demands for the nodes were calculated by dividing the PHD by the number of subdivision lots to obtain a demand per lot of 1.215 gpm, and then each lot was assigned to a given node. The number of lots and total demand assigned to each node is given in Table 5-1.

<table>
<thead>
<tr>
<th>Node Reference</th>
<th>Number of Lots</th>
<th>Peak Hour Demand (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-86</td>
<td>1</td>
<td>1.215</td>
</tr>
<tr>
<td>J-87</td>
<td>1</td>
<td>1.215</td>
</tr>
<tr>
<td>J-88</td>
<td>1</td>
<td>1.215</td>
</tr>
<tr>
<td>J-89</td>
<td>2</td>
<td>2.430</td>
</tr>
<tr>
<td>J-90</td>
<td>2</td>
<td>2.431</td>
</tr>
<tr>
<td>J-91</td>
<td>4</td>
<td>4.861</td>
</tr>
<tr>
<td>J-92</td>
<td>2</td>
<td>2.431</td>
</tr>
<tr>
<td>J-93</td>
<td>2</td>
<td>2.431</td>
</tr>
<tr>
<td>J-96</td>
<td>1</td>
<td>1.216</td>
</tr>
<tr>
<td>J-98</td>
<td>2</td>
<td>2.430</td>
</tr>
</tbody>
</table>
Hydraulic analysis of the proposed system was carried out using the provided WaterCAD model as modified in Section 5.2.

No calibration of the provided model was undertaken on the assumption that it had already been calibrated. The purpose of calibration is to check that the model is a good reflection of how the existing water system operates. It involves comparing a known set of conditions in the water system against the same set of conditions in the model to see if they match. If there is a significant difference between the system and the model, the model is not a good representation of reality. A known set of conditions in the water system suitable for modeling can be produced by undertaking a fire flow test, which is undertaken at fire hydrants.

Since the proposed South Circle Estates distribution systems will not have fire hydrants, a fire flow analysis was not undertaken. For water distribution systems, the worst-case scenario in terms of demands and pressures is usually represented by a demand for fire flow occurring during the peak hour of the peak day. Since fire flows cannot occur in this system, the worst-case scenario is represented by the demands occurring during the peak hour of the peak day i.e. PHD.

The system was therefore modeled using the PHD given for Ten Sleep and estimated for South Circle Estates with an 24-Hour Extended Period Simulation (EPS). The EPS calculates the system pressures and demands for each hour in the run period based upon the demand and demand pattern allocated to each node. The EPS therefore provides a representation of how pressures would vary throughout the peak day. Since the demands were entered into the model as peak hour and fixed demands (Section 4.4), the pressures in the Ten Sleep part of the model should not vary throughout the simulation as there is no variation in demand. The only change occurring in the model would be the emptying and filling of the South Circle water storage tank, which would affect pressures in the South Circle part of the model and the flow demanded out of Ten Sleep #2, which could impact Ten Sleep if there was insufficient water to meet the demands of both Ten Sleep and South Circle. The EPS model would therefore highlight any impact to the Ten Sleep system under a worst-case demand situation as well as indicating how the proposed South Circle system would perform under the same circumstances.

The results of the modeling are illustrated in Figure 6-1 to Figure 6-8. The locations can be correlated with reference to Figure 5-1 and Figure 5-2.

Figure 6-1 shows the water level in the South Circle storage tank. An initial water level of 9 ft was used at the start of the EPS, and during the simulation period, the control valve operated as intended to open when the water level fell to 5 ft and closed when the water level reached 10 ft. During the simulation, the tank required filling once and the time taken to fill the tank is approximately 2 hours.

The water flow to the tank from Ten Sleep #2 during filling is given in Figure 6-2. At the start of filling period, the filling rate was 193 gpm, and by the end of filling period the filling rate had dropped to 173 gpm. The effects of filling the tank on flows to Ten Sleep from the two wells are shown in Figure 6-3 and Figure 6-4. These two graphs show that the flow of water into Ten Sleep remain constant i.e. filling the South Circle storage tank did not impact flows to Ten Sleep.
This is because the combined system demands (1,314 gpm at the start of tank filling) do not exceed the maximum model available flow rate of 1,600 gpm.

At the highest elevation point in the South Circle system (Figure 6-5), the pressures varied in the range of 54 – 57 psi and are the lowest pressures within this system. At the lowest elevation point in the South Circle system (Figure 6-6), the pressures varied in the range 89 – 94 psi and are the highest pressures within the system. Therefore pressures within the subdivision remained acceptable throughout the simulation period. At the highest point in the entire Ten Sleeps/South Circle system (in the transmission line to South Circle, Figure 6-7), the pressures varied in the range 28 – 37 psi, so no negative pressures were encountered during the simulation period. A check was made of the pressures within the Ten Sleep system to see if there were any effects on system pressures by supplying water to South Circle. The lowest system pressures were found to occur at node J-54 in the model (Figure 6-8), where the pressure remained constant at 59.3 psi. Additionally, the pressures remained constant at all nodes within the system; therefore providing water to South Circle Estates has no effect on Ten Sleep pressures during the simulation period.
Figure 6-1: South Circle Tank Water Level

South Circle Tank - South Circle - PHD = 21.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow) - Level (Calculated)

<table>
<thead>
<tr>
<th>Level (Calculated) (ft)</th>
<th>Time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.00</td>
<td>24.000</td>
</tr>
<tr>
<td>9.38</td>
<td>22.000</td>
</tr>
<tr>
<td>8.75</td>
<td>20.000</td>
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<tr>
<td>8.13</td>
<td>18.000</td>
</tr>
<tr>
<td>7.50</td>
<td>16.000</td>
</tr>
<tr>
<td>6.88</td>
<td>14.000</td>
</tr>
<tr>
<td>6.25</td>
<td>12.000</td>
</tr>
<tr>
<td>5.63</td>
<td>10.000</td>
</tr>
<tr>
<td>5.00</td>
<td>8.000</td>
</tr>
<tr>
<td>4.00</td>
<td>6.000</td>
</tr>
<tr>
<td>2.00</td>
<td>4.000</td>
</tr>
<tr>
<td>0.00</td>
<td>2.000</td>
</tr>
</tbody>
</table>
Figure 6-2: Flows from Ten Sleep #2 to South Circle

- South Circle - PHD = 21.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow)

<table>
<thead>
<tr>
<th>Flow (gpm)</th>
<th>200</th>
<th>175</th>
<th>150</th>
<th>125</th>
<th>100</th>
<th>75</th>
<th>50</th>
<th>25</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (hours)</td>
<td>24.000</td>
<td>22.000</td>
<td>20.000</td>
<td>18.000</td>
<td>16.000</td>
<td>14.000</td>
<td>12.000</td>
<td>10.000</td>
<td>8.000</td>
</tr>
</tbody>
</table>
Figure 6-3: Flows from Ten Sleep #2 to Ten Sleep

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>621</td>
</tr>
<tr>
<td>2.000</td>
<td>621</td>
</tr>
<tr>
<td>4.000</td>
<td>621</td>
</tr>
<tr>
<td>6.000</td>
<td>621</td>
</tr>
<tr>
<td>8.000</td>
<td>621</td>
</tr>
<tr>
<td>10.000</td>
<td>621</td>
</tr>
<tr>
<td>12.000</td>
<td>621</td>
</tr>
<tr>
<td>14.000</td>
<td>621</td>
</tr>
<tr>
<td>16.000</td>
<td>621</td>
</tr>
<tr>
<td>18.000</td>
<td>621</td>
</tr>
<tr>
<td>20.000</td>
<td>621</td>
</tr>
<tr>
<td>22.000</td>
<td>621</td>
</tr>
<tr>
<td>24.000</td>
<td>621</td>
</tr>
</tbody>
</table>
Figure 6-4: Flows from Ten Sleep #1 to Ten Sleep

Flow (gpm)

Time (hours)

P-86 - South Circle - PHD = 21.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow)
Figure 6-5: System Pressures, South Circle High Point (J-96)

J-96 - South Circle - PHD = 21.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow) - Pressure

Pressure (psi)

57.5
57.0
56.5
56.0
55.5
55.0
54.5
54.0

Time (hours)

24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0

Pressure (psi)

57.5
57.0
56.5
56.0
55.5
55.0
54.5
54.0

Time (hours)

24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Figure 6-6: System Pressures, South Circle Low Point (J-98)

- J-98 - South Circle - PHD = 21.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow)

Pressure (psi)

- 95.0
- 94.0
- 93.0
- 92.0
- 91.0
- 90.0
- 89.0
- 88.0

Time (hours)

- 0.000
- 2.000
- 4.000
- 6.000
- 8.000
- 10.000
- 12.000
- 14.000
- 16.000
- 18.000
- 20.000
- 22.000
- 24.000

- J-98 - South Circle - PHD = 21.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow) - Pressure
Figure 6-7: System Pressures, Transmission Line High Point (J-99)

J-99 - South Circle - PHD = 21.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow) - Pressure

Pressure (psi)

Time (hours)
Figure 6-8: System Pressures, Low Pressure Point in Ten Sleep (J-54)

Pressure (psi):
- 67.5
- 66.3
- 65.0
- 63.8
- 62.5
- 61.3
- 60.0
- 58.8
- 57.5
- 56.3
- 55.0
- 53.8
- 52.5

Time (hours):
- 24.000
- 22.000
- 20.000
- 18.000
- 16.000
- 14.000
- 12.000
- 10.000
- 8.000
- 6.000
- 4.000
- 2.000
- 0.000
To determine how the proposed water supply system would handle future growth, the demands in the system were increased. For the Ten Sleep system, the Level II report stated a future (2032) PHD of 679 gpm based upon the population increasing from 454 to 496. This represents an increase of 58 gpm from the current demands. In the WaterCAD model, the Ten Sleep demands had been assigned to 60 nodes; therefore to represent future flows, 1 gpm was added to 58 nodes to simulate growth occurring throughout the system. For the South Circle system, the demand at each node was doubled to provide a PHD of 43.75 gpm, and are shown in . Together with the modeled 500 gpm fire flow, the total system demand in the model was increased from 1,143 gpm to 1,223 gpm, an increase of 80 gpm. The system was modeled using a 24-Hour EPS and the proposed South Circle system to determine if improvements are required to handle future growth.

Table 7-1: South Circle, Future Peak Hour Demands

<table>
<thead>
<tr>
<th>Node Reference</th>
<th>Number of Lots</th>
<th>Peak Hour Demand (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-86</td>
<td>1</td>
<td>2.430</td>
</tr>
<tr>
<td>J-87</td>
<td>1</td>
<td>2.430</td>
</tr>
<tr>
<td>J-88</td>
<td>1</td>
<td>2.430</td>
</tr>
<tr>
<td>J-89</td>
<td>2</td>
<td>4.860</td>
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<tr>
<td>J-90</td>
<td>2</td>
<td>4.862</td>
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<tr>
<td>J-91</td>
<td>4</td>
<td>9.722</td>
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<td>J-92</td>
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<td>J-93</td>
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<td>4.862</td>
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<tr>
<td>J-96</td>
<td>1</td>
<td>2.432</td>
</tr>
<tr>
<td>J-98</td>
<td>2</td>
<td>4.860</td>
</tr>
</tbody>
</table>

A comparison of the modeling results for the future demands against the current demands are illustrated in Figure 7-1 to Figure 7-2. The locations can be correlated with reference to Figure 5-1 and Figure 5-2.

Figure 7-1 shows the water level in the South Circle storage tank. An initial water level of 9 ft was used at the start of the EPS, and during the simulation period, the control valve operated as intended to open when the water level fell to 5 ft and closed when the water level reached 10 ft. During the simulation, the tank required filling twice and the time taken for each fill is approximately 2 hours.

The water flow to the tank from Ten Sleep #2 during the fill periods is given in Figure 7-2. At the start of each filling period, the filling rate was 200 gpm, and by the end of filling period the filling rate had dropped to 185 gpm. This is a slightly higher rate of fill than with current demands. The effects of filling the tank on flows to Ten Sleep from the two wells are shown in Figure 7-3 and Figure 7-4. These two graphs show that the flow of water into Ten Sleep remain constant i.e. filling the South Circle storage tank did not impact flows to Ten Sleep. This is because the combined system demands (1,379 gpm at the start of tank filling) do not exceed the maximum model available flow rate of 1,600 gpm.
At the highest elevation point in the South Circle system (Figure 7-5), the pressures varied in the range of 54 – 56 psi, which represents a 1 psi drop off in pressure when the system is being fed by the well. At the lowest elevation point in the South Circle system (Figure 7-6), the pressures varied in the range 89 – 94 psi and are the same as the current demand pressures. Therefore pressures within the subdivision remained acceptable throughout the simulation period. At the highest point in the entire Ten Sleeps/South Circle system (in the transmission line to South Circle, Figure 7-7), the pressures varied in the range 28 – 37 psi and are the same as the current demand pressures. A check was made of the pressures within the Ten Sleep system to see if there were any effects on system pressures by supplying water to South Circle. The lowest system pressures were found to occur at node J-54 in the model (Figure 7-8), where the pressure remained constant at 59.1 psi, which represents a 0.2 psi pressure drop when compared to the current demand pressures. Additionally, the pressures remained constant at all nodes within the system; therefore providing water to South Circle Estates has no effect on Ten Sleep pressures during the simulation period.
Figure 7-2: Future Flows from Ten Sleep #2 to South Circle

P-158 - South Circle - PHD = 21.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow)

Flow (gpm)

Time (hours)

0.000 1.000 2.000 3.000 4.000 5.000 6.000 7.000 8.000 9.000 10.000 11.000 12.000 13.000 14.000 15.000 16.000 17.000 18.000 19.000 20.000 21.000 22.000 23.000 24.000
Figure 7-3: Future Flows from Ten Sleep #2 to Ten Sleep

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<tr>
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</tr>
<tr>
<td>24.000</td>
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</tbody>
</table>

- **Flow** P-87 - South Circle - PHD = 21.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow)
- **Flow** P-87 - South Circle - PHD = 43.8 gpm (Ten Sleep = 679 gpm + 500 gpm fire flow)
Figure 7-4: Future Flows from Ten Sleep #1 to Ten Sleep

Flow (gpm)

550
540
530
520
510
500
490
480
470
460
450
440

Time (hours)

8.000 10.000 12.000 14.000 16.000 18.000 20.000 22.000 24.000

P-86 - South Circle - PHD = 51.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow) - Flow
P-86 - South Circle - PHD = 43.8 gpm (Ten Sleep = 679 gpm + 500 gpm fire flow) - Flow
Figure 7-5: Future System Pressures, South Circle High Point (J-96)

- J-96 - South Circle - PHD = 21.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow) - Pressure
- J-96 - South Circle - PHD = 43.8 gpm (Ten Sleep = 679 gpm + 500 gpm fire flow) - Pressure

Pressure (psi)

57.5
57.0
56.5
56.0
55.5
55.0
54.5
54.0

Time (hours)

0.000
2.000
4.000
6.000
8.000
10.000
12.000
14.000
16.000
18.000
20.000
22.000
24.000
Figure 7-7: Future System Pressures, Transmission Line High point (J-99)

J-99 - South Circle - PHD = 21.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow) - Pressure

J-99 - South Circle - PHD = 43.8 gpm (Ten Sleep = 679 gpm + 500 gpm fire flow) - Pressure
Figure 7-8: Future System Pressures, Low Pressure Point in Ten Sleep (J-54)

J-54 - South Circle - PHD = 21.9 gpm (Ten Sleep = 621 gpm + 500 gpm fire flow) - Pressure
J-54 - South Circle - PHD = 43.8 gpm (Ten Sleep = 679 gpm + 500 gpm fire flow) - Pressure

Pressure (psi)

Time (hours)
8.0 WATER AGE ANALYSIS

Another factor to take into consideration in the hydraulic analysis of a water supply system is the water age i.e. how long does the water remain in the system before it is consumed. Water age impacts on water quality, since the longer it remains in the system, the greater chance that water quality can degrade.

The purpose of water age modeling for the South Circle water supply system is to see what the water age would be with the proposed water distribution system. The water supply from Ten Sleep is un-chlorinated, suggesting that the wells provide good quality water and since the water is supplied on-demand with no storage in the system, the water age is going to be relatively low, merely the time taken for the water to reach the end user from the wells. The introduction of a water storage tank into the system increases water age since the volume of water stored in the system increases, so water that has to pass through a storage tank will spend longer time in the system.

Water age is also dependent upon the demands within the system. Since water moves more slowly through a system at lower demands, a hydraulic analysis of water age was carried out by using Average Day Demands. In order to achieve this, a demand pattern was created equivalent to a fixed demand (i.e. each hour within the pattern has a multiplier of 1) and applied to every node in the model with a demand. Since the PHD to ADD ratio used to calculate demands is 4:1, ADD demands were achieved by changing the daily factor in the demand pattern from 1 to 0.25. In addition, the 500 gpm fire flow was removed from the model.

In water age analysis, the analysis commences with a water age equal to zero; therefore it must go through several iterations to calculate the water age. In order to achieve this, the run time for the analysis was set to 360 hours.

The results of water age modeling are illustrated in Figure 8-1 to Figure 8-5. The locations can be correlated with reference to Figure 5-1 and Figure 5-2. In the Ten Sleep system, the water age within the Town close to the wells is very small. Figure 8-1 shows a water age of 8.5 hours and this is typical of the nodes located within the Town. The highest water age is to be found at the end of the line that feeds the Shriver Park subdivision, the furthest point from the wells; Figure 8-2 shows that the water age is 85 hours.

In the South Circle system, the water age in the storage tank (Figure 8-3) varies in accordance with changes in water level. When the tank has just been filled, the water age is approximately 103 hours. By the time the tank has fallen 5 ft and is about to be filled, the water age is approximately 160 hours. The effect of the subdivision being fed at different times with water from the storage tank and directly from the wells is illustrated in Figure 8-4, which is the water age for node J-92 located at the end of the 3-inch diameter main, and has the highest water age in the system. When it is being fed from the storage tank, the water age varies from approximately 120 hours when the tank is full to approximately 170 hours when the tank is half empty. When the control valve is opened to fill the tank, the water age falls to approximately 30 hours and rises to 60 hours just before the control valve is closed. The lowest water age in the subdivision is located at the point closest to the well (node J-98, Figure 8-5). The highest water age experienced when the tank is half full is less than 100 hours; when the control valve is
opened to fill the tank, the water age drops to approximately 1 hour and rises to 50 hours just before the control valve is closed.
Figure 8-1: Water Age, J-29

J-29 - South Circle - Water Age Analysis @ ADD - Age (Calculated)

Age (Calculated) (hours)

Time (hours)

360.000 324.000 288.000 252.000 216.000 180.000 144.000 108.000 72.000 36.000 0.000
Figure 8-2: Water Age, J-61

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<td>87.500</td>
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</tbody>
</table>
Figure 8-4: Water Age, J-92

Age (Calculated) (hours)

360.000 324.000 288.000 252.000 216.000 180.000 144.000 108.000 72.000 36.000 0.000

Time (hours)

0.000 36.000 72.000 108.000 144.000 180.000 216.000 252.000 288.000 324.000 360.000


9.0 CONCLUSIONS/RECOMMENDATIONS

Analysis of the results from the modeling of the modified Ten Sleep water supply system to supply domestic water to the South Circle Estates indicate that the subdivision can be supplied with water without impacting the supply of water to Ten Sleep under extreme demand conditions i.e. peak hour demand of 621 gpm with a fire flow of 500 gpm and supplying the South Circle system with 193 gpm. Even with a higher fire flow of 1,000 gpm, the total system demand while supplying South Circle during the peak hour would be 1,814 gpm, which still does not exceed the yield capacity of the two wells; therefore supplying water to South Circle in such a circumstance would not impact the flows or pressures within the Ten Sleep system. Any negative impact on pressures within the Ten Sleep system of such a scenario will be dependent on the distribution system within Ten Sleep (elevations, pipe sizes etc.) and will be independent of the supply of water to South Circle.

In taking future demands into consideration, with a fire flow of 500 gpm the extreme system demand would be 1,379 gpm, an increase of 65 gpm. These demands still do not exceed the yield capacity of the two wells, and modeling indicates that that the subdivision can be supplied with water without impacting the supply of water to Ten Sleep in the future.

The only time the supply of water to South Circle would have a direct impact on the Ten Sleep water supply system would be if the combined demands exceeded the sustainable yield of the two wells. One scenario that could lead to this situation would be the loss of flows from Ten Sleep #2. In such a situation, the water storage tank in the South Circle tank would act as a back-up and will continue to supply water if the feed control valve had to remain closed to enable the Town to meet its water demand until the well was back online. In such a situation, the volume remaining in the modeled half-full tank would be approximately 15,000 gallons and would provide approximately 1.9 days worth of storage before becoming empty; in addition, since half depth of the tank is only 5 ft, the loss in system pressure would only amount to 2 psi.

In the above modeling, the flow of water to the storage tank with the control valve open was approximately 200 gpm but the system demands are only 22 gpm. The Town could therefore throttle back the supply of water to South Circle and the storage tank would still fill provided the rate of fill exceed the system demands. By throttling the flows more water would be available to the Town for emergency situations by increasing the fill time of the South Circle tank e.g. by throttling the tank supply to 50 gpm, an additional 150 gpm becomes available to the Town during the filling period.

In terms of water age, the installation of a water storage tank in the South Circle system will increase water age in that system when compared to the water age in the Ten Sleep system. The highest water age in the South Circle system would be approximately twice that of the Ten Sleep system, and would only match its water ages when the storage tank is being filled by the well. This improvement in water age provides another reason to throttle the flow from the well, since the South Circle system would experience lower water ages for longer periods. Water age can also be controlled by providing positive turnover of water in the water storage tank. This can be achieved by having separate inlet and outlet pipes to the storage tank, with the inlet pipe splash feeding into the top of the tank, so that fresh water fills the tank during each filling cycle.
Water age can also be controlled by having variable set points, such that the top water level can be lowered during periods of low demands to reduce the volume of water stored in the tank.

Based upon modeling of the Ten Sleep system and analysis of the results, it is recommended that following infrastructure is required to supply water to South Circle Estates from Ten Sleep:

- Supply South Circle Estates from Ten Sleep #2 via a 6-inch diameter transmission main following the route of Hyattville Highway and South Circle.

- Provide 30,000 gallons of buried water storage with an overflow elevation of 4,610 ft. The recommended depth of storage is not to exceed 10 ft.

- Provide a vault on the transmission line just downstream of Ten Sleep #2, containing a meter, pressure reducing valve and flow control valve. Consideration should also be given to providing a means to dose chlorine into the main, should chlorination be required in the future. Contact time for disinfection can be achieved in the main due to the residence time between the point of dosing and the first customer.

- Provide a control system for the operation of the flow control valve. The water storage tank should be equipped with a pressure transducer to provide an analogue signal that is proportional to the depth of water in the tank. This signal should be transmitted (via radio link or hard-wired) to a control system to operate the flow control valve. One way to control the valve would be to use the tank level signal to open the valve at the tank bottom water level set point, and to close the valve at the tank top water level set point. The set points should be adjustable. If desired the control system could also use a flow signal from the flow meter to actuate the valve once activated by the bottom water level set point to throttle the flow into the system to a flow rate set point.
APPENDIX E – HINCKLEY MEMORANDUM
MEMORANDUM

TO: Barry Venn  
DATE: June 11, 2010

FROM: Bern Hinckley  
PROJECT: South Circle

SUBJECT: Town of Tensleep Well Capacity

This memo summarizes information obtained from the January 12, 2004 “Town of Tensleep - Water Supply Project - Level II Report” and Dec. 1, 2002 “Town of Tensleep - Water Supply Project - Level I Master Plan Report” by Lidstone and Associates with respect to the supply capacity of the two wells providing the municipal water supply for the Town of Tensleep, Wyoming. Specifically, we examine those wells with respect to provision of an additional 25 gpm peak-day demand to serve the South Circle Subdivision and to provide a fireflow demand of 1500 gpm, for 4 hours, at a wellhead pressure of 40 psi. Lidstone (2004) has identified the projected future, peak-hour demand for the town to be 679 gpm.

Tensleep is served by two wells, both flowing strongly from the Madison Limestone, with a total depth of approximately 1100 ft. The 2002 short-term shut-in pressure for both wells was approximately 120 psi.

**Capacity.** Well No. 1, Wyoming State Engineer Permit P368G, has an adjudicated right to produce 350 gpm. With a casing diameter of only 5 inches, it is unlikely that the capacity of this well could be usefully improved through installation of a pump. The well is reported to have been flow tested at 1100 gpm upon completion in 1955. Lidstone (2004) tested the well at 725 gpm and concluded it had “a sustained yield” of 500 gpm. However, the Lidstone (2002) report describes 725 as the “maximum flow ... at 46 psi wellhead pressure due to restriction of the pressure reducing valve” and that “the maximum yield of the well would have been greater” absent that valve.

A “sustained” yield is not needed for 4-hour fire flows. Projecting the rate of pressure reduction (“drawdown”) with time from the data plot for this test (Lidstone, 2002) indicates only an additional decline of approximately 3 ft. (1.3 psi) had the 30-minute test been extended to 4 hours. Since 725 gpm was the measured discharge at 46 psi, the 4-hour discharge at 40 psi would quite likely be greater than 725 gpm.

Well No. 2, Wyoming State Engineer Permit P48580G, has an adjudicated right to produce 500 gpm. Although the 8-5/8" casing of this well would accommodate a high-capacity pump, it is
difficult to conceive of a situation where that would be necessary. The well is reported to have been flow tested at 3046 gpm upon completion in 1978. Lidstone (2004) tested the well at 2730 gpm and concluded it had “a sustained yield” of 1,000 - 1,500 gpm.

As discussed above, a “sustained” yield is not necessary to meet fire flows. This well was tested for 30 minutes at 2730 gpm with 7 psi remaining wellhead pressure, 2350 gpm with 33 psi, and 1900 gpm with 61 psi. As above, projection of the test’s 30-minute “drawdown” data to 4 hours indicates minimal additional loss in pressure or, consequently, of the flow produced by that pressure. Assuming the specific capacity indicated at 2350 gpm (12.5 gpm/ft; which is lower than that found at 1900 gpm), the 2350 gpm test at 33 psi can be adjusted to 40 psi. A flow reduction of 202 gpm results from this calculation. Assuming this is conservative based on using the higher specific capacity, but that some flow loss would occur over a longer test, a 4-hour flow at 40 psi of approximately 2150 gpm is indicated.

Two additional conclusions from the Lidstone (2002, 2004) testing are significant:

1) “Ten Sleep Nos.1 and 2 operate independently”. This is almost certainly not correct over the long term – they are both drawing from the same aquifer – and the authors point out that additional testing would be needed to confirm inter-well relationships. However, over the short duration of a 4-hour fire flow, this is an encouraging conclusion, indicating the additive nature of short-term capacities.

2) “The artesian pressure of the Madison aquifer has not appreciably changed”. Thus, the driving force for the productivity of the Tensleep wells has not declined under historical use and the wells can reasonably be expected to exhibit the tested performance characteristics in the future. Note that a fire flow event, while requiring a high discharge rate for a short time, represents no significant long-term depletion of the aquifer.

**Summary.** Based on the testing results reported by Lidstone (2002, 2004), the adjudicated water rights (850 gpm), and the projected demands cited above, there is clearly sufficient capacity in these wells to meet the additional municipal demands of adding South Circle to the service area. With respect to fire flows, the analysis outlined above indicates a combined, short-term capacity of approximately 2875 gpm, enough to meet both the stated future municipal demand (680 gpm) and a 1500 gpm fireflow with a substantial margin for error.

Note that this analysis is based solely on measured performance at the wellheads, without regard for the hydraulic considerations of wellhead facilities or of the water transmission and distribution system, or of other engineering considerations associated with storage or transmission facilities.

**Water rights.** The difference between the water right and the actual capacity of these wells reflects the difference between demonstrated beneficial use - the measure of a water right - and the simple hydraulic capacity of the well. As explained in the Lidstone (2002) report, the adjudicated rates were determined by flow measurements through the installed pressure-reducing
valves into the municipal system. Wyoming State Engineer’s Office - Groundwater Division personnel assure us that short-term exceedance of the water-right yield for fire suppression does not create a water-rights issue (Johnson, pers. comm. 6/11/10).

If use of the Town of Tensleep wells were to be extended to the South Circle Subdivision, a petition to the Board of Control for an enlargement of place of use would be required. We recommend inclusion of a request for additional conditions and limitations in that petition to clarify that short-term production up to the full capacity of the wells for fire suppression is explicitly allowed within the water right.
APPENDIX F – PLAN AND PROFILE DRAWINGS
APPENDIX G – ENVIRONMENTAL REPORT
ENVIRONMENTAL REPORT

FOR

SOUTH CIRCLE MASTER PLAN LEVEL I STUDY

WASHAKIE COUNTY
WYOMING

NOVEMBER 2010
ENVIRONMENTAL REPORT

SUMMARY

PROJECT IDENTIFICATION

Applicant: South Circle Estates Improvement and Service District
Address: Box 83, Ten Sleep, Wyoming, 82442
Project: South Circle Master Plan, Level I Study

CONTACT PERSON

Boyd Whitlock
Box 83, Ten Sleep, WY 82442
Ph: 307-234-4003

ABSTRACT

The South Circle Estates Improvement and Service District is located approximately one mile north of the Town of Ten Sleep, Wyoming, in Washakie County. The District’s domestic water system is currently provided by an artesian well, which also serves as an irrigation well for surrounding pastures. The District has a mostly dual water system, with a small piping system for domestic use and larger piping system for irrigation use. In some places in the system, the two water systems are commingled. The District receives domestic water continually, but shares the well on a 10 day per month rotating basis for irrigation. The District’s existing domestic water system is inadequately sized, and the District experiences low pressure and flow problems, most particularly when the District is using the well during its 10-day irrigation cycle. In addition, water quality testing has shown that the well water has radio nuclide levels that exceed the EPA maximum contaminant levels.

The District is planning to obtain a reliable water supply by extending a supply pipeline from the nearby Town of Ten Sleep, and constructing a new and independent domestic water distribution system. The new water system will initially serve 24 taps. Each tap will be metered. All of the new water pipelines and distribution system is planned to be constructed in existing public roadway right-of-ways or in existing easements already serving the existing water system. A small portion of the project and the water transmission pipeline from the Town of Ten Sleep
water storage tank are planned to be constructed in an easement to be obtained from the US Bureau of Land Management.

The proposed water supply project should not have any adverse impacts on the planning area with proposed mitigation measures. Several issues were raised during the planning stages, including: (1) erosion control and re-vegetation of areas disturbed during construction; (2) impacts on wildlife; (3) impacts on wetlands; (4) impacts on archeological or historic sites; and (5) impacts on threatened or endangered species.

COMMENT PERIOD
In conformance with the requirements of the National Environmental Policy Act and Wyoming Environmental Review Process, this Finding of No Significant Impact (FONSI) will be subject to a 30-day public review period. The FONSI will be distributed to interested persons and agencies for their review. The FONSI will be available for public review at the Wyoming Department of Environmental Quality/Water Quality Division, 122 West 25th Street, Herschler Building, Cheyenne, Wyoming. All comments received will be given due consideration. Comments should be directed to:

Brian Mark, SRF Program Principal
Water Quality Division
122 West 25th Street
Herschler Building, 4W
Cheyenne, WY 82002
Tel: 307-777-5973; Fax: 307-777-5973
E-mail: bmark@wyo.gov
SECTION 1 – PURPOSE AND NEED FOR ACTION

This section of the Environmental Report (Report) identifies the purpose and the need for the water supply project.

PROJECT PURPOSE AND NEED
The South Circle Improvement and Service District (District) is located about one mile north of the Town of Ten Sleep, Wyoming, in Washakie County, see Figure 1-1. The District’s domestic water supply is provided by an artesian well, Beth Well No. 1. The domestic system is undersized and experiences low pressure and flow problems during the summer months when the artesian well is also used as an irrigation well for the District and adjacent pastures and lands. In addition to the pressure and flow problems, the well has radio nuclide levels that exceed the EPA maximum contaminant limit. The District needs to obtain a safe and reliable water supply and construct a separate and independent domestic water distribution system. The existing irrigation system will be disconnected from the domestic system, and will continue to be used for irrigation.

The Level I study investigated three options for improving the water system for the District. The options are discussed in the next section. All of the options will provide a more reliable and functional water system for all the District customers.

DECISIONS TO BE MADE/SPECIAL APPROPRIATION GRANT
The decision to be made is to select an alternative in this document for improving the District’s water supply system and to serve approximately 24 new properties, including the “No Action” alternative, where no improvements would be provided. The decision will take into consideration the analysis of environmental effects. The decision will also take into consideration comments, suggestions, and recommendations brought forward during the public and agency scoping process, as well as any requirements by other federal agencies that have jurisdiction over the project. The project will require a NPDES permit for ground disturbance activities and a Section 404 permit for wetland/waters of the U.S.
FIGURE 1-1
VICINITY MAP
SOUTH CIRCLE ESTATES - IMPROVEMENT & SERVICE DISTRICT
SCALE: 1" = 2000'

NOTE:
BOUNDARY AND LOCATIONS SHOWN ARE APPROXIMATE ONLY.
SECTION 2 – ALTERNATIVES

This section of the Report defines the alternatives and further describes the preferred alternative.

ALTERNATIVE 1 – BETH WELL REHABILITATION

The Beth Well Rehabilitation has been identified as Option No. 1. This option includes continuing to use the existing irrigation well for both domestic and irrigation uses. A separate flow stream would be drawn from the well to provide the domestic supply, and will be treated to reduce the radio nuclide levels before being distributed to the consumers. The occasional water pressure and flow problems will be corrected by installing a new water storage facility that would provide additional flows and stabilize pressures when the well cannot meet the system demands. A new and separate domestic water system would be constructed to replace the existing system. This option is more expensive than option No. 2, and is not likely to receive a high prioritization for state or federal funding.

ALTERNATIVE 2 – NEW TEN SLEEP WELL

This alternative has been identified as Option No. 2. This option includes drilling a new well in the Ten Sleep formation to provide for the domestic supply. The new well is expected to be artesian and to have adequate quantity and pressure to supply the domestic system. A new and separate domestic water system would be constructed to replace the existing system. It is believed that the well would be adequate to meet all the system demands and that a storage tank would not be needed with this option. This option is the least expensive option but the chances of receiving state or federal funding for this option are not very good.

ALTERNATIVE 3 – TEN SLEEP WATER SUPPLY

This alternative has been identified as Option No. 3. This option includes extending a water pipeline from the nearby Ten Sleep water system to supply the District. The Town’s supply is provided by two artesian wells and the system appears to have adequate capacity to serve the District. The Town is planning to construct a new water storage tank near the southern District boundary that will serve as the source of supply. A new and separate domestic water system would be constructed to replace the existing system. Although this option is the most expensive option, it is the option with the best opportunity to receive state and federal funding assistance. This option is the preferred option for improving the District’s domestic water system.
ALTERNATIVE 4 – NO ACTION ALTERNATIVE

The “No Action” Alternative is not acceptable because the water quality from the well contains radio nuclides which exceed the EPA maximum contaminant levels, and could threaten the health of the consumers. In addition, the pressure fluctuations and low pressure episodes experienced in the domestic water system also threaten the health and safety of the consumers.

DETAILED DESCRIPTION OF PREFERRED ALTERNATIVE

The conceptual design of the proposed water system improvements for South Circle Estates Improvement and Service District is given in Figure 6-1 attached to this Report. The conceptual design has been developed in accordance with the DEQ regulations and requirements and standard engineering design criteria. The goal of the conceptual design is to locate and align the new water mains so that every property can be served in very close proximity to the existing service line serving the residence in an effort to minimize the cost to the property owner for connecting to the new water system. Some of the significant design elements and features of the conceptual design are highlighted below:

- The connection to the Town of Ten Sleep’s water system is planned to be made directly to the 12-inch discharge piping leaving the new water storage tank.
- The 6-inch transmission pipeline from the tank to the District will be aligned along the tank access road that will be constructed to access the tank site. The access road and pipeline will be on BLM property and will need to be permitted.
- A buried concrete meter vault will be constructed on the 6-inch pipeline near the point of connection to the 12-inch transmission pipeline. The meter will be used to measure the District’s usage, and for billing purposes by the Town.
- An ultra violet light (UV) disinfection facility will be constructed on the 6-inch supply pipeline prior to the first service connection to ensure that all the water going to the District users is disinfected. The house will be a small prefabricated insulated and heated building that will allow easy access to the UV system for maintenance and replacement.
- A pressure reducing valve may be required to control pressures below 90 psi in the District, if the Town’s tank is constructed with an overflow height above the elevation of
4620 feet. If required, the PRV can be installed in the disinfection facility, and will be easily accessible for maintenance.

- The 6-inch transmission pipeline will be routed through the northern part of the District from Lot 5 to Lot 1 in the same location as the current domestic service pipeline. A flushing hydrant will be installed at the end of the 6-inch transmission pipeline to allow for occasional flushing and maintenance. Easements may be required for this alignment since the existing domestic pipeline does not appear to be located in the platted easement.

- A new 4-inch pipeline is planned to be constructed from Lot 1 along the existing roadway to serve lots 17, 18, 8 and 9, and will be looped back into the 6-inch supply line to provide circulation and good flows and pressures.

- A new 3-inch pipeline will be constructed southward from the 4-inch line to serve Lots 10-15 and Lot 18. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Seven new meter pits will be installed to serve the properties along this pipeline. An easement will be needed between Lot 13 and 14 to extend the pipeline to the Hyattville Highway right-of-way.

- A new 4-inch pipeline will be constructed from the 6-inch supply pipeline at Lot 5 to the Beth No. 1 well site to serve the existing customers and three to four new services planned by the property owner. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Up to eight new meter pits will be constructed at the property lines to serve the properties. This pipeline will be constructed in the existing platted water line easement.

- A new 2-inch pipeline will be constructed to serve Lots 7 and 8. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Two new meter pits will be constructed at the property lines to serve the properties.

- The water main piping is planned to be gasketed-joint class 160 PVC because it is easier to repair and find parts for. Fittings should be PVC push-on fittings because it eliminates the need for metal fittings and bolts that can corrode and fail. Any metal fittings, valves, hydrants and accessories should be protected with sacrificial anodes. All water line piping should be installed with tracer wire and metallic detector tape.

- The location of all fittings, valves, and road undercrossings will be marked with 4-inch painted steel posts with information stenciled on the posts. All meter pit locations will
also be marked with similar posts and the readouts for the touch read system will be attached to the posts for easy access.

- Air-vacuum release valves will be installed at the tops of hills to relieve the air that can build up in the pipeline and reduce capacity.
- Isolation valves will be located to minimize service disruptions during maintenance.
- All paved roadway areas disturbed by pipeline construction will be re-paved and restored to pre-existing condition.
- All areas along the graveled roadways that are disturbed by construction will be re-graveled and restored to pre-existing condition.
- All areas within the easements for water lines across private property will be seeded or graveled and returned to pre-existing condition to satisfy the property owner.
- The new water meters will be located in buried “meter pits” that will be located in public rights-of-way or easements dedicated to the District, and as close to the existing water service lines as possible. A touch read meter system will be provided to allow efficient meter reading for the District operator.

SECTION 3 - IMPACTS AND MITIGATION

This section of the Report identifies the impacts, environmental issues, and permits associated with construction of the water supply system for the District.

ISSUE SUMMARY
The proposed water supply project should not have any significant adverse impacts on the planning area with proposed mitigation measures. Several issues were raised during the planning stages. These issues included: (1) erosion control and re-vegetation of areas disturbed during construction; (2) impacts on wildlife; (3) impacts on wetlands; (4) impacts on archeological or historic sites; and (5) impacts on threatened or endangered species.

POPULATION, LAND USE AND GROWTH
The current population of the District area is estimated to be 75. Historically, the population in Washakie County has grown at a very low rate of 0.5% to 1% per year. For the purpose of the study, a growth rate of 1% was assumed to project future populations. Over a 50-year period, the
1% annual growth equates to a multiple of 1.65, which if applied to the current population would result in a year 2060 population of 123. It is unlikely that the District will extend its service area to serve additional customers beyond the current District boundary.

ENVIRONMENTAL ISSUES
This following section summarizes the responses received from the state and federal agencies regarding the proposed project. All agencies’ response letters are attached at the back of this report.

Wyoming Game and Fish Department provided two comments concerning terrestrial considerations and aquatic considerations. The terrestrial considerations mentioned that sage grouse have been observed using the fields north of the District, and that golden and bald eagles have been observed within two miles of the proposed project. They recommended that the project proponents conduct appropriate surveys in the area prior to construction. The aquatic considerations recommended that best management practices be used to control erosion and prevent sediment from reaching nearby waterways in order to minimize impacts to the aquatic waterways.

The U.S. Department of Agriculture Natural Resources Conservation Service responded that “Based on the information provided, we believe your project will not adversely impact important agricultural lands, since there will be no apparent conversion of lands from agricultural use to non-agricultural use. However, we would recommend prompt re-vegetation of the disturbed areas to minimize soil erosion and weed control”.

The U.S. Army Corps of Engineers determined that some water lines may cross several small streams, and stated that should these streams prove to be waters of the US, any discharge of dredged or fill material into them associated with construction will require a Department of the Army Corps of Engineers permit.

The Wyoming State Historic and Preservation Office (SHPO) stated that “A search of our records shows that a cultural resource survey has not been conducted for the area of potential effect” (APE). They recommended that the USDA in conjunction with the District’s consultant carry out appropriate efforts necessary for identification of historic properties, which may
include background research, consultation, and consideration of visual effects, sample field investigations, or field surveys. A report will need to be submitted to SHPO for review and comment.

The U.S. Department of the Interior Fish and Wildlife Service (FWS) stated that they would appreciate receiving information on the current status of each of the following species in the proposed project area:

- Black-footed ferret, endangered
- Canada lynx, threatened
- Greater sage-grouse, candidate
- Ute ladies’-tresses, terrestrial orchid, threatened

The FWS also wanted a review of the status of the following “species of concern”

- White-tailed prairie dog
- Mountain Plover (bird)
- Migratory birds

The FWS recommended that best management practices should be implemented wherever possible, including: installation of sediment and erosion control devices adequate and continued maintenance of sediment and erosion control devices to insure their effectiveness minimizing disturbance areas to avoid wetlands, streams, riparian areas, and flood plains; and reseeding and replanting of riparian vegetation native to Wyoming in order to stabilize shorelines and streambanks.

The Wyoming Department of Environmental Quality, Air Quality Division states that they do not have any concerns at this time and will not require any permitting. However, the contractor should be required to minimize fugitive dust during construction. Environmental planning for construction should include effective dust control procedures that will ensure compliance with the Wyoming Air Quality Standards and Regulations. Dust control measures may include frequent watering and/or chemical stabilization.
The Natural Resources Conservation Service (NRCS) states that it does not appear there will be any permanent conversion of prime farmland, but they do recommend prompt re-vegetation of the disturbed areas to minimize soil erosion and weed encroachment.

**PERMITS**

The project will require a National Pollution Discharge Elimination System (NPDES) permit prior to any ground disturbance activities and a Section 404 permit from the Army Corps of Engineers prior to any impacts to wetlands or other waters of the U.S.

**UNAVOIDABLE ADVERSE IMPACTS**

Unavoidable adverse impacts will include minor, short term increases in noise and ambient air particulate levels and increased traffic in the immediate vicinity of the construction activities. These impacts will be minor and short term in nature, and mitigated to the extent possible by including proper construction practices in the project specifications.

Construction of the project will result in the commitment of resources including capital, manpower and materials.

**SECTION 4 – MITIGATION SUMMARY**

After an evaluation of anticipated impacts of construction and operation of the proposed facilities, the following mitigation alternatives and recommendations were selected to minimize or eliminate these impacts.

1. The applicant will perform a cultural survey, an archeological survey, and a biological survey as required.

2. The applicant will demonstrate to the satisfaction of the Administrator that it has, or will have a fee simple or such other estate or interest in the site of the project, including necessary easements and rights-of-way, as the Administrator finds sufficient to assure undisturbed use and possession for the purpose of construction and operation for the estimated life of the project. This demonstration must be completed satisfactorily prior to start of any construction.
(3) The applicant agrees to perform: a) routine mitigation techniques for limiting direct runoff from disturbed areas and dewatering devices, including berms, sediment traps, silt fences, water checks, etc. which will be effective in limiting possible erosion and sediment discharge; b) implement dust control measures at the access roads and construction sites; c) re-establish vegetation which was disturbed in accordance with local land use type.

(4) The applicant will provide a status report to the FWS for the threatened, endangered, and candidate species listed above.

SECTION 5 – COMMENTS AND COORDINATION
This section of the Report addresses final comments and coordination efforts.

PREPARERS OF THE ENVIRONMENTAL REPORT
This Environmental Report was prepared by Barry Venn, PE, 609 Consulting, LLC, 5830 E. 2nd Street, Casper, WY 82609.

PUBLIC PARTICIPATION
Public participation activities included newsletters and public meetings. The primary function of the newsletters was to notify the property owners of the status of the study, present important issues facing property owners and provide scheduling of public meetings.

At least four public meetings were held during the course of the study. The meetings were well attended with an average attendance of over 50 percent of the residents at each meeting. At each meeting, representatives of the WWDC and the consultant made presentations and answered questions. The purpose of the meetings was to allow the public the opportunity to hear about the study, and to provide input about issues, interests, and the direction the study should take.
AGENCY COORDINATION AND CONSULTATION

The following agencies were contacted/consulted in the development of the Environmental Report:

- U.S. Army Corps of Engineers
- U.S. Department of Agriculture, NRCS
- U.S. Department of the Interior, Fish and Wildlife Service
- Wyoming Department of Environmental Quality, Air Quality Division
- Wyoming Game and Fish Department
- Wyoming State Historic Preservation Office

Responses from each of the agencies are included at the end of this report.
Wyoming Regulatory Office

Barry Venn
609 Consulting
5830 East Second Street
Casper, Wyoming 82609

Dear Mr. Venn:

This letter is in response to your request dated April 27, 2010, for Department of the Army review of the South Circle Estates Water Supply Project. The proposed work will be located in Sections 8 and 17, Township 47 North, Range 88 West, Washakie County, Wyoming.


The proposed work involves the installation of a water transmission line from Tensleep, the installation of water service lines in South Circle Estates and the construction of a water storage tank. We have reviewed the information submitted with your request and determined that the newly installed lines will cross several small streams. Should these streams prove to be waters of the United States, any discharge of dredged or fill material to them associated with water line installation will require a Department of the Army permit.

If you have any questions, please contact Dennis Blinkhorn at (307)772-2300 and reference file number NWO-2010-01000.

Sincerely,

Matthew A. Bilodeau
Program Manager
Wyoming Regulatory Office
May 11, 2010

Barry Venn, PE
609 Consulting, LLC
5830 East 2nd Street
Casper, WY 82609

RE: Washakie County General File
Permitting Requirements

Dear Mr. Venn:

Regarding your 4/27/10 letter requesting a compliance determination for the South Circle Estates Water Supply project, the Air Quality Division has no concerns at this time and will not require any permitting. In order to maintain compliance with our general opacity and public nuisance standards, however, the contractor should be advised to minimize fugitive dust emissions during construction. This normally includes watering access roads and staging areas, particularly during dry, windy conditions. The burning of waste materials is prohibited without specific authorization from the Air Quality Division. This project is not located in the vicinity of an area where known violations of ambient air quality standards have occurred.

Demolition of buildings may require an asbestos inspection prior to demolition. Contact Linda DeWitt at (307) 777-7394 for questions regarding asbestos abatement.

Please call me at 307-332-6755 or email at gmeekewyo.gov if you have questions concerning this matter.

Sincerely,

Greg Meeker
District 4 Engineer
Air Quality Division
FAX TRANSMITTAL

TO: Barry Venn

FAX NUMBER: 307-265-4672

FROM: WILDLIFE HABITAT PROTECTION PROGRAM

TELEPHONE: 307-777-4506 FAX 307-777-4677

DATE: 5-27-10

PAGES: 3 (INCLUDING COVER SHEET)

NOTES: We 12086

Please call (307) 777-4506 immediately if Complications develop
Dear Mr. Venn:

The staff of the Wyoming Game and Fish Department has reviewed the Level I Reconnaissance Study for the South Circle Estates Water Supply Project submitted by USDA Rural Utilities Service in Washakie County. We offer the following comments for your consideration.

**Terrestrial Considerations:**

Construction of this pipeline should not have significant negative impacts on wildlife or their habitat in the area; however, as more homes are constructed in the area potential impacts will likely increase due to fragmentation of habitats. There are no crucial big game ranges or sage-grouse leks in close proximity to this project site, however sage-grouse have been observed using irrigated fields north of this site. Golden and bald eagles have been observed within 2 miles of the proposed project. We recommend that the project proponents conduct appropriate surveys in the area prior to construction.

**Aquatic Considerations:**

To minimize impacts to the aquatic resources in nearby waterways, we recommend that best management practices be used to control erosion and prevent sediment from reaching these waterways and proper development for stream crossings. Examples of best management practices are: stream crossings designed to maintain channel stability, not increase water velocity or prevent fish passage at any flow, buffer zones, disturbed area stabilization with mulch, disturbed area stabilization with permanent vegetation, disturbed area stabilization with sod, and disturbed area stabilization with temporary vegetation. Additional examples of best management practices can be found at the following website: [http://www.cicacenter.org/bmps.html](http://www.cicacenter.org/bmps.html).
Thank you for the opportunity to comment. If you have any questions or concerns, please contact Tom Easterly, Cody Region Wildlife Biologist, at 307-765-2742 or Steve Yekel, Cody Region Fisheries Supervisor, at 307-527-7125 Ext. *816.

Sincerely,

[Signature]

John Emmench
Deputy Director

cc: USFWS
    Tim Woolley, Cody Region
    Tom Easterly, Cody Region
May 4, 2010

Barry Venn
609 Consulting LLC
5830 East 2nd Street
Casper, WY 82609

Re: South Circle Estates Water Supply Project (SHPO File # 0510JRD003)

Dear Mr. Venn:

Thank you for consulting with the Wyoming State Historic Preservation Office (SHPO) regarding the above referenced project.

A search of our records shows that a cultural resource survey has not been conducted in the area of potential effect. Following 36 CFR Part 800, and prior to any ground disturbing activities, we recommend the USDA, in conjunction with 609 Consulting carry out appropriate efforts necessary for identification of historic properties, which may include background research, consultation, consideration of visual effects, sample field investigations or field survey. The identification efforts must be conducted by a consultant meeting the Secretary of the Interior's Professional Qualification Standards (48 FR 22716, Sept. 1983). A report detailing the results of these efforts must be provided to SHPO staff for our review and comment.

We have enclosed a copy of a cultural resource consultants list for your use. Please refer to SHPO project control number #0510JRD003 on any future correspondence dealing with this project. If you have any questions, please contact Joseph Daniele at 307-777-8793.

Sincerely,

Joseph Daniele
Wyoming State Historic Preservation Office
The Wyoming State Historic Preservation Office (SHPO) does not permit or license consultants and makes no endorsement of any particular consultant.

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Dear Mr. Venn:

The Natural Resources Conservation Service (NRCS) has reviewed the proposal for the South Circle Estates Water Supply Project dated April 27, 2010.

The Agriculture and Food Act of 1981, (Public Law 97-98) containing the Farmland Protection Policy Act (FPPA)—Subtitle I of Title XV, Section 1539-1549, is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency.

It does not appear there will be any permanent conversion of prime farmland based on the information you provided. We do recommend prompt re-vegetation of the disturbed areas to minimize soil erosion and weed encroachment. If you need assistance developing a seeding plan or would like a review of an existing seeding plan to ensure suitability for the soil types impacted, feel free to contact the local NRCS office in Worland. A good point of contact would be Ben Bonella, the District Conservationist, at (307) 347-2456 extension 106.

If you have any questions, or need to discuss this comment, please contact Casey Sheley at (307) 233-6770.

Sincerely,

J. XAVIER MONTOYA
State Conservationist

Cc: Ben Bonella, District Conservationist, Worland Field Office
    Geri Sullivan, Area Conservationist, Riverton Area Office
Mr. Barry Venn
609 Consulting, LLC
5830 East 2nd Street
Casper, WY 82609

Dear Mr. Venn:

Thank you for your letter of April 27, 2010, received in our office on April 30, regarding plans for the South Circle Estates Water Supply Project (Project) which will provide a water supply via upgrades and new construction of water systems. The Project area as shown for the preferred option is located in Sections 8 and 17 of T47N, R88W, with the service area 1 mile north of the town of Ten Sleep in Washakie County, Wyoming. The Project will consist of extending a water transmission pipeline from the town of Ten Sleep’s water system, construction of a new water distribution system, and installation of a water storage tank. You requested information from the U.S. Fish and Wildlife Service (Service) to help you complete an environmental review pursuant to the National Environmental Policy Act that is needed by the Rural Utilities Service.

You have requested information regarding species listed under the Endangered Species Act of 1973, as amended (Act), 16 U.S.C. 1531 et seq. In response to your request, the U.S. Fish and Wildlife Service (Service) is providing you with recommendations for protective measures for threatened and endangered species in accordance with the Act. We are also providing recommendations concerning migratory birds in accordance with the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703, and the Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668. Wetlands are afforded protection under Executive Orders 11990 (wetland protection) and 11988 (floodplain management), as well as section 404 of the Clean Water Act. Other fish and wildlife resources are considered under the Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq., and the Fish and Wildlife Act of 1956, as amended, 16 U.S.C. 742a-742j.

In accordance with Section 7(c) of the Act, we have determined that the following species or their designated habitat may be present in the proposed Project area. We would appreciate
receiving information as to the current status of each of these species within the proposed Project area.

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>STATUS</th>
<th>HABITAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black-footed ferret (Mustela nigripes)</td>
<td>Endangered</td>
<td>Prairie dog towns</td>
</tr>
<tr>
<td>Canada lynx (Lynx canadensis)</td>
<td>Threatened</td>
<td>Montane forests</td>
</tr>
<tr>
<td>Greater sage-grouse (Centrocercus urophasianus)</td>
<td>Candidate</td>
<td>Sagebrush communities</td>
</tr>
<tr>
<td>Ute ladies’-tresses (Spiranthes diluvialis)</td>
<td>Threatened</td>
<td>Seasonally moist soils and wet meadows of drainages below 7000 feet</td>
</tr>
</tbody>
</table>

**Black-footed ferret:** Black-footed ferrets may be affected if prairie dog towns are impacted. Please be aware that black-footed ferret surveys are no longer recommended in white-tailed prairie dog towns except those noted in a February 2, 2004, letter written by the Service. It is noted that your Project area has been block cleared for ferret surveys. However, we encourage you to protect all prairie dog towns or complexes for their value to the prairie ecosystem and the many species that rely on them. We further encourage you to analyze potentially disturbed prairie dog towns for their value to future black-footed ferret reintroduction.

**Canada Lynx:** On March 24, 2000, the Service listed the Canada lynx in the contiguous United States as threatened (65 FR 16052). Historically, lynx were observed in every mountain range in Wyoming. Concentrations of observations occur in western Wyoming in the Wyoming and Salt River ranges and continuing north through the Tetons and Absaroka ranges in and around Yellowstone National Park. Numerous records have also come from the west slope of the Wind River Range, with fewer observations in the Bighorn and Uinta mountains. In Wyoming, the lynx lives in subalpine/coniferous forests of mixed age and structural classes. Mature forests with downed logs and windfalls provide cover for denning sites, escape, and protection from severe weather. Early to mid-successional forest with high stem densities of conifer saplings provide optimal habitat for the lynx’s primary prey, the snowshoe hare (Lepus americanus). Snowshoe hare reach their highest densities in regenerating forests that provide visual cover from predators and thermal cover. To benefit lynx, habitats should retain an overstory for concealment and forested connectivity between feeding, security, and denning habitats.

**Greater sage-grouse:** The Service has determined that the greater sage-grouse warrants listing under the Act, but the development of a proposed listing rule is precluded by other higher priority listing actions. As a result, the greater sage-grouse has been placed on the list of candidate species. Candidates are reviewed annually to determine if they continue to warrant listing or to reassess their listing priority. Ideally, sufficient threats can be removed to eliminate the need for listing in which case sage-grouse would no longer be a candidate. If threats are not
addressed or the status of the species declines, a candidate species can move up in priority for a listing proposal.

Please see our recent Federal Register notice (75 FR 13910) on greater sage-grouse for detailed information concerning the status of the species. Greater sage-grouse are dependent on sagebrush habitats year-round. Habitat loss and degradation, as well as loss of population connectivity, have been identified as important factors contributing to the decline of greater sage-grouse populations rangewide. Therefore, any activities that result in loss or degradation of sagebrush habitats that are important to this species should be closely evaluated for their impacts to sage-grouse. If important breeding habitat (leks, nesting or brood rearing habitat) is present in the Project area, the Service recommends no Project-related disturbance March 15 through June 30, annually. Minimization of disturbance during lek activity, nesting, and brood rearing is critical to sage-grouse persistence within these areas. Likewise, if important winter habitats are present, we recommend no Project-related disturbance November 15 through March 14.

We recommend you contact the Wyoming Game and Fish Department to identify important greater sage-grouse habitats within the Project area and appropriate measures to minimize potential impacts from the proposed Project. The Service recommends surveys and mapping of important greater sage-grouse habitats where local information is not available. The results of these surveys should be used in Project planning, to minimize potential impacts to this species. No Project activities that may exacerbate habitat loss or degradation should be permitted in important habitats.

**Ute ladies'-tresses**: Ute ladies'-tresses (*Spiranthes diluvialis*) is a perennial, terrestrial orchid, 8 to 20 inches tall, with white or ivory flowers clustered into a spike arrangement at the top of the stem. *S. diluvialis* typically blooms from late July through August; however, depending on location and climatic conditions, it may bloom in early July or still be in flower as late as early October. *S. diluvialis* is endemic to moist soils near wetland meadows, springs, lakes, and perennial streams where it colonizes early successional point bars or sandy edges. The elevation range of known occurrences is 4,200 to 7,000 feet (although no known populations in Wyoming occur above 5,500 feet) in alluvial substrates along riparian edges, gravel bars, old oxbows, and moist to wet meadows. Soils where *S. diluvialis* have been found typically range from fine silt/sand, to gravels and cobbles, as well as to highly organic and peaty soil types. *S. diluvialis* is not found in heavy or tight clay soils or in extremely saline or alkaline soils. *S. diluvialis* seems intolerant of shade and small scattered groups are found primarily in areas where vegetation is relatively open. Surveys should be conducted by knowledgeable botanists trained in conducting rare plant surveys. *S. diluvialis* is difficult to survey for primarily due to its unpredictability of emergence of flowering parts and subsequent rapid desiccation of specimens. The Service does not maintain a list of "qualified" surveyors but can refer those wishing to become familiar with the orchid to experts who can provide training or services.

**Species of Concern**

**White-tailed prairie dog**: In May of 2008 the Service initiated a status review (73 FR 24910) for the white-tailed prairie dog (*Cynomys leucurus*). The purpose of the status review is to
determine whether the species warrants listing as threatened or endangered under the Act. Threats that may be significant to conserving white-tailed prairie dog populations include disease (sylvatic plague) and some control programs (poisoning). While the white-tailed prairie dog occurs over much of its historic range, colonies are more widely dispersed and population sizes have declined. The white-tailed prairie dog inhabits areas across western and central Wyoming, northwest Colorado, northeastern Utah, and a small area in south-central Montana. Wyoming encompasses the majority of the range of the species. White-tailed prairie dogs typically inhabit moderately sloped grassland, desert grassland, and shrublands at altitudes between 5,500 to 9,800 feet. We encourage the conservation of prairie dog colonies for their value to the many species that rely on them. Prairie dogs serve as the primary prey species for the black-footed ferret and several raptors, including the golden eagle and ferruginous hawk. Prairie dog colonies and burrows also provide shelter or nest sites for species like the mountain plover (Charadrius montanus) and the burrowing owl (Athene cunicularia).

**Mountain Plover:** The Service has agreed to reopen the comment period in 2010 on the proposed rule to list the mountain plover as a threatened species (67 FR 72396, December 5, 2002) and to complete a new final determination on the proposal by May 1, 2011. Once the comment period is reopened and pending the completion of the new final determination, the mountain plover will be proposed for listing. Section 7(a)(4) of the Act, requires Federal agencies to confer with us on any action that is likely to jeopardize the continued existence of any species proposed for listing. Federal action agencies may also request a conference on any proposed action that may affect a species proposed for listing.

We encourage Project planners to develop and implement protective measures should mountain plovers occur within Project areas. Measures to protect the mountain plover from further decline may include: (1) avoidance of suitable habitat during the plover nesting season (April 10 through July 10), (2) prohibition of ground disturbing activities in prairie dog towns, and (3) prohibition of any permanent above ground structures that may provide perches for avian predators or deter plovers from using preferred habitat. Suitable habitat for nesting mountain plovers includes grasslands, mixed grassland areas and short-grass prairie, shrub-steppe, plains, alkali flats, agricultural lands, cultivated lands, sod farms, and prairie dog towns. We encourage you to develop protective measures with an assurance of implementation should mountain plovers be found within the Project areas.

**Migratory Birds:**

The MBTA, enacted in 1918, prohibits the taking of any migratory birds, their parts, nests, or eggs except as permitted by regulations, and does not require intent to be proven. Section 703 of the MBTA states, “Unless and except as permitted by regulations ... it shall be unlawful at any time, by any means or in any manner, to ... take, capture, kill, attempt to take, capture, or kill, or possess ... any migratory bird, any part, nest, or eggs of any such bird...” The BGEPA prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagles or their body parts, nests, or eggs, which includes collection, molestation, disturbance, or killing.
Work that could lead to the take of a migratory bird or eagle, their young, eggs, or nests (for example, if you are going to erect new roads, or power lines in the vicinity of a nest), should be coordinated with our office before any actions are taken. Enclosed please find our general recommendations for the protection of bald eagles and other raptor species. We strongly encourage Project proponents to fully implement the protective measures described in the enclosures in order to help ensure compliance with the MBTA and the BGEPA. We are also available to assist you in developing a Project specific plan to address the MBTA and BGEPA concerns.

Removal or destruction of such nests, or causing abandonment of a nest could constitute violation of one or both of the above statutes. Removal of any active migratory bird nest or nest tree is prohibited. For golden eagles, inactive nest permits are limited to activities involving resource extraction or human health and safety. Mitigation, as determined by the local Service field office, may be required for loss of these nests. No permits will be issued for an active nest of any migratory bird species, unless removal of an active nest is necessary for reasons of human health and safety. Therefore, if nesting migratory birds are present on, or near the Project area, timing is a significant consideration and needs to be addressed in Project planning.

If nest manipulation is proposed for this Project, the Project proponent should contact the Service’s Migratory Bird Office in Denver at 303-236-8171 to see if a permit can be issued for this Project. No nest manipulation is allowed without a permit. If a permit cannot be issued, the Project may need to be modified to ensure take of a migratory bird or eagle, their young, eggs or nest will not occur.

**Wetlands/Riparian Areas**

Wetlands may be impacted by the proposed Project. Wetlands perform significant ecological functions which include: (1) providing habitat for numerous aquatic and terrestrial wildlife species, (2) aiding in the dispersal of floods, (3) improving water quality through retention and assimilation of pollutants from storm water runoff, and (4) recharging the aquifer. Wetlands also possess aesthetic and recreational values. If wetlands may be destroyed or degraded by the proposed action, those wetlands in the Project area should be inventoried and fully described in terms of their functions and values. Acreage of wetlands, by type, should be disclosed and specific actions should be outlined to avoid, minimize, and compensate for all unavoidable wetland impacts.

Riparian or streamside areas are a valuable natural resource and impacts to these areas should be avoided whenever possible. Riparian areas are the single most productive wildlife habitat type in North America. They support a greater variety of wildlife than any other habitat. Riparian vegetation plays an important role in protecting streams, reducing erosion and sedimentation as well as improving water quality, maintaining the water table, controlling flooding, and providing shade and cover. In view of their importance and relative scarcity, impacts to riparian areas should be avoided. Any potential, unavoidable encroachment into these areas should be further avoided and minimized. Unavoidable impacts to streams should be assessed in terms of their functions and values, linear feet and vegetation type lost, potential effects on wildlife, and
potential effects on bank stability and water quality. Measures to compensate for unavoidable losses of riparian areas should be developed and implemented as part of the Project.

Plans for mitigating unavoidable impacts to wetland and riparian areas should include mitigation goals and objectives, methodologies, time frames for implementation, success criteria, and monitoring to determine if the mitigation is successful. The mitigation plan should also include a contingency plan to be implemented should the mitigation not be successful. In addition, wetland restoration, creation, enhancement, and/or preservation does not compensate for loss of stream habitat; streams and wetlands have different functions and provide different habitat values for fish and wildlife resources.

Best Management Practices (BMPs) should be implemented within the Project area wherever possible. BMPs include, but are not limited to, the following: installation of sediment and erosion control devices (e.g., silt fences, hay bales, temporary sediment control basins, erosion control matting); adequate and continued maintenance of sediment and erosion control devices to insure their effectiveness; minimization of the construction disturbance area to further avoid streams, wetlands, and riparian areas; location of equipment staging, fueling, and maintenance areas outside of wetlands, streams, riparian areas, and floodplains; and re-seeding and re-planting of riparian vegetation native to Wyoming in order to stabilize shorelines and streambanks.

We appreciate your efforts to ensure the conservation of Wyoming’s fish and wildlife resources and look forward to working with you. If you have questions regarding this letter or your responsibilities under the Act and/or other authorities or resources described above, please contact Mark Bellis of my office at the letterhead address or phone (307) 352-0377.

Sincerely,

Brian T. Kelly
Field Supervisor
Wyoming Field Office

Enclosure (1)

cc: WGFD, Non-game Coordinator, Lander, WY (B. Oakleaf)
    WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (M. Flanderka)
Protections for Raptors

Raptors, or birds of prey, and the majority of other birds in the United States are protected by the Migratory Bird Treaty Act, 16 U.S.C. 703 (MBTA). A complete list of migratory bird species can be found in the Code of Federal Regulations at 50 CFR 10.13. Eagles are also protected by the Bald and Golden Eagle Protection Act, 16 U.S.C. 668 (Eagle Act).

The MBTA protects migratory birds, eggs and nests from possession, sale, purchase, barter, transport, import, export, and take. The regulatory definition of take, defined in 50 CFR 10.12, means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to hunt, shoot, wound, kill, trap, capture, or collect a migratory bird. Activities that result in the unpermitted take (e.g., result in death, possession, collection, or wounding) of migratory birds or their eggs are illegal and fully prosecutable under the MBTA. Removal or destruction of active nests (i.e., nests that contain eggs or young), or causing abandonment of an active nest, could constitute a violation of the MBTA, the Eagle Act, or both statutes. Removal of any active migratory bird nest or any structure that contains an active nest (e.g., tree) where such removal results in take is prohibited. Therefore, if nesting migratory birds are present on or near a project area, project timing is an important consideration during project planning. As discussed below, the Eagle Act provides additional protections for bald and golden eagles and their nests. For additional information concerning nests and protections under the MBTA, please see the U.S. Fish and Wildlife Service's (Service) Migratory Bird Permit Memorandum, MBMP-2.

For infrastructure (or facilities) that have potential to cause direct avian mortality (e.g., wind turbines, guyed towers, airports, wastewater disposal facilities, transmission lines), we recommend locating structures away from high avian-use areas such as those used for nesting, foraging, roosting or migrating, and the travel zones between high-use areas. If the wildlife survey data available for the proposed project area and vicinity do not provide the detail needed to identify normal bird habitat use and movements, we recommend collecting that information prior to determining locations for any infrastructure that may create an increased potential for avian mortalities. We also recommend contacting the Service's Wyoming Ecological Services office for project-specific recommendations.

Additional Protections for Eagles

The Eagle Act protections include provisions not included in the MBTA, such as the protection of unoccupied nests and a prohibition on disturbing eagles. Specifically, the Eagle Act prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagle or their body parts, nests, chicks or eggs, which includes collection, possession, molestation, disturbance, or killing. The term "disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR 22.3 and see also 72 FR 31132).

The Eagle Act includes limited exceptions to its prohibitions through a permitting process. The Service has issued regulations concerning the permit procedures for exceptions to the Eagle Act's prohibitions (74 FR 46839), including permits to take golden eagle nests which interfere with resource development or recovery operations (50 CFR 22.25). The regulations identify the conditions under which a permit may be issued (i.e., status of eagles, need for action), application requirements, and other issues (e.g., mitigation, monitoring) necessary in order for a permit to be issued.

For additional recommendations specific to Bald Eagles please see our Bald Eagle information web page (http://www.fws.gov/wyominges).

Recommended Steps for Addressing Raptors in Project Planning

Using the following steps in early project planning, agencies and proponents can more easily minimize impacts to raptors, streamline planning and permitting processes, and incorporate measures into an adaptive management program:
1. Coordinate with appropriate Service offices, Wyoming Game and Fish Department, Tribal governments, and land-management agencies at the earliest stage of project planning.
2. Identify species and distribution of raptors occurring within the project area by searching existing data sources (e.g., Wyoming Game and Fish Department, Federal land-management agencies) and by conducting on-site surveys.
3. Plan and schedule short-term and long-term project disturbances and human-related activities to avoid raptor nesting and roosting areas, particularly during crucial breeding and wintering periods.
4. Determine location and distribution of important raptor habitat, nests, roost sites, migration zones and, if feasible, available prey base in the project impact area.
5. Document the type, extent, timing, and duration of raptor activity in important use areas to establish a baseline of raptor activity.
6. Ascertain the type, extent, timing, and duration of development or human activities proposed to occur, and the extent to which this differs from baseline conditions.
7. Consider cumulative effects to raptors from proposed projects when added to past, present, and reasonably foreseeable actions. Ensure that project mitigation adequately addresses cumulative effects to raptors.
8. Minimize loss of raptor habitats and avoid long-term habitat degradation. Mitigate for unavoidable losses of high-valued raptor habitats, including (but not limited to) nesting, roosting, migration, and foraging areas.
9. Monitor and document the status of raptor populations and, if feasible, their prey base post project completion, and evaluate the success of mitigation efforts.
10. Document meaningful data and evaluations in a format that can be readily shared and incorporated into wildlife databases (contact the Service's Wyoming Ecological Services office for details).

Protection of nesting, wintering (including communal roost sites), and foraging activities is considered essential to conserving raptors. In order to promote the conservation of migratory bird populations and their habitats, Federal agencies should implement those strategies directed by Executive Order 13186, "Responsibilities of Federal Agencies To Protect Migratory Birds" (66 FR 3853).

**Recommended Seasonal and Spatial Buffers to Protect Nesting Raptors**

Because many raptors are particularly sensitive to disturbance (that may result in take) during the breeding season, we recommend implementing spatial and seasonal buffer zones to protect individual nest sites/territories (Table 1). The buffers serve to minimize visual and auditory impacts associated with human activities near nest sites. Ideally, buffers would be large enough to protect existing nest trees and provide for alternative or replacement nest trees. The size and shape of effective buffers vary depending on the topography and other ecological characteristics surrounding the nest site. In open areas where there is little or no forested or topographical separation, distance alone must serve as the buffer. Adequate nesting buffers will help ensure activities do not take breeding birds, their young or eggs. For optimal conservation benefit, we recommend that no temporary or permanent surface occupancy occur within species-specific spatial buffer zones. For some activities with very substantial auditory impacts (e.g., seismic exploration and blasting) or visual impacts (e.g., tall drilling rig), a larger buffer than listed in Table 1 may be necessary, please contact the Service's Wyoming Ecological Services office for project specific recommendations on adequate buffers.

As discussed above, for infrastructure that may create an increased potential for raptor mortalities, the spatial buffers listed in Table 1 may not be sufficient to reduce the incidence of raptor mortalities (for example, if a wind turbine is placed outside a nest disturbance buffer, but inadvertently still within areas of normal daily or migratory bird movements); therefore, please contact the Service's Wyoming Ecological Services office for project specific recommendations on adequate buffers.

Buffer recommendations may be modified on a site-specific or project-specific basis based on field observations and local conditions. The sensitivity of raptors to disturbance may be dependent on local topography, density of vegetation, and intensity of activities. Additionally, individual birds may be habituated to varying levels of disturbance and human-induced impacts. Modification of protective buffer recommendations may be considered where biologically supported and developed in coordination with the Service's Wyoming Ecological Services Field Office.

Because raptor nests are often initially not identified to species (e.g., preliminary aerial surveys in winter), we first recommend a generic raptor nest seasonal buffer guideline of January 15th – August 15th. Similarly, for spatial nesting buffers, until the nesting species has been confirmed, we recommend applying a 1-mile spatial buffer around the nest. Once the raptor species is confirmed, we then make species-specific and site-specific recommendations on seasonal and spatial buffers (Table 1).

Activities should not occur within the spatial/seasonal buffer of any nest (occupied or unoccupied) when raptors are in the process of courtship and nest site selection. Long-term land-use activities and human-use activities should not occur within the species-specific spatial buffer of occupied nests. Short-term land use and human-use activities proposed to
occur within the spatial buffer of an occupied nest should only proceed during the seasonal buffer after coordination with the Service, State, and Tribal wildlife resources management agencies, and/or land-management agency biologists. If, after coordination, it is determined that due to human or environmental safety or otherwise unavoidable factors, activities require temporary incursions within the spatial and seasonal buffers, those activities should be planned to minimize impacts and monitored to determine whether impacts to birds occurred. Mitigation for habitat loss or degradation should be identified and planned in coordination with applicable agencies.

Please contact the Service’s Wyoming Ecological Services Field Office if you have any questions regarding the status of the bald eagle, permit requirements, or if you require technical assistance regarding the MBTA, Eagle Act, or the above recommendations. The recommended spatial and seasonal buffers are voluntary (unless made a condition of permit or license) and are not regulatory, and they do not supersede provisions of the MBTA, Eagle Act, Migratory Bird Permit Memorandum (MBMP-2), and Endangered Species Act. Assessing legal compliance with the MBTA or the Eagle Act and the implementing regulations is ultimately the authority and responsibility of the Service’s law enforcement personnel. Our recommendations also do not supersede Federal, State, local, or Tribal regulations or permit conditions that may be more restrictive.

Table 1. Service’s Wyoming Ecological Services Field Office’s Recommended Spatial and Seasonal Buffers for Breeding Raptors

<table>
<thead>
<tr>
<th>Raptors of Conservation Concern (see below for more information)</th>
<th>Spatial buffer (miles)</th>
<th>Seasonal buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golden Eagle</td>
<td>0.5</td>
<td>January 15 - July 31</td>
</tr>
<tr>
<td>Ferruginous Hawk</td>
<td>1</td>
<td>March 15 - July 31</td>
</tr>
<tr>
<td>Swainson’s Hawk</td>
<td>0.25</td>
<td>April 1 - August 31</td>
</tr>
<tr>
<td>Bald Eagle</td>
<td>see our Bald Eagle information web page</td>
<td></td>
</tr>
<tr>
<td>Prairie Falcon</td>
<td>0.5</td>
<td>March 1 - August 15</td>
</tr>
<tr>
<td>Peregrine Falcon</td>
<td>0.5</td>
<td>March 1 - August 15</td>
</tr>
<tr>
<td>Short-eared Owl</td>
<td>0.25</td>
<td>March 15 - August 1</td>
</tr>
<tr>
<td>Burrowing Owl</td>
<td>0.25</td>
<td>April 1 - September 15</td>
</tr>
<tr>
<td>Northern Goshawk</td>
<td>0.5</td>
<td>April 1 - August 15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Wyoming Raptors</th>
<th>Spatial buffer (miles)</th>
<th>Seasonal buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osprey</td>
<td>0.25</td>
<td>April 1 - August 31</td>
</tr>
<tr>
<td>Cooper’s Hawk</td>
<td>0.25</td>
<td>March 15 - August 31</td>
</tr>
<tr>
<td>Sharp-shinned Hawk</td>
<td>0.25</td>
<td>March 15 - August 31</td>
</tr>
<tr>
<td>Red-tailed Hawk</td>
<td>0.25</td>
<td>February 1 - August 15</td>
</tr>
<tr>
<td>Rough-legged Hawk (winter resident only)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Northern Harrier</td>
<td>0.25</td>
<td>April 1 - August 15</td>
</tr>
<tr>
<td>Merlin</td>
<td>0.5</td>
<td>April 1 - August 15</td>
</tr>
<tr>
<td>American Kestrel</td>
<td>0.125</td>
<td>April 1 - August 15</td>
</tr>
<tr>
<td>Common Barn Owl</td>
<td>0.125</td>
<td>February 1 - September 15</td>
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<tr>
<td>Northern Saw-whet Owl</td>
<td>0.25</td>
<td>March 1 - August 31</td>
</tr>
<tr>
<td>Boreal Owl</td>
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<td>February 1 - July 31</td>
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<td>Long-eared Owl</td>
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<td>February 1 - August 15</td>
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<tr>
<td>Great Horned Owl</td>
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<td>December 1 - September 30</td>
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<tr>
<td>Northern Pygmy-Owl</td>
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<td>April 1 - August 1</td>
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<tr>
<td>Eastern Screech-owl</td>
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</tr>
<tr>
<td>Western Screech-owl</td>
<td>0.125</td>
<td>March 1 - August 15</td>
</tr>
<tr>
<td>Great Gray Owl</td>
<td>0.25</td>
<td>March 15 - August 31</td>
</tr>
</tbody>
</table>
Raptors of Conservation Concern

The Service's Birds of Conservation Concern (2008) report identifies "species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing" under the Endangered Species Act (16 U.S.C 1531 et seq.). This report is intended to stimulate coordinated and proactive conservation actions among Federal, State, and private partners. The Wyoming Partners in Flight Wyoming Bird Conservation Plan identifies priority bird species and habitats, and establishes objectives for bird populations and habitats in Wyoming. This plan also recommends conservation actions to accomplish the population and habitat objectives.

We encourage project planners to develop and implement protective measures for the Birds of Conservation Concern as well as other high-priority species identified in the Wyoming Bird Conservation Plan. For additional information on the Birds of Conservation Concern that occur in Wyoming, please see our Birds of Conservation Concern web page.

Additional Planning Resources


Wyoming Game and Fish Department Internet Link to Raptor Information

References


