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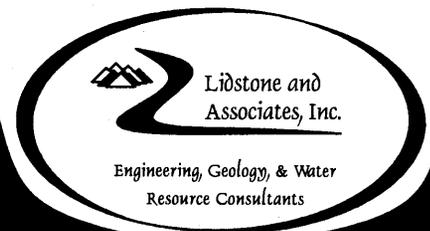
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EXECUTIVE SUMMARY
TOWN OF TEN SLEEP
WATER SUPPLY PROJECT
LEVEL II REPORT

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EXECUTIVE SUMMARY

**TOWN OF TEN SLEEP
WATER SUPPLY PROJECT
LEVEL II REPORT**

Prepared for:

TOWN OF TEN SLEEP
P.O. Box 5
Ten Sleep, WY 82442

And:

WYOMING WATER DEVELOPMENT COMMISSION
6920 Yellowtail Road
Cheyenne, WY 82002

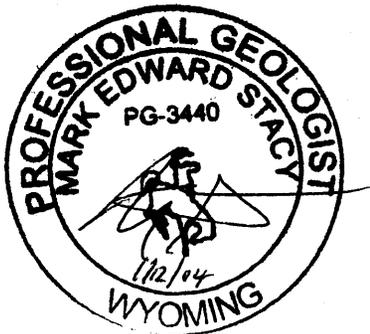
Prepared by:

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In Association With:

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Worland, WY 82401

January 12, 2004



**TOWN OF TEN SLEEP
WATER SUPPLY PROJECT
LEVEL II REPORT**

EXECUTIVE SUMMARY

Lidstone and Associates, Inc. (LA), in association with Donnell and Allred, Inc., has completed its Level II investigation of the Ten Sleep water system. Located approximately 25 miles east of Worland on U.S. Highway 16 in Washakie County, Wyoming, the Town of Ten Sleep (Town) is currently served by two flowing, artesian Madison Aquifer wells that provide adequate supply for the residential population. Based on original open flow test data, these wells are capable of supplying more than 4,000 gallons per minute (gpm) of high quality water. While Town residents enjoy an abundant supply of this water, the average daily water consumption is roughly 493 gallons per capita per day (gpcpd) or 155 gpm. This rate of consumption is roughly twice the average daily system use reported by the Wyoming Water Development Commission in the 2002 Water System Survey Report. Although these demands have yet to exceed system capacity, there have been instances where a significant drop in pressure has been experienced when both the park and cemetery have been irrigated simultaneously.

During the Level I investigation, LA completed a master plan evaluation of the water supply, transmission, and distribution systems. Based on this review, LA determined that the principal problems associated with the water system appear to be the lack of sufficient water system capacity to meet maximum daily demand during the summer months, system leakage estimated at 50,000 to 66,000 gallons per day, the age of Ten Sleep No. 1, and the lack of sufficient aquifer test data to estimate sustainable flows from Ten Sleep No. 2. To address these issues, LA recommended the Town request funding from the Wyoming Water Development Commission (WWDC) to complete a Level II investigation to further explore these issues and to finalize the engineering design of the proposed water system alternatives.

The purposes of this investigation have been to document the condition of Ten Sleep No. 1, determine through aquifer testing the sustainable yield of Ten Sleep No. 2, better identify areas in the distribution system that require upgrades, develop preliminary designs for storage, transmission, and treatment upgrades, and to finalize the conceptual water system designs previously completed.

Based on the data reviewed and additional fieldwork, LA has arrived at the following conclusions:

- Ten Sleep No. 1 remains in very good physical condition, still yields excellent artesian flows, and does not appear to be losing water to the overlying Tensleep Aquifer. Comparison of the well video with the as-built well diagram revealed that for its age, the well casing is in very good condition. The open hole portion of Ten Sleep No. 1 was in similarly good condition and revealed that the productivity of this well is primarily dependent upon permeable fractures in the Darwin Sandstone and Madison Limestone.

- Stepped and constant-rate flow testing of Ten Sleep No. 2 conducted in 2002 and 2003 revealed the well is still capable of yielding large artesian flows, but also

indicated the efficiency of this well has declined slightly since well construction in 1978. This loss of efficiency may be partly due to the fact that this well has not been used to its full capacity since that time. During the test and at rates of 2,000 gpm and more, LA observed carbonate debris emanating from the well indicating redevelopment. Furthermore, aquifer testing of this well revealed the sustainable yield of Ten Sleep No. 2 may be between 1,000 to 1,500 gpm based on short term testing.

- Based on our review of the available data, it appears that replacement wells for both Ten Sleep Nos. 1 and 2 could be drilled and completed successfully at a location offset close to each existing well. An 1,100-foot deep replacement well completed with 8 5/8 inch diameter casing grouted into the top of the Madison Limestone would likely yield a good redundant supply well that would be serviceable for 30 years or more.
- Ten Sleep's transmission and distribution system consists of a combination of two and four inch diameter asbestos concrete and galvanized iron mains that were installed in the mid-1950s, and six, eight, and ten inch diameter PVC mains that were installed during the late 1970s. Several of Ten Sleep's major distribution lines were upgraded around 1980. However, many of the old galvanized iron (GI) lines that were installed prior to the mid-1950s are still in operation. These lines were installed privately to bring water to one or more homes. As with most of the distribution system, there was very little thought of how the overall system would function, or how these small two and four inch lines might affect the rest of the system.
- LA reviewed the Town's municipal water system ordinances and found that they had not been revised since 1954. LA therefore prepared a complete draft set of ordinances for City Council review and approval.
- LA also conducted a thorough search for easements on Ten Sleep's water system, but discovered only a handful of recorded easements for the line extending south to Shriver Park Subdivision. No other recorded easements for water lines in town were found.

Based on our further investigation into the Ten Sleep water system, LA has prepared construction level designs and cost estimates for several alternatives to increase water system capacity and enhance the long-term viability of the water system. The alternatives developed as a result of this investigation include:

- Installing a 300,000 gallon storage tank made of steel or concrete based on the review of WDEQ storage requirements presented in the Level I Master Plan. While this tank would not be sized for fire flows for insurance purposes, it would ensure that the Town has large volumes of water available in the event of a fire. This tank size would be capable of containing one day of storage under the current and projected average daily use, and up to two days if conservation measures are implemented.

LA has identified three potential storage tank locations, two north of Town and one south of Town. All of these locations provide sufficient elevation to adequately pressurize the system and facilitate gravity feed to the distribution system. The northern tank sites allow the opportunity for an isolated transmission line. This is important advantage due to the proposed treatment requirement pending enactment of the future EPA Ground Water Rule, and water stagnation concerns. In addition, a tank in front of the distribution system will allow for “tank turnover.” The three sites are briefly described below along with their respective costs:

A. Sutherland Knob (A)

Located west of Ten Sleep No. 2, this site is preferred due to its proximity to the Town’s wells, which would allow for a shorter and more economical isolated transmission line. Due to the fact that this site is located on private land, there will be no federal or state permitting requirements. The landowners, Jim and Martha Sutherland, are currently not interested in providing an easement and/or allowing the purchase of this land, however, they have allowed room for negotiation with the Town.

Cost Estimate for Storage Tank at Site A

| Item | Unit | Estimated Quantity | Unit Price | Cost |
|---|-------------|---------------------------|-------------------|--------------|
| Mobilization | LS | 1 | \$50,000.00 | \$50,000.00 |
| New 8 in. Transmission Line from Well 1 to Well 2 | LF | 1709 | \$24.00 | \$41,016.00 |
| New 8 in. Transmission Line from Well 2 to Tank w/ Return Line in Same Trench | LF | 3073 | \$35.00 | \$107,555.00 |
| 300,000 gal Concrete Tank and Foundation ¹ | LS | 1 | \$420,000.00 | \$420,000.00 |
| Fittings | LS | 1 | \$20,000.00 | \$20,000.00 |
| Telemetry Building | LS | 1 | \$20,000.00 | \$20,000.00 |
| Telemetry / Power Supply | LS | 1 | \$20,000.00 | \$20,000.00 |
| Chlorination Equipment | LS | 1 | \$15,000.00 | \$15,000.00 |
| SUBTOTAL (1) | | | | \$693,571.00 |
| ENGINEERING 10% of SUBTOTAL (1) | | | | \$69,357.10 |
| SUBTOTAL (2) | | | | \$762,928.10 |
| CONTINGENCY @ 15% OF SUBTOTAL (2) | | | | \$114,439.22 |
| TOTAL CONSTRUCTION COSTS | | | | \$877,367.32 |
| SURVEYING | | | | \$6,000.00 |
| GEOTECHNICAL | | | | \$10,000.00 |
| LEGAL COSTS | | | | \$5,000.00 |
| PRIVATE LAND EASEMENT-TANK LOCATION | | | | \$20,000.00 |
| PRIVATE LAND EASEMENT-TRANSMISSION LINE WELL 1 TO WELL 2 | | | | \$1,725.00 |
| PERMITTING COSTS | | | | \$2,000.00 |
| FINAL PLANS/SPECIFICATIONS | | | | \$30,000.00 |
| TOTAL COST | | | | \$952,092.32 |

¹300,000 gal Steel Tank would cost \$195,000

B. BLM Location (B)

In the event that an agreement with the Sutherlands cannot be reached, a northern alternative exists on nearby Bureau of Land Management (BLM) land, northeast of the Sutherland Knob. It is recommended that a pipeline to this location follow County Road 54 north and then east to the site. By following this route, the Town will avoid crossing through private

property, which would require additional easement negotiations. While a tank located at this site will require longer pipe lengths, an isolated transmission line may still be economically feasible. Therefore, this location has similar advantages to the Sutherland Knob.

If this site is chosen, the Town must contact the BLM and apply for a Special Use Permit. An Environmental Assessment (EA), which addresses National Environmental Policy Act (NEPA) Requirements, may be required as part of the Special Use Permit application process. The Permit must also address the tank location, transmission line, and permanent access road for tank and line maintenance. A cultural resources survey and Threatened and Endangered Species investigation will be required in the area of the proposed activity. Clearance from the Wyoming State Historical Preservation Office (SHPO) and the BLM must be obtained prior to the commencement of any site work.

Cost Estimate for Storage Tank at Site B

| Item | Unit | Estimated Quantity | Unit Price | Cost |
|---|------|--------------------|--------------|----------------|
| Mobilization | LS | 1 | \$50,000.00 | \$50,000.00 |
| New Transmission Line from Well 1 to Well 2 | LF | 1709 | \$24.00 | \$41,016.00 |
| New Transmission Line from Well 2 to Tank w/ Return Line in Same Trench | LF | 9000 | \$35.00 | \$315,000.00 |
| 300,000 gal Concrete Tank and Foundation ¹ | LS | 1 | \$420,000.00 | \$420,000.00 |
| Fittings | LS | 1 | \$20,000.00 | \$20,000.00 |
| Telemetry Building | LS | 1 | \$20,000.00 | \$20,000.00 |
| Telemetry / Power Supply | LS | 1 | \$30,000.00 | \$30,000.00 |
| Chlorination Equipment | LS | 1 | \$15,000.00 | \$15,000.00 |
| SUBTOTAL (1) | | | | \$911,016.00 |
| ENGINEERING 10% of SUBTOTAL (1) | | | | \$91,101.60 |
| SUBTOTAL (2) | | | | \$1,002,117.60 |
| CONTINGENCY @ 15% OF SUBTOTAL (2) | | | | \$150,317.64 |
| TOTAL CONSTRUCTION COSTS | | | | \$1,152,435.24 |
| SURVEYING | | | | \$10,000.00 |
| GEOTECHNICAL | | | | \$10,000.00 |
| LEGAL COSTS | | | | \$5,000.00 |
| PRIVATE LAND EASEMENT-TRANSMISSION LINE WELL 1 TO WELL 2 | | | | \$1,725.00 |
| PERMITTING COSTS | | | | \$15,000.00 |
| FINAL PLANS/SPECIFICATIONS | | | | \$30,000.00 |
| TOTAL COST | | | | \$1,224,160.24 |

¹300,000 gal Steel Tank would cost \$195,000

C. State Land Location (C)

This site is located south of town, approximately 1,500 feet north of Wyoming Highway 434. Due to the increased distance from town, constructing an isolated line to this site would most likely be cost-prohibitive at this time. Therefore, it is recommended that a tank at this location be connected to the existing eight inch line which runs along the highway. Since there will not be an isolated transmission line to this tank, the only opportunity for disinfection will be at each well house via in line chlorination at a chlorination contact tank. To the extent possible, care

will need to be taken to avoid slugging the closest services with too much chlorine. If this alternative is pursued, the Town will need to apply for an easement with the Office of State Lands and Investments for both the tank location and access.

Cost Estimate for Storage Tank at Site C

| Item | Unit | Estimated Quantity | Unit Price | Cost |
|--|------|--------------------|--------------|--------------|
| Mobilization | LS | 1 | \$50,000.00 | \$50,000.00 |
| 8 in. Connection to Existing 10 in. Line w/ Return Line in Same Trench | LF | 2200 | \$35.00 | \$77,000.00 |
| 300,000 gal Concrete Tank and Foundation ¹ | LS | 1 | \$420,000.00 | \$420,000.00 |
| Fittings | LS | 1 | \$10,000.00 | \$10,000.00 |
| Chlorination Equipment ² | LS | 2 | \$30,000.00 | \$60,000.00 |
| Telemetry Building | LS | 1 | \$10,000.00 | \$10,000.00 |
| Telemetry / Power Supply | LS | 1 | \$15,000.00 | \$15,000.00 |
| SUBTOTAL (1) | | | | \$642,000.00 |
| ENGINEERING 10% of SUBTOTAL (1) | | | | \$64,200.00 |
| SUBTOTAL (2) | | | | \$706,200.00 |
| CONTINGENCY @ 15% OF SUBTOTAL (2) | | | | \$105,930.00 |
| TOTAL CONSTRUCTION COSTS | | | | \$812,130.00 |
| SURVEYING | | | | \$8,000.00 |
| GEOTECHNICAL | | | | \$10,000.00 |
| LEGAL | | | | \$5,000.00 |
| STATE LAND ACCESS EASEMENT | | | | \$1,650.00 |
| STATE LAND TANK SITE EASEMENT | | | | \$5,000.00 |
| PERMITTING COSTS | | | | \$6,000.00 |
| FINAL PLANS/SPECIFICATIONS | | | | \$25,000.00 |
| TOTAL COST | | | | \$872,780.00 |

¹300,000 gal Steel Tank would cost \$195,000

²Chlorination will need to be done at each well house

➤ Replace several existing two inch galvanized iron and four inch asbestos concrete mains that are approaching the end of their design life with six-inch PVC mains. To develop a list of distribution system improvements, LA modeled the entire water system using WaterCAD V.6.0. These recommended improvements were prioritized according to age and condition of materials, historical problems, and overall benefit to the system. The following distribution system improvements are recommended, and cost estimates are included for each of the improvements on the following table:

1. *Replace the two inch GI and four inch AC line between 1st Street and 2nd Street from Cottonwood to Chinese Elm Alley.*
2. *Replace the two inch line in Pine Street, south of 3rd Street, with six inch PVC, bore under 2nd Street (U.S. Highway 16) and connect to the existing six inch PVC line south of 2nd Street. Abandon the old two inch GI line in Ponderosa Alley and connect all current customers to existing PVC mains.*
3. *Connect the six inch PVC line in 6th Street to the six inch PVC line in Fir Street.*
4. *Replace the two inch line between 2nd Street and 3rd Street from Willow to west of Fir with six inch PVC.*
5. *Investigate the crossing under Cottonwood Street south of First Street and upgrade if necessary. Replace the valve at the west end of the crossing.*

**TABLE 6.1
COST ESTIMATE FOR DISTRIBUTION SYSTEM IMPROVEMENTS**

| IMPROVEMENT 1 | IMPROVEMENT 2 | IMPROVEMENT 3 | IMPROVEMENT 4 | IMPROVEMENT 5 | Meter All Remaining Service Connections Outside Improvement Areas | ALL IMPROVEMENTS |
|--|--|---|---|---|---|------------------|
| Alley between First Street and Second Street from Cottonwood Street to Chinese Elm Alley | Pine Street from south of Second Street to Third Street and Ponderosa Alley | Pine Street to Fir Street in line with Sixth Street | Alley between Second Street and Third Street from Willow Street to west of Fir Street | East side of Cottonwood Street south of First Street | | |
| Replace existing 4" AC and 2" GI with 6" PVC | Replace existing 2" PE with 6" PVC and abandon 2" GI, connect existing services to mains | Loop existing 6" PVC mains | Replace existing 2" line with 6" PVC | Connect existing 6" PVC to 10" PVC with 3" PE under Cottonwood Street | | |

| BID ITEM NO. | DESCRIPTION | UNIT | ESTIMATED UNIT COST | ESTIMATED QUANTITY | CONSTRUCTION ESTIMATE | ESTIMATED QUANTITY | TOTAL ESTIMATED COST |
|--------------|---|------|---------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|----------------------|
| 1 | Mobilization (7%) | LS | - | 1 | \$3,972.85 | 1 | \$3,822.35 | 1 | \$837.55 | 1 | \$4,264.93 | 1 | \$328.65 | 1.00 | \$11,529.00 | 1 | \$24,755.33 |
| 2 | 6" Class 150 PVC Pipe | LF | \$20.00 | 1300 | \$26,000.00 | 410 | \$8,200.00 | 320 | \$6,400.00 | 1150 | \$23,000.00 | | \$0.00 | | | 3180 | \$63,600.00 |
| 3 | 3" SDR 11 PE Pipe | LF | \$12.00 | | \$0.00 | | \$0.00 | | \$0.00 | | \$0.00 | 60 | \$720.00 | | | 60 | \$720.00 |
| 4 | 2" SDR 11 PE Pipe | LF | \$12.00 | | \$0.00 | | \$0.00 | | \$0.00 | 165 | \$1,980.00 | | \$0.00 | | | 165 | \$1,980.00 |
| 5 | 6" Gate Valve | EA | \$750.00 | 6 | \$4,500.00 | 1 | \$750.00 | 2 | \$1,500.00 | 6 | \$4,500.00 | | \$0.00 | | | 15 | \$11,250.00 |
| 6 | 3" Gate Valve | EA | \$550.00 | | \$0.00 | | \$0.00 | | \$0.00 | | \$0.00 | 1 | \$550.00 | | | 1 | \$550.00 |
| 7 | 2" Gate Valve | EA | \$400.00 | | \$0.00 | | \$0.00 | | \$0.00 | 1 | \$400.00 | | \$0.00 | | | 1 | \$400.00 |
| 8 | 2-1/8" Flushing Hydrant | EA | \$1,800.00 | | \$0.00 | | \$0.00 | | \$0.00 | 1 | \$1,800.00 | | \$0.00 | | | 1 | \$1,800.00 |
| 9 | Foundation Material | LF | \$2.25 | 840 | \$1,890.00 | 320 | \$720.00 | 60 | \$135.00 | 1150 | \$2,587.50 | | \$0.00 | | | 2370 | \$5,332.50 |
| 10 | Select Backfill | LF | \$4.50 | 840 | \$3,780.00 | 320 | \$1,440.00 | 60 | \$270.00 | 1150 | \$5,175.00 | | \$0.00 | | | 2370 | \$10,665.00 |
| 11 | Street Repair (Asphalt) | LF | \$30.00 | 150 | \$4,500.00 | 320 | \$9,600.00 | | \$0.00 | 150 | \$4,500.00 | | \$0.00 | | | 620 | \$18,600.00 |
| 12 | 1-1/2" HDPE Service Line | LF | \$10.00 | 150 | \$1,500.00 | | \$0.00 | | \$0.00 | | \$0.00 | | \$0.00 | | | 150 | \$1,500.00 |
| 13 | 1"HDPE Service Line | LF | \$8.00 | 20 | \$160.00 | 340 | \$2,720.00 | 20 | \$160.00 | 120 | \$960.00 | | \$0.00 | | | 500 | \$4,000.00 |
| 14 | 3/4" HDPE Service Line | LF | \$7.50 | 180 | \$1,350.00 | 290 | \$2,175.00 | 20 | \$150.00 | 120 | \$900.00 | 100 | \$750.00 | | | 710 | \$5,325.00 |
| 15 | Bore for 6" Water Line (including casing) | LF | \$225.00 | | \$0.00 | 90 | \$20,250.00 | | \$0.00 | | \$0.00 | | \$0.00 | | | 90 | \$20,250.00 |
| 16 | Connection to existing system (Including fittings) | EA | \$1,000.00 | 5 | \$5,000.00 | 2 | \$2,000.00 | 2 | \$2,000.00 | 5 | \$5,000.00 | 2 | \$2,000.00 | | | 16 | \$16,000.00 |
| 17 | 3/4" Service Connections with meters and check valves | EA | \$675.00 | 9 | \$6,075.00 | 10 | \$6,750.00 | 2 | \$1,350.00 | 15 | \$10,125.00 | 1 | \$675.00 | 168.00 | \$113,400.00 | 205.00 | \$138,375.00 |
| 18 | 1" Service Connections with meters and check valves | EA | \$1,500.00 | | | | | | | | | | | 25.00 | \$37,500.00 | 25.00 | \$37,500.00 |
| 19 | 2" Service Connections with meters and check valves | EA | \$2,300.00 | | | | | | | | | | | 6.00 | \$13,800.00 | 6.00 | \$13,800.00 |
| 20 | Auto Gun to read meters | LS | \$2,000.00 | 1 | \$2,000.00 | | | | | | | | | | | 1.00 | \$2,000.00 |

| | | |
|---------------------------------|--|--------------|
| SUBTOTAL (1) | | \$378,402.83 |
| ENGINEERING 10% of SUBTOTAL (1) | | \$37,840.28 |
| SUBTOTAL (2) | | \$416,243.11 |
| CONTINGENCY 15% OF SUBTOTAL (2) | | \$62,436.47 |
| TOTAL CONSTRUCTION COSTS | | \$478,679.57 |
| SURVEYING | | \$15,000.00 |
| LEGAL COSTS | | \$5,000.00 |
| PERMITTING | | \$5,000.00 |
| GEOTECHNICAL | | \$8,000.00 |
| EASEMENTS | | \$8,000.00 |
| FINAL PLANS / SPECIFICATIONS | | \$40,000.00 |
| TOTAL COSTS | | \$559,679.57 |

Notes:

Touch Read Equipment will be required to read meters.
Amount of different sized service connections was assumed, based on known aspects of the existing system.

Units:

LS: lump sum
LF: linear foot
EA: each