EXECUTIVE SUMMARY

PINE BLUFFS LEVEL I WATER STUDY

WYOMING WATER DEVELOPMENT COMMISSION

NOVEMBER, 1994

BY

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CHEYENNE, WYOMING 82001

IN ASSOCIATION WITH
LIDSTONE & ANDERSON, INC.
I. INTRODUCTION

The Town of Pine Bluffs, recognizing that they were experiencing new development and that no significant improvements had been made to their water system in a decade. Considering these facts, the Town requested that this study be funded by the Wyoming Water Development Commission.

The purpose of this study was to evaluate both the Town's water supply and delivery system and determine the presence of deficiencies. This analysis included both present and future projected demands.

Pine Bluffs' existing water system consists of six wells and a series of transmission and distribution mains, and two water storage tanks. The combined reservoir storage of both tanks is approximately 710,000 gallons. The Town's water mains consist of approximately 21,550 lineal feet of 4-inch mains, 12,600 lineal feet of 6-inch mains, 14,400 lineal feet of 8-inch mains, and 5,400 lineal feet of 12-inch mains. Many of the old mains in the downtown area are in very poor condition and the system is deficient in the number of gate valves and fire hydrants. Water pressures are low in certain areas of south Pine Bluffs, however, the Town is currently installing a booster pump to help with this problem.

Pine Bluffs' current population is approximately 1,060, which is a slight downturn from the 1980s. Currently, Pine Bluffs serves 508 customers, all of which are metered. Existing average water demands for the Town are:

- 396 gallons per capita per day
- 290 gallons per minute
- 1,043,460 gallons per day total use

Pine Bluffs uses more than average amounts of water for its size. Existing water rates for the Town are very reasonable. They are as follows:

- $7.00 for 0 to 4,000 gallons
- $0.35 for each 1,000 gallons over 4,000 gallons.
II. PURPOSE AND CONTENT

This study evaluated Pine Bluffs' existing supply and distribution system; the existing demands and uses; water quality; water quantity; and water rights. The evaluation included impacts from future demands and potential regulation changes. In more detail, the study consisted of the following:

A. Research and mapping of the existing water system.

B. An analysis of the Pine Bluffs service area and its present and future water demands.

C. An evaluation of both water quantity and water quality. Because nitrates and radon gas were indicated to be a potential problem, these water quality issues were evaluated and tested in greater than normal detail.

D. The physical features of the system (i.e., the pumps, watermains, valves, fire hydrants, and storage tanks) were evaluated.

E. A master plan was prepared which outlined system deficiencies and made recommendations for improvements.

F. An operating plan which outlines several recommended routine operating improvements was prepared.

G. Because of the complexity of the Town's water rights, a complete chapter in the Water Study was devoted to this issue.

H. Recommendations for proceeding into a Level II Study and detailed cost estimates for this study were presented.
III. FINDINGS

A. WATER SUPPLY SYSTEM

The AVI/Lidstone & Anderson team studied the geology and hydrogeology of the area surrounding Pine Bluffs. The existing pumps were tested (all except No. 3) and a detailed study of the Town’s water rights was made. The supply system was also studied for deficiencies.

Well tests indicated that the Town’s best wells are the Ekxtrom No. 1, Well No. 1, and Well No. 2. Table III.1 is a summary of our findings with regard to the wells.

The water supply system itself was found to be in good condition with the following exceptions:

1. Lack of main transmission line to existing storage tanks (water is currently routed through distribution system before reaching the storage tanks).

2. Old 4-inch mains in the downtown area and near the new industrial park should be replaced with larger lines.

3. A number of fire hydrants and gate valves are needed at strategic locations.

B. WATER SUPPLY DEMANDS

Based on a 35-year planning horizon, and a population projection for the year 2030 of 1,350 people, the AVI/Lidstone & Anderson team made the future demand projections as indicated on Table III.2.
<table>
<thead>
<tr>
<th>WELL #</th>
<th>PERMIT #</th>
<th>PRIORITY DATE</th>
<th>ADJUDICATED RIGHT (GPM)</th>
<th>CURRENT PRODUCTION CAPACITY (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P295C</td>
<td>1920</td>
<td>375</td>
<td>700 - 1,000</td>
</tr>
<tr>
<td>2</td>
<td>P124G</td>
<td>1/11/1952</td>
<td>325</td>
<td>600 - 750</td>
</tr>
<tr>
<td>3</td>
<td>P13171W</td>
<td>12/30/1971</td>
<td>375</td>
<td>225 - 350</td>
</tr>
<tr>
<td>4</td>
<td>P13170W</td>
<td>12/30/1971</td>
<td>850</td>
<td>125 - 175</td>
</tr>
<tr>
<td>5</td>
<td>P3994W</td>
<td>8/7/1973</td>
<td>750</td>
<td>1,081 - 1,256</td>
</tr>
<tr>
<td>Ekxtrom No. 1</td>
<td>P298C</td>
<td>1920</td>
<td>1,100 Not to Exceed 49.42 Acre-feet Annually</td>
<td>900 - 1,100</td>
</tr>
</tbody>
</table>

| Totals (less Ekxtrom No. 1) | 2,675 | 1,650-2,275 |
| Totals (with Ekxtrom No. 1) | 2,706 | 2,550-3,375 |

**NOTES:**

1. PRODUCTION CAPACITY ESTIMATED BASED ON ANALYSIS OF STEP DISCHARGE TESTS CONDUCTED BY LIDSTONE & ANDERSON, INC., 1994.
2. WELL PUMPING IS LIMITED TO A TOTAL OF 49.42 ACRE FEET TO BE WITHDRAWN BETWEEN MAY 15 AND OCTOBER 15. THIS CONVERTS TO AN ESTIMATED 153-DAY AVERAGE PUMPING RATE OF 73 GPM.
C. WATER QUALITY

Composite samples of the Town’s water were analyzed for a full suite of EPA parameters. In general, all results were well below EPA standards. The exception was nitrates. Our nitrate test results of the Town’s wells ranged from a low of 2.6 mg/l NO$_3$-N to a high of 8.0 mg/l NO$_3$-N. The team also studied nitrate levels at a number of private wells surrounding the Town. Results of these tests are presented in Chapter 4 of the study.

Our nitrate study concluded that with the limited amount of data available, it was difficult to draw any conclusions regarding the contamination. Further testing is recommended for the Level II Study.

Radon-222 tests were also made of the three best producing wells for the Town. The results are presented in Table III.3.
TABLE III.3
RADON CONCENTRATIONS AT SELECTED TOWN OF PINE BLUFFS MUNICIPAL WELLS

<table>
<thead>
<tr>
<th>Well</th>
<th>Radon Content (pCi/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well No.1</td>
<td>Ra 432.1 +/- 36.5 pCi/L</td>
</tr>
<tr>
<td>Well No. 2</td>
<td>Ra 398.2 +/- 36.4 pCi/L</td>
</tr>
<tr>
<td>Well No. 6</td>
<td>Ra 378.0 +/- 36.5 pCi/L</td>
</tr>
</tbody>
</table>

Based on a recent EPA study, the overall national average of radon gas in water was 249 pCi/l. The average for Wyoming was 558 pCi/l and was 351.6 pCi/l for Nebraska. At this point in time, Pine Bluffs' radon gas is not considered significant.

D. OPERATIONAL IMPROVEMENTS

Pine Bluffs is currently operating their system very well. We have only a few helpful suggestions which are as follows:

1. Continue to track power usage with water pumped at each well monthly. This will track efficiency and will give an indication when pumps need replacing.

2. Service and calibrate and/or replace master well meters in each well house annually; 2-inch and larger meters annually; and smaller meters every 10 years.

3. Balance water meters monthly with master well meters. This will help track leaks, etc.

4. Establish a fire hydrant flushing program at a minimum of once per year for each hydrant. This will help prevent biofilm from building on iron pipes which produce false bacteria tests.

5. Periodically drain, clean, and inspect tanks.

6. A representative from the Town of Pine Bluffs' staff should attend the American Water Works Association Annual Meeting/Convention at least once every three to four years. The classes and seminars presented here are the best available and will keep staff abreast of changes in technologies as well as Federal Rules and Regulations regarding the Safe Drinking Water Act, etc.
7. The Town should continue to measure monthly static water levels at each well. Measurements should be taken during the same period each month and all data should be related to the same datum (unique to each well). The well should be taken off line for a minimum of 24 hours prior to measurement. Water level trends should be evaluated on an annual basis.

E. WATER RIGHTS

In summary, Pine Bluffs’ best wells have the least water adjudication and vice versa. The AVI/Lidstone & Anderson Team has devoted an entire section of the report to this issue. This issue is the highest priority out of all other issues. In general, our recommendations are to improve the water rights for Well No. 1 with an enlargement from Well No. 3 permit, and enlarge the Ekxtrom No. 1 well with an enlargement from Well No. 6 permit. Please refer to Chapter IX of the Report for complete details.

F. RECOMMENDATION AND COST ESTIMATES

The AVI/Lidstone & Anderson team highly recommends that the Town ask the WWDC to proceed into a Level II Study. The scope of this study and associated costs are listed below.

ITEMIZED COSTS AND SCOPE OF LEVEL II STUDY

I. Water rights analysis and well production investigation for Ekxtrom No. 1 well. Includes report to Board of Control. \$45,000.00

II. Rehab Wells: pull pumps, test, inspect and report. \$20,000.00

III. Nitrogen Awareness Program \$5,000.00

IV. Nitrate Investigation \$40,000.00

V. Transmission line direct to water tanks \$20,000.00

\$130,000.00

15% Contingency \$19,500.00

\$149,500.00

CALL \$150,000.00
Our master plan outlined four phases of future development as follows:

Phase I - Replacing pumps and motors, etc. (Cost $103,730.00).

Phase II - Water main improvements in the industrial park area (Cost $291,582.00).

Phase III - Water main improvements in the downtown area (Cost $201,768.00).

Phase IV - Transmission line direct to the existing water storage tanks and chlorine contact chambers for isolated wells not directed to the storage tanks (Cost $574,310.00).

The costs of each phase is based on 1994 dollars and the estimated cost per tap for these improvements are shown below. Costs for new construction that is eligible for WWDC funding was considered 67% grant and 33% loan (4% for 30 years); for WWDC eligible rehabilitation projects, we used 50% grant and 50% loan (4% for 30 years). Non-eligible items were assumed at 50% grant and 50% loan (8% for 30 years) from sources such as the Wyoming Farm Loan Program.
### TABLE III.4
ANNUAL COSTS AND MONTHLY COSTS PER TAP

<table>
<thead>
<tr>
<th>PHASE</th>
<th>ANNUAL COSTS IN DOLLARS</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WWDC ELIGIBLE</td>
<td>NON-ELIGIBLE</td>
<td>TOTAL</td>
<td>AVERAGE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WWDC</td>
<td>WWDC</td>
<td></td>
<td>COST</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PER MONTH</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PER TAP</td>
<td></td>
</tr>
<tr>
<td>PHASE I*</td>
<td>3,230</td>
<td></td>
<td>3,230</td>
<td>$0.53</td>
<td></td>
</tr>
<tr>
<td>PHASE II**</td>
<td>--</td>
<td>12,950</td>
<td>12,950</td>
<td>$2.13</td>
<td></td>
</tr>
<tr>
<td>PHASE III**</td>
<td>--</td>
<td>8,961.50</td>
<td>8,961.50</td>
<td>$1.47</td>
<td></td>
</tr>
<tr>
<td>PHASE IV***</td>
<td>5,995</td>
<td>11,555</td>
<td>17,550</td>
<td>$2.88</td>
<td></td>
</tr>
</tbody>
</table>

Note: Capitol Recovery Factors - 30 Years @ 4% = 0.05783; 30 years @ 8% = 0.08883.

* Phase I - Rehabilitation of wells 50% grant, 50% loan, WWDC loan @ 4%

** Phase II and III - Water main improvements 50% grant, 50% loan, Farm Loan at 8%.

*** Phase IV - New construction WWDC eligible 67% grant, 33% loan. Other 50%-50% split.