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MOORCROFT WATER SUPPLY LEVEL II

EXECUTIVE SUMMARY

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Jan. 3, 1994
Moorcroft Water Supply Level II

Executive Summary

History

The Town of Moorcroft water supply system has historically depended on small volume wells constructed in the Lance formation. The Town has constructed and used six of these type wells over the years to satisfy the water demand. When a State Funded water supply system for the City of Gillette was constructed, the water transmission line from the Madison formation Well Field to Gillette passed near Moorcroft. A condition of the project was the capability for Moorcroft to tap into that water transmission line for use as supplemental supply. Moorcroft exercised that option and over the past few years, Moorcroft's utilization and dependence on that Madison Transmission line has continually increased.

In 1991, the Town of Moorcroft requested that the Wyoming Water Development Commission (WWDC) initiate a project to evaluate the Town's water needs, existing supply capabilities, and potential for development of a system which would reduce or eliminate the Town's dependence on the Gillette system. The two obvious advantages to be gained from this study were the potential ability of the Town of Moorcroft to own and operate their entire water system independently of another government entity and the potential for the City of Gillette to obtain the capability to utilize Moorcroft's capacity in the Madison Transmission line for delivery of water to the Gillette Service Area.

The initial phase of this project was a Level I Study done by Weston Engineering of Upton, Wyoming. In this study, a preliminary evaluation was made of the existing Moorcroft system, the potential for development of additional source, the projected water requirement, and improvements needed for the storage and transmission system.

The Level I report indicates the following information: Moorcroft has six municipal water supply wells, two of which are currently being utilized in the system. Of the wells not used, one is excluded due to the production of entrained gasses, one due to interference with an adjacent well which is used, one because of inadequate supply, and one due to poor water quality. The two wells utilized have a combined capacity of between 20 and 35 gpm.

The water consumption rate for Moorcroft currently is 123,000 gallons per day (85 gpm) and a maximum daily consumption of 307,200 gallons per day (213 gpm). The projected consumption rate for the year 2000 is 157,000 gallons per day (109 gpm).
with a maximum daily consumption of 393,000 gallons per day (273 gpm).

The Level I report recommends three improvements;
1) Construction of a 500,000 gallon water storage reservoir;
2) construction of a pipeline system to collect water from all sources and transmit that water to the storage facility prior to entry into the distribution system;
3) Construction of a new Lance/Foxhills well.

The Level II study was initiated with two major objectives. The first was the construction and testing of the Lance/Foxhills well recommended in Level I, and the second was to prepare preliminary engineering design and cost estimates for the storage and transmission line improvements recommended in the Level I report.

LEVEL II
Well construction and preliminary engineering/estimates.

WELL CONSTRUCTION AND TESTING

The initial site selected for construction of the proposed well was based upon the criteria described in the Level I report. This criteria included intersecting the target aquifer (Foxhills) as near the outcrop as practical for improved water quality and second to locate the well as near as practical to a desired location for the proposed storage facility. A site meeting these criteria was selected on the east side of Moorcroft. The landowner, Alden Robinson, was contacted and an agreement for access and improvement easements was reached.

Plans, specifications, and contract documents were developed for the proposed well construction. A contractor, Weston Engineering, was selected for the project as low bidder in a public bidding process. Weston Engineering constructed a pilot hole which was logged both geologically by the project geologist Dr. J. Paul Gries, and electronically by Goodwell Inc., of Upton. Upon completion of logging operations, it was determined that the target formation was not encountered in an acceptable form. That is, there was no sand aquifer encountered. This pilot hole was abandoned by grouting from total depth to surface.

Upon abandoning the initial hole, another site selection process was conducted. Criteria developed included site availability, proximity to Moorcroft, and moving down dip in the formation to increase potential drawdown depth in the production formation. Two sites were selected, one owned by Crook County School District No. 1 and being adjacent to the Moorcroft High School Complex. The other site was located at the west end of the Moorcroft Recreation Complex immediately west of Town. This land is owned by the State of Wyoming and leased by Moorcroft for recreation purposes.
Permission was received from both the State of Wyoming and the School District to construct and test the proposed well. The site to the west of Town was selected due to the potential for increases head (i.e. drawdown capability) for the well. A pilot hole was drilled and logged as described above. The logging operations indicated a sand formation approximately 90 feet thick lying between 790 and 880 feet below ground surface. This sand formation was selected for development.

The pilot hole was reamed to 12 1/4" and the well was completed as follows using 792.5 feet of steel casing and 91.5 feet of stainless steel well screen. Gravel pack was installed in the lower 234 feet with the remainder of the casing pressure grouted to surface.

Upon completion of construction, the testing program was initiated. A stepped rate test was conducted at rates of 45, 70, 95 and 105 gpm. Constant discharge tests were executed at three separate rates, 100 gpm, 70 gpm and 45 gpm. Analysis of these tests indicate a continuous safe production rate of 45 gpm.

During the testing program, the produced water was tested at regular intervals for temperature, pH and total dissolved solids. The results indicate the water temperature to be between 9 and 15 degrees Centigrade (with a median of about 14 deg. C.), a pH of 7 and total dissolved solids in the 1100 to 1300 mg/l range. A preliminary report on water chemistry indicates acceptable municipal water with a slightly higher than desirable sulfate content. These test indicate that the water from this well is consistent with the water quality from the other wells in Moorcroft.

PRELIMINARY ENGINEERING DESIGN AND COST ESTIMATES

The elements addressed in the preliminary design of the proposed improvements include well completion, transmission line length and sizing, water treatment and storage facility size and location.

The design for the well completion improvements involve determining the production rate and hydraulic characteristics for the pump. This well is designed for a production rate of 45 gallons per minute with a total dynamic head of 760 feet requiring a 15 horsepower motor.

There are two transmission lines required under this proposed design, one to collect the water supply and deliver it to the treatment/storage facility, the other to return the water to the distribution system. The design for the water collection line is based on projected maximum day water demand (273 gpm) and is sized at 6" in diameter. The return line is sized to deliver a fire flow of 1200 gallons per minute. That flowrate requires a pipe 10" in diameter.

The storage facility is sited to provide adequate pressure for the existing distribution system. The most accessible location which allows for that pressure is
immediately east of Moorcroft. The landowner has agreed to allow the facility to be sited at that location. Associated with the storage facility will be a chlorination facility, the only active treatment required, and a control system which will allow for automatic operation of the well system.

The total estimated cost for improvements including professional fees and contingencies is $942,000.00. In addition to that cost, the WWDC will require the Town to reimburse the State for approximately 1/3 of the cost of construction of the new well, or about $25,000.00 for a total project cost of approximately $967,000.00.

SUMMARY AND CONCLUSIONS

The well as constructed will provide an excellent addition to the Town's water supply capabilities. While a more productive well would have been desirable, the inclusion of the newly constructed well, along with the capability to utilize the existing Well No. 6 will provide an adequate water supply for the Town of Moorcroft at the present time.

The major benefit from the improvements proposed in this study are the transmission lines and storage. The addition of the source collection line will enable the Town to utilize the No. 6 well. This well has the highest potential production capability of all of the Town's wells. It is not used however, due to the production of entrained gases. In collecting all of the well water to a central storage location, those gases will be allowed to dissipate in the storage tank prior to entry into the distribution system.

The proposed storage facility will provide the Town with adequate storage to attenuate large fluctuations in demand as well as provide for fire flow capabilities. These are capabilities which the Town does not currently enjoy. As well as allowing for better utilization of water sources, the fire flow capability has the potential to allow for an improved fire rating resulting in lower fire insurance costs for the entire Town.

Under a probable funding mix, the WWDC will grant 67%, or approximately $631,000 to the Town of Moorcroft towards completion of this project. The WWDC will finance the remaining $336,000 with a 30 year, 4% loan. The payments on that loan would amount to about $1,600 per month. It is recommended that this project, including the favorable funding offered by the WWDC, be initiated at the earliest opportunity. The supply, collection, storage and transmission improvements are critical to the continued operation of the Town's water system.