EXECUTIVE SUMMARY
FOR THE:

CLEARMONT CBM IMPACT LEVEL I STUDY

Prepared for the:

Wyoming Water Development Commission
and
Town of Clearmont

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INTRODUCTION

The purpose of this study was to assess the potential effects of encroaching coal bed methane (CBM) development on the Town of Clearmont’s water supply wells and to make recommendations for adding protections and/or contingencies that the Town can take to ensure a reliable, potable groundwater supply in the future. The Town of Clearmont is located along Clear Creek, a tributary to the Powder River in the northwestern part of the Powder River Basin (PRB).

SCOPE OF THIS STUDY

The Clearmont CBM Impact Level I Study included a review of the local/regional hydrogeology of the Tertiary Wasatch and Fort Union formations and a review of existing and future CBM development in the vicinity of Clearmont. The project also included a field evaluation task to collect baseline data from the Town’s two water supply wells, including pump tests, water quality sampling, and routine water level measurements.

HYDROGEOLOGIC SETTING AND NATURE OF CBM

The Clearmont water supply wells are completed in the Wasatch/Fort Union Aquifer System. The water-bearing units within the Wasatch Formation consist of fine-to coarse-grained, lenticular sandstones interbedded with shale and coal with minor amounts of coarse conglomerates. The Fort Union Formation water-bearing units yield water from fine-grained sandstone, jointed coal, and clinker beds. The numerous thick and relatively widespread coal beds within the Fort Union Formation are important aquifers in the PRB.

During the process of coalification, methane-rich gas is generated and stored in the coal matrix and adsorbs onto the surface of the coal. Water then permeates the coal and the pressure of the water holds the methane adsorbed to the coal. During development of CBM, a portion of the water contained in the coal aquifer is removed from the CBM wells. CBM is typically produced in a three-stage process: (1) during the initial dewatering stage, the amount of water produced exceeds that of gas; (2) with continued production, the volume of water continues to decrease as the volume of methane increases; and (3) a stable production stage is reached when maximum methane is produced and water production becomes stable. According to recent State Engineer’s Office (SEO) permitting guidelines, the ratio of water to gas produced during CBM production must be below 10 bbls/mcf after a period of three years in order to prove “beneficial use” of groundwater produced during CBM production.

CLEARMONT WATER SUPPLY WELL EVALUATION PROGRAM

The Clearmont water supply wells, which are completed in the Wasatch/Ft. Union Aquifer, were evaluated by WESTON as part of this study. Both wells were videologged and pump tested and samples were collected for submittal to a laboratory for water quality analyses. The videolog of Well No. 1 indicated that the well is in good condition and the specific capacity of Well No. 1 has remained the same as when it was drilled in 1978. However, Clearmont Well No. 1 is limited to a yield of approximately 5 gpm. While the videolog of Well No. 2 revealed that many of the perforations are plugged and the well has been partially filled with debris, the specific capacity of the well is the same as when the well was drilled in 1980. The pump test results indicate that Well No. 2 could sustain a 25 gpm pumping rate over a period of 20 years, which is significantly more water than the well is currently producing.
FUTURE SUSTAINABILITY OF CLEARMONT WELLS

The study area for this project is a six mile radius surrounding the Town of Clearmont. Of the 183 CBM wells placed into production within the study area, 162 have produced only water and 21 have produced water and gas at ratios well over 10 bbls/mcf. As a result, many of the SEO permits for CBM wells three years and older have been cancelled.

In order to evaluate the future sustainability of the Clearmont wells, WESTON considered three CBM development scenarios to assess the range of potential impacts that may affect the Clearmont wells in the next twenty years.

CBM Development Scenario 1 – Moratorium on all CBM Well Production

Under this development scenario, an immediate moratorium would be placed on all producing CBM wells that are operating at a water/gas ratio above 10 bbls/mcf. In addition, a moratorium would be placed on issuing any future CBM well permits in the Clear Creek drainage due to a history of poor gas production in CBM wells installed in the area.

Under Scenario 1, the water levels in the Clearmont wells would probably remain consistent with current water levels. However, because Clearmont Well No. 1 is only able to sustain a pumping rate of 5 gpm, it would not be able to meet the needs of the community in the event that Well No. 2 were to become inoperable.

CBM Development Scenario 2 – Status Quo

Under this development scenario, it is assumed that CBM wells in the study area would continue to operate at current rates. CBM well permits would be cancelled under the SEO 5 year review period for all wells producing at a water/gas ratio greater than 10 bbls/mcf. Under this scenario, it is assumed that new CBM well permits would not be issued in areas where permits have been cancelled, as per the current SEO cancellation policy.

Under Scenario 2, the water levels in the Clearmont wells would probably remain consistent with current water levels. Because none of the CBM wells in the immediate vicinity of the Town of Clearmont are currently in operation, the potential effects of Scenario 1 and 2 are virtually the same with respect to how each might impact the Clearmont wells.

CBM Development Scenario 3 – Full Development in Clear Creek Drainage

Under this development scenario, it is assumed that a total of 6,712 wells will be installed in the Clear Creek drainage by 2020, according to estimates provided in the 2007 Wyoming State Geological Survey (WSGS) report. It is also assumed that there will be no restrictions on excessive water/gas ratios during production.

Under this development scenario, water levels in the Clearmont wells would begin to decline as more wells are drilled and placed online during the next twenty years. Based on SEO monitoring well data, the maximum decline observed in the Wasatch wells overlying producing coal seams was approximately 340 feet. Water level declines of that magnitude would most likely render Clearmont Well No. 1 useless. Clearmont Well No. 2 would also be severely impacted under this scenario.
CONCLUSIONS

Although CBM development has expanded into the Clear Creek drainage in the vicinity of Clearmont, all the wells within the study area that have been completed for production of CBM have pumped only water or water and very small quantities of gas. Based on recent permit limits set by the SEO that mandate cancellation of a permit when the water/gas ratio is over 10 bbls/mcf after three years of pumping, it is unlikely that CBM wells in the vicinity of Clearmont will be allowed to continue pumping large volumes of water without producing gas. Therefore, CBM Development Scenario 2 is the most likely outcome in the vicinity of Clearmont. Consequently, it is unlikely that future CBM production in the Clearmont area will have an adverse affect on the Town of Clearmont water supply wells.

Both of the Clearmont wells are over thirty years old and approaching their expected lifetime of 40 years. In addition, because Well No. 1 would be unable to meet the needs of the community in the event that Well No. 2 became inoperable, it is likely that the Town of Clearmont will require a new water supply well within the next ten years.

RECOMMENDATIONS

Based on our evaluation of the Clearmont wells, WESTON recommends the following:

- Measure and record weekly static water levels in both wells using the airlines;
- Collect weekly meter readings from both the inflow meter from the wells and the outflow meter from the storage tank;
- Routinely compare the static and pumping water levels in both wells to the production data to facilitate the identification of trends in well performance;
- Petition the SEO to amend the permit conditions for the Clearmont wells that cannot currently be met, including the requirement for 24 hour continuous pumping prior to collecting pumping water levels and the requirement for separate meters on each well;
- In accordance with the SEO permit conditions, submit an annual report to the SEO before February 15 of each year;
- Apply to the WWDC for a Level II Water Supply Study to begin the process of conducting a well siting study and drilling an exploratory test well to replace Clearmont Well No. 1; and
- Establish a sinking fund to pay for replacing one or both wells.

In order to monitor CBM development activities in the Clearmont area, WESTON recommends the following:

- Define an area of concern to include the sections listed in Table VII-1 and petition the SEO and Wyoming Oil and Gas Conservation Commission (WOGCC) to notify the Town of Clearmont whenever new permits are issued within the area of concern.
- Download permit data from the SEO and WOGCC websites on a quarterly schedule to determine if there have been changes in permitting status that may trigger more drilling and CBM development in the area.