



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 2737-2, Summer Creek Inn**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit Application No. 2737-2, Summer Creek Inn, c/o Daniel Evangelisto, 23204 Summer Creek Drive, Rapid City SD 57702.

The Chief Engineer is recommending APPROVAL of Application No. 2737-2 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) it is in the public interest with the following qualification:

The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.

See report on application for additional information.

Jeanne Goodman, Chief Engineer
March 2, 2015

REPORT TO THE CHIEF ENGINEER
ON
WATER PERMIT APPLICATION NO. 2737-2
SUMMER CREEK INN
FEBRUARY 4, 2015

Water Permit Application No. 2737-2 proposes to appropriate water from one well completed into the Precambrian Crystalline Rock aquifer, at a maximum rate of 0.09 cubic feet of water per second (cfs). The existing well that is to be used for this appropriation is 100 feet deep and located in the NE¼ NE¼ Sec. 22, T1N-R5E. The water is for commercial use.

AQUIFER: Precambrian aged Crystalline Rock (CRSL)

Geology and Aquifer Characteristics:

The water well completion report included with this application indicates the well this application proposes to use was constructed in 2007. The report identifies the strata encountered by the borehole as consisting of “drift” overlying hard, grey, fractured schist. The geology of the area has been generally described as metamorphosed black shale (Redden and Dewitt, 2008). This Early Proterozoic aged material is a “Dark, thin-bedded slate, phyllite, or schist, with local beds of metachert (Redden and Dewitt, 2008). The rock types present in this area are all crystalline and make up what can be considered a single hydrologic unit. The crystalline rocks themselves are relatively impermeable, and groundwater is derived primarily through joints, fractures and foliation within the rock. The distribution, orientation and interconnection of these zones of secondary porosity and permeability are unpredictable, and the aquifer characteristics are site specific and highly variable.

The geology of the pre-Cambrian rock in the vicinity of this well site is complex. Complicated structure has resulted from repeated deformations. The beds are tilted nearly on edge with generally a northwest-southeast strike and an easterly dip, although variations occur (Redden and DeWitt, 2008). The axis of an overturned anticline has been inferred, and a fault with significant lateral displacement has been identified within one mile of this well site (Redden and DeWitt, 2008). The fault, the orientation of the beds, and lithologic changes within the beds may all serve as local aquitards. The aquifer (crystalline rock), which outcrops throughout this area, is under unconfined conditions, and the static water level of wells in this area are expected to be about the same elevation as neighboring creeks and streams (South Branch Prairie Creek, Prairie Creek and Clear Creek).

The well completion report submitted with this application indicates the well was constructed in accordance with the SD Well Construction Standards. The report indicates the well produced approximately 100 gallons per minute when developed with air and the static water level of the well was reported to be 30 feet below grade on September 7, 2007.

SOUTH DAKOTA CODIFIED LAW (SDCL) 46-2A-9

Pursuant to SDCL 46-2A-9, a permit to appropriate water may be issued only if there is reasonable probability that there is unappropriated water available for the applicant's proposed use, that the proposed diversion can be developed without unlawful impairment of existing rights and that the proposed use is a beneficial use and in the public interest. This report will address the availability of unappropriated water and existing rights from the aquifer.

WATER AVAILABILITY:

The probability of unappropriated water available from an aquifer can be evaluated by considering SDCL 46-6-3.1 which requires "No application to appropriate groundwater may be approved if, according to the best information reasonably available, it is probable that the quantity of water withdrawn annually from a groundwater source will exceed the quantity of the average estimated annual recharge of water to the groundwater source. An application may be approved, however, for withdrawals of groundwater from any groundwater formation older than or stratigraphically lower than the Greenhorn formation in excess of the average estimated annual recharge for use by water distribution systems."

Water Permit Application No. 2737-2 proposes to appropriate water from the crystalline rock aquifer for a commercial use at the Summer Creek Inn. The well that supplies the Summer Creek Inn is also used to supply a residence (Harris), therefore is a water distribution system pursuant to SDCL 46-1-6(17). Since the Pre-Cambrian aged crystalline rock is older than the Greenhorn Formation and the water is to be used for a water distribution system, the withdrawal/recharge issue need not be considered.

The DENR-Water Rights Program monitors two observation wells completed into the Precambrian aged Crystalline Rock aquifer. Neither of these observation wells are in the immediate vicinity of the well that this application proposes to use. Due to the observation wells' distances from the well that is to be used to supply this appropriation, site and the site specific nature of the aquifer, these observation wells do not describe the local characteristics of the aquifer. However, this data can provide representative general characteristics of the aquifer.

Water level data from the observation wells identify fluctuations of over 50 feet in response to varying climatic conditions, rising during wet years and gradually declining water levels during dry years. In general, the temporal effects of pumping are masked by climatic conditions indicating that recharge to, and natural discharge from the Pre-Cambrian Crystalline Rock aquifer greatly exceeds well withdrawals and additional water is available for well withdrawals to capture. Therefore, this proposed appropriation is not expected to cause withdrawals to exceed recharge in the crystalline rock aquifer in the area of the well site.

IMPAIRMENT OF EXISTING RIGHTS:

There are only two rights/permits appropriating water from the crystalline rock aquifer within approximately 1.5 miles of the well this application proposes to use. The existing water rights include: Water Right No. 1627-2, Kurt Braun; and Water Right No. 1679-2, Pactola Water Association. The wells used to supply these appropriations are all located within 1700 feet of the well that is to supply Water Permit No. 2737-2 (Water Rights, 2015b).

The Water Management Board deferred consideration of Water Permit Application No. 1627-2 in March 1978, pending staff investigation of the area. "Former Water Rights Commissioner, Mr. Mickelson asked for the investigation, expressing concern for possible sewage problems in the area" (Christensen, 1980). One conclusion of the investigation was: "Biological contamination can become a serious problem if sewage is improperly discharged" (Christensen, 1980). The board approved the water permit on January 30, 1980.

The drawdown that will result from pumping a well completed into the crystalline rock aquifer is dependent on aquifer characteristics in the immediate vicinity of the well bore. Since secondary porosity and permeability features of this aquifer dictate the shape and orientation of a well's drawdown cone well interference is not necessarily dependent on distance between wells. Since the porosity of the Crystalline aquifer is small, 0.03-0.10, (Driscoll and others, 2002) drawdown from a pumped well or wells, may extend over a fairly widespread area. Precise drawdown effects at the well site would require additional data and testing. It is possible that drawdown from this proposed well could be measurable in nearby wells, however interference should not be significant considering the small diversion rate proposed.

ARSD 74:02:04:20(6) defines an adequate well as a well constructed to allow the inlet to the pump to be placed not less than 20 feet into the saturated aquifer. An adversely impacted domestic well is defined by ARSD 74:02:04:20(7) as a well in which the pump intake was set at least 20 feet below the top of the aquifer and the water level of the aquifer has declined to a level that the pump will no longer deliver sufficient water for the well owner's needs. Since the porosity of the Crystalline Rock aquifer is low, 20 feet of saturated thickness may not be sufficient for a well to be a reliable water supply. In other words, in this hydrogeologic setting, wells that are "adequate" by definition may not be reliable water supplies. Under these circumstances it can be argued that, any measurable interference (drawdown), from a competing well is actually an adverse impact. However, with natural water level fluctuations in this aquifer measured in excess of 50' at the Water Rights' Observation well; well interference of a few feet could be considered insignificant.

CONCLUSIONS:

1. This application proposes to divert water at a maximum rate of 0.09 cfs from one existing well completed into the Crystalline Rock aquifer for commercial use.
2. The well that is to be used to supply this appropriation was completed in 2007 and has presumably been in use since.
3. Precambrian aged crystalline rock is a viable aquifer in this area.
4. Information is not available to quantify a hydrologic budget for the Crystalline Rock aquifer.
5. The Precambrian aged crystalline rock aquifer is older than the Greenhorn Formation and the water is to be used for a water distribution system. Therefore, the withdrawal/recharge issue need not be considered.
6. Observation well data indicates that there is a reasonable probability that withdrawals will not exceed recharge.
7. There is a reasonable probability that any possible well interference due to the proposed diversion will not unlawfully impair existing users.



Ken Buhler
SD DENR-Water Rights Program

REFERENCES:

- Christensen, J., 1980, Report on Eidelweiss Mountain Improvement, Association Application No. 1625-2 and Northwestern Engineering Co. Application No. 1627-2: SD DENR-Water Rights Program, Water Right File No. 1627-2
- Driscoll, D.G., Carter J.M., Williamson, J.E., and Putnam, L.D., 2002, Hydrology of the Black Hills Area, South Dakota: U.S. Geological Survey Water-Resources Investigations Report 02-4094, 1503 p.
- Harris, Linda. "Permit for the Summer Creek Inn B&B" Email to Eric Gronlund. 23 December 2014
- Redden, J.A., and DeWitt, Ed, 2008, Maps showing geology, structure, and geophysics of the central Black Hills, South Dakota: U.S. Geological Survey Scientific Investigations Map 2777, 44-p. pamphlet, 2 sheets.
- Water Rights, 2015a. Observation Well Files, SD DENR-Water Rights Program, Joe Foss Bldg., Pierre, South Dakota.

Water Rights, 2015b. Water Right/Permit Files, SD DENR-Water Rights Program, Joe Foss
Bldg., Pierre, South Dakota.