

**Water and Environmental Programs
Engineering Success Stories**

State: South Dakota

Borrower Name: Minnehaha Community Water Corporation (47-050-0460318665)

Engineering Firm: Banner Associates, Inc. of Brookings, SD

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Congressional Information: John Thune

County: Minnehaha County

Keywords: Milk Bottle Well Design

Well Design for Improved Well Capacity

Description of Problem/Issue:

Limited saturated thickness in shallow aquifers limits the pumping rate from shallow wells.

Pumping rate is limited because the drawdown due to pumping will pull the water level down to the top of the well screen. With a saturated thickness of 20' (typical in Eastern South Dakota) conventional well design with 10 feet of screen would permit drawdown of 10 feet, permitting a total pumping rate of 200 to 300 gallons per minute for typical well design.

Solution:

Use of "Milk Bottle" design for wells and well screen in shallow aquifer with limited saturated thickness.

This design uses 5 feet of 24" or 30" diameter screen and a 12" well casing and pitless adapter unit. The larger screen diameter provides a similar screen open area while allowing an additional 5 feet of head for drawdown while pumping. The use of this design also has permitted a somewhat higher specific capacity (gallons per minute of flow per foot of drawdown). The combination of these factors (more available head and higher specific capacity) permits design of wells with pumping rates of 1.5 to 2 times the rate that can be achieved with a more conventional design.

Minnehaha Community Water Corporation, Dell Rapids, South Dakota, constructed two wells using this design in 1993 and plans to add a third in 1998. The two existing wells have provided pumping capacity of 500 gpm or more while conventional wells in the same aquifer and similar conditions have a capacity of 250 to 300 gallons per minute. The advantage is the ability to provide more pumping capacity for essentially the same investment in pumps, controls, and pitless adapter unit.