

September 1, 2000

L54(2380)
ROMO/General

Memorandum

To: Superintendent, Rocky Mountain National Park

Through: William L. Jackson, Chief, Water Operations Branch

From: Larry Martin, Hydrologist, Water Operations Branch

Subject: Trip Report for Travel to Rocky Mountain National Park on August 29-30, 2000.

PURPOSE: This trip was made to conduct drawdown and yield testing at the Aspenglen Campground supply well.

SUMMARY: The existing well could be equipped with a larger pump to increase the yield. It appears that 15 gallons per minute is the maximum sustained yield from the well in its current condition. It is likely that the yield could be increased by redeveloping the well.

DISCUSSION: The water supply well for the Aspenglen Campground is located between the campground and the Bighorn Ranger Station. It is north of the Fall River and east of the road leading to the campground. The well is 78 feet deep. It was constructed in 1991 as a replacement for another well in the area that had filled with sand and sediment. The original well had been constructed using perforated casing, which allowed sand to enter the well, eventually filling it to the point where it was no longer useable. The replacement well was constructed using stainless steel well screen and a sand filter pack to prevent sediment from entering the well. I will refer to the original well as Well No. 1 and the new well as Well No. 2.

Well No. 1 was constructed in 1965. It was 101 feet deep. Well No. 1 was tested by pumping at 55 gpm for 12 hours, resulting in water level drawdown of 21 feet. The static water level was 18 feet below ground surface and the pumping water level was 39 feet. The well was constructed with perforated casing. During the test pumping it became obvious that the perforations were too large, as sand was entering the well. A 5-inch steel liner was installed with smaller perforations to reduce the amount of sand entering the well. This worked for several years, but by 1991 the well had filled with sand to the point that it was no longer useable and a new well was constructed.

Well No. 2 was constructed with Stainless steel well screen (0.020" slot size) from 44-54 and 63-73 feet below ground surface. Colorado Silica Sand 8-12 was installed as a filter pack from 20-73 feet below ground surface. A drawdown and yield test was conducted at Well No. 2 at the time of construction. Static water level was 24 feet below ground surface. At a pumping rate of 15 gpm, the water level was drawn down to 54 feet below ground surface. At a pumping rate of 20 gpm, the water level was drawn down to 63 feet below ground surface. Data from this test are plotted on the attached Figure 1.

The well was retested on August 29, 2000 using the 1-hp pump that is normally installed in the well. Response of water level in the well to pumping is shown on Figure 2. The well was pumped at an average rate of 11.8 gpm for 2 hours. Drawdown stabilized at 46 feet below ground surface. Most of the drawdown and recovery of the water level in the well occurred in the first 10 minutes after starting or stopping pumping. This is probably indicative of an inefficient well; the water level in the well is drawn down more than the water level in the aquifer to induce flow into the well. Water level in Well No. 1 (located 10 feet from Well No. 2) was also monitored during this test. Water level in Well No. 1 was lowered 0.9 feet during the test. This indicates that the water level in the aquifer was not lowered very much.

A 1½-hp pump was installed in Well No. 2 for testing on August 30, 2000. Response of water level in the well to pumping is shown on Figure 3. The well was initially pumped at the maximum rate of the pump, 20 gpm. The water level was quickly drawn down to the pump intake at 67 feet below ground surface. A valve on the discharge line was partially closed to reduce the pumping rate to about 15 gpm. This resulted in the water level in the well recovering to about 55 feet below ground surface. After 50 minutes, the pump was turned off to monitor recovery. Water level quickly rose to within about 1 foot of the static water level. The pump was restarted and the water level was drawn down to about 56 feet below ground surface. Pumping continued for an hour. When the pump was turned off, the water level in the well quickly recovered to within about 1 foot of the static water level and then recovered at a much slower rate. These data indicate that the water level in the aquifer is lowered only about 1 foot during pumping, but that the water level in the well must be drawn down much further to create enough head differential between the aquifer and the well for water flow into the well.

Response of the water level in Well No. 1 to pumping Well No. 2 on August 29 and 30 are shown in figures 4 and 5.

The combination of evidence from the testing of Well No. 1 and Well No. 2 leads me to believe that Well No. 2 should be capable of producing much larger quantities of water than is currently being obtained. It appears that Well No. 2 was either not properly constructed or not properly developed to obtain maximum yield from the aquifer. The screen may not have been placed in the proper intervals, opposite the most prolific water-bearing zones. The well may not have been properly developed, leaving fine-grained sediments clogging the well screen and sand filter pack. We can't do anything about the location of the well screen. We can redevelop the well by "jetting" it. Jetting is the process of spraying water at high pressure through the well screen and into the sand filter pack outside of the well screen. The spray of water causes fine-grain particles in the sand filter pack to be washed into the well. The sediment is then removed by bailing the well. The process should result in more efficient movement of water from the aquifer, through the sand filter pack, and into

the well. The well should then be capable of being pumped at higher rates with less drawdown of the water level.

Park staff will arrange to have the well jetted, probably in Spring 2001. WRD staff will then retest the well to determine an optimal pumping rate. Park staff can then select a pump for the well, based on the results of the testing.

ACTION ITEMS: None at this time.

cc:

ROMO – Roger Dillard, Tom O’Neil
2380 – Kimball

Aspenglen Campground Well No. 2
Drawdown and Yield Test at Construction, May 9, 1991

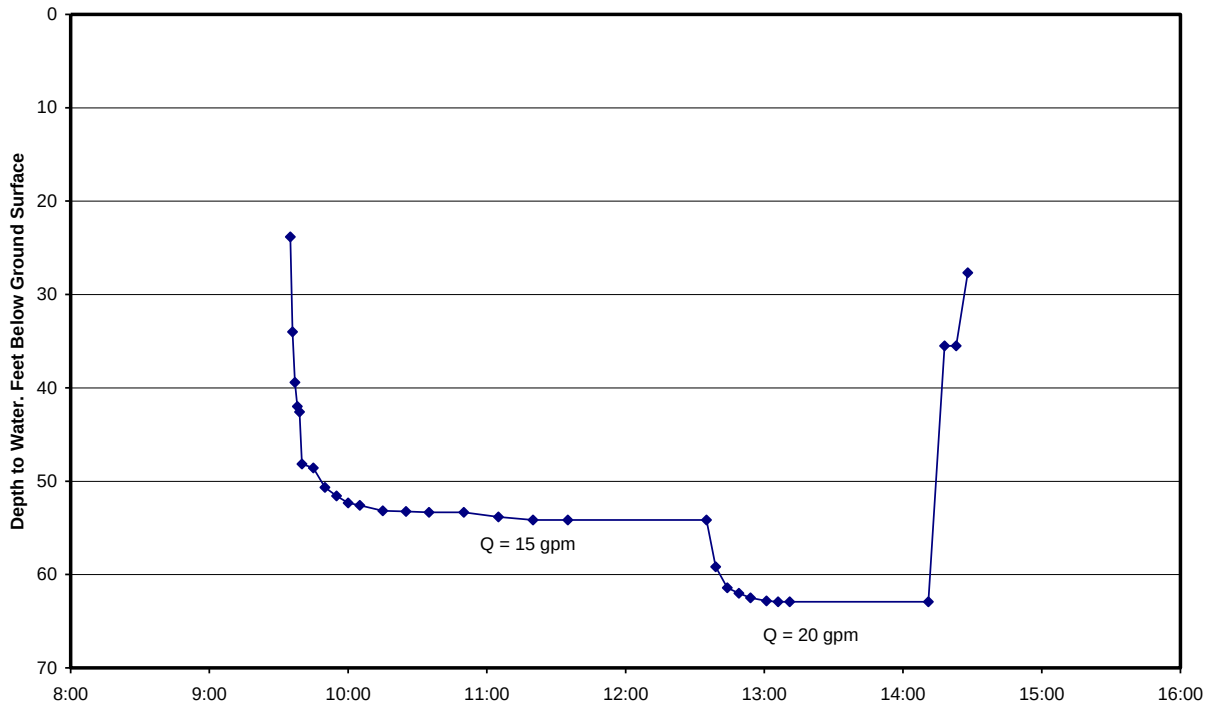


Figure 1

Aspenglen Campground Well No. 2
Drawdown and Yield Test - August 29, 2000

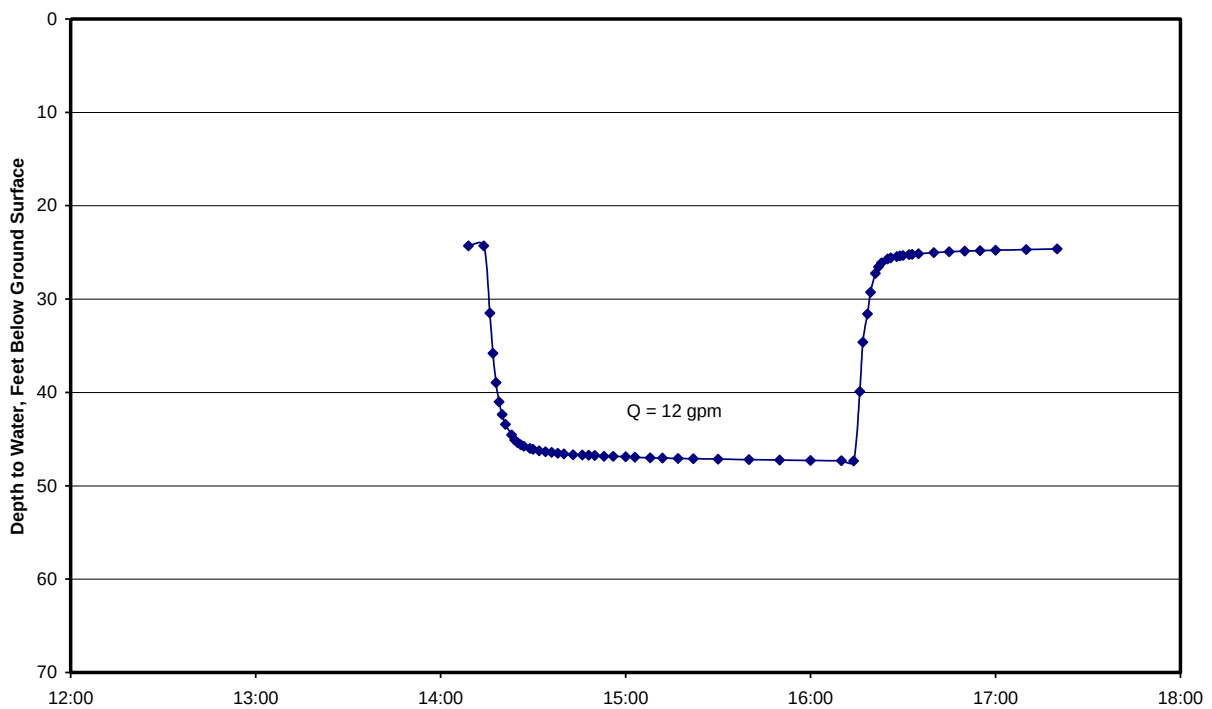


Figure 2

**Aspenglen Campground Well No. 2
Drawdown and Yield Test - August 30, 2000**

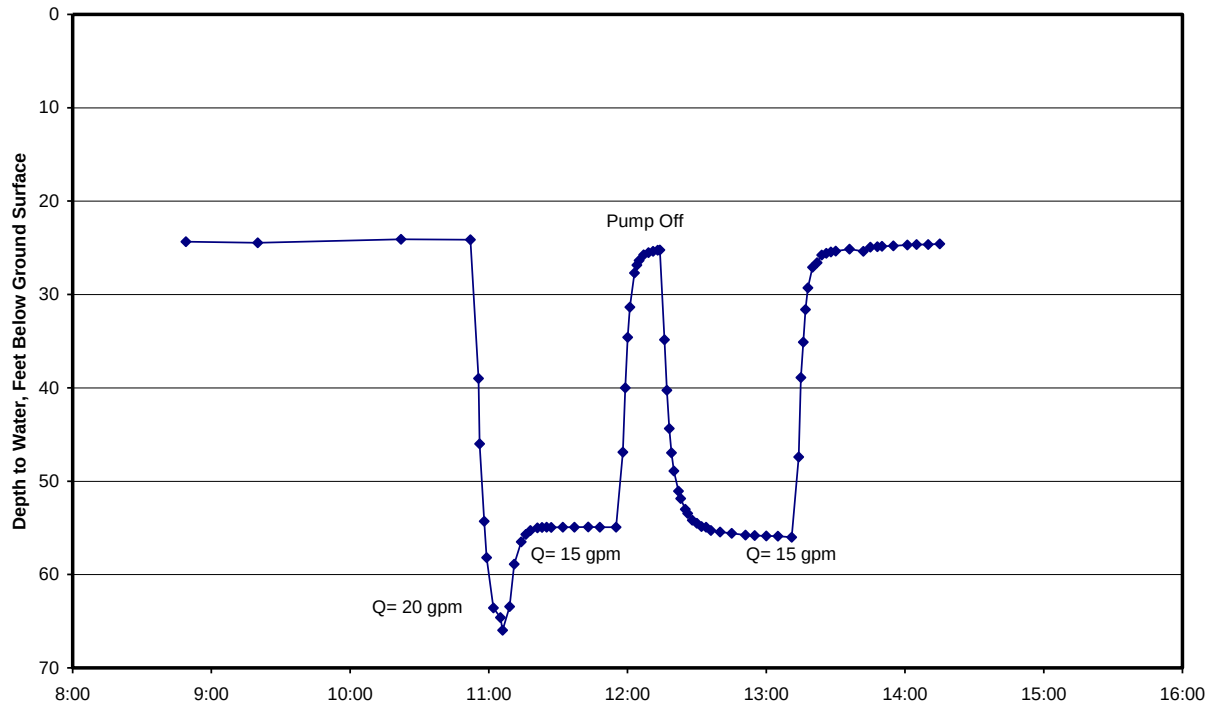


Figure 3

**Aspenglen Campground Well No. 1
August 29, 2000**

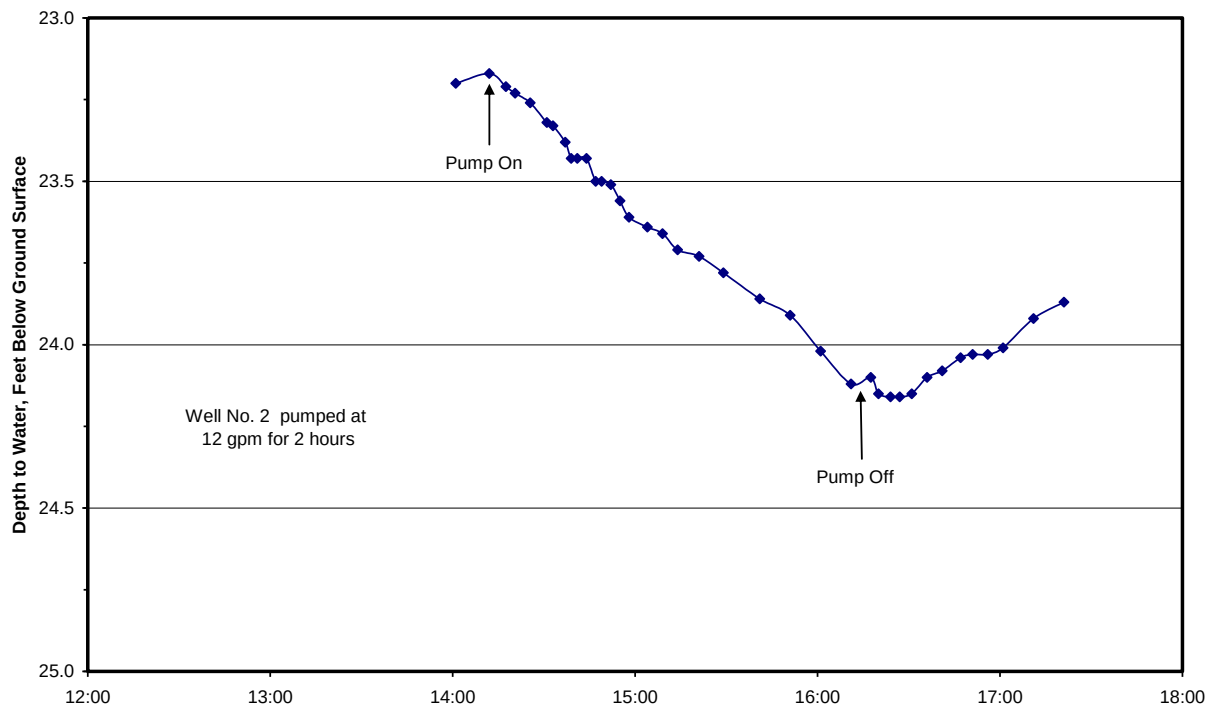


Figure 4

Aspenglen Campground Well No. 1
August 30, 2000

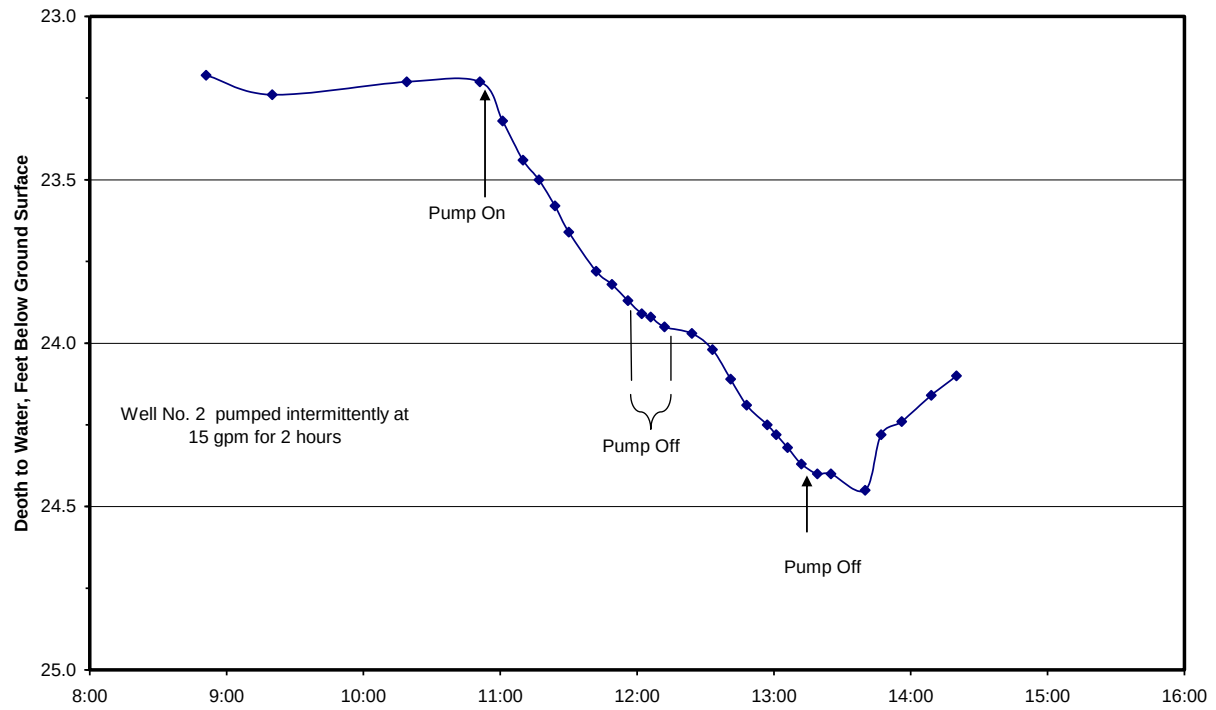


Figure 5