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A Few Comments Regarding the Water-Supply Wells at the Visitor Center and the Sawmill Trail Well, Florissant Fossil Beds National Monument

The original water supply well (Well No. 1) for the visitor center was a shallow well (100 feet deep). It was probably constructed as the domestic supply well for the ranch house that was at the site prior to establishment of the park. This well was plugged and abandoned after construction of Well No. 12 in 1984. A new well was drilled in 1984 (Well No. 12); located a few hundred feet south of the visitor center and admin building. This well is still the sole source of water for the administrative offices and visitor center. The Sawmill Trail Well was constructed in 1990. It is located in an unnamed valley, 5000 feet (as measured in a straight line) southwest of the visitor center. Well locations are shown on Figure 1.

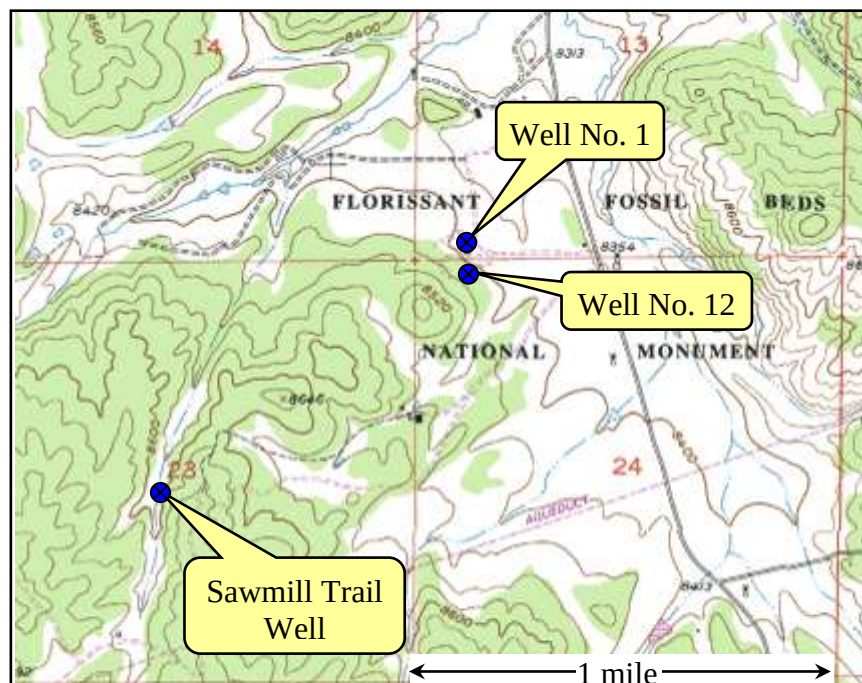


Figure 1. Locations of water-supply wells for the visitor center and admin offices at Florissant Fossil Beds National Monument.

Well No. 12

Well No. 12 was constructed in May 1984. There is conflicting information in the files regarding the depth of the well; whether it was drilled to 471, 480, or 500 feet deep. The most credible information seems to be in a letter from Rocky Mountain Pump & Drilling, dated December 15, 1989. It states that the well is 471 feet deep with 6-inch steel surface casing to an unknown depth and a 4-inch PVC liner from 11 to 471 feet with perforations at 130 feet and from 361 to 461 feet. There is no geologic log for this well.

The well was test pumped at the time of construction (May 1984). The majority of the test was conducted at a pumping rate of about 6 gpm, resulting in drawdown of the water level to about 173 feet. Static water level prior to pumping was 54 feet. The results of this test are shown on Figure 2.

Well No. 12 was test pumped again in December 1989. The majority of that test was conducted at a pumping rate of 4 gpm, resulting in drawdown of the water level to about 431 feet. Static water level prior to pumping was 55½ feet. The results of this test are shown in Figure 3.

Clearly there is a large discrepancy between the results of the two tests. The water level stabilized during the first test at 173 feet with a pumping rate of 6 gpm. During the second test, the water level stabilized at 431 feet with a pumping rate of 4 gpm. I suspect that the 431 foot data is erroneous, but there's no way to know for certain. A new test could be conducted to determine the stable water level when the well is being pumped. However, we would likely only verify that the well is only capable of sustaining a low-yield, 5 gpm or less.

It might be possible to increase the yield from this well by hydrofracking. Hydrofracking is a process of progressively isolating 20-foot sections of the well and injecting water and sand until the pressure builds up sufficiently to fracture the bedrock adjacent to the well. The sand and water mix flows into the newly created fractures and the sand then prevents the fracture from completely closing when the pressure is released. The increased fracturing may allow more water to enter the well.

It will not be possible to remove the PVC liner for hydrofracking if Well No. 12 was constructed with a sand filter in the annular space between the PVC liner and the borehole. The local well drilling company might remember whether this was done, or if they always install a sand filter as a general practice. If the PVC liner can't be pulled from the well, it could be drilled out; adding an additional expense to the hydrofracking operation.

Sawmill Trail Well

The only yield data available I have found for the Sawmill Trail Well is on the well completion and pump installation report. The well was drilled to 220 feet and was completed with 8-inch steel casing to 30½ feet and 6-inch PVC casing and well screen from 9-166 feet. The lower part of the borehole, from 163 to 220 feet was backfilled with drill cuttings. The well was tested in June 1990 by pumping at 18 gpm for 12 hours,

resulting in a final pumping level of 141 feet. The static water level prior to pumping was 10½ feet.

It would seem prudent to conduct another test at the Sawmill Trail Well prior to committing to construction of a pipeline from the well to NPS facilities. The initial plan might be to install a 20 gpm test pump and conduct a series of step-drawdown tests at rates of 10, 15, and 20 gpm; while monitoring the pumping rate and water-level drawdown and recovery. The data could then be used to select a pumping rate for a 48 or 72 hour pumping test. The resultant data should provide a better indication of the sustained yield for the Sawmill Trail Well. If a new water system is constructed with the Sawmill Trail Well as the sole source of water, then an all-weather access road will need to be constructed to the well to provide access for service vehicles.

Staff at NPS Water Resources Division are available to assist in design and/or conducting a test of the Sawmill Trail Well or to assist with preparing a scope of work for hydrofracking of Well No.12 at the visitor center.

Recommendations and Alternatives

1. Hydrofrack the existing supply well, Well No. 12 to see if the yield can be increased. A temporary water supply will be needed for park facilities during the time the well is being hydrofracked and tested.
 - a. Remove the pump from the well.
 - b. Remove the PVC liner from the well and redrill the borehole below the bottom of the steel casing if necessary.
 - c. Hydrofrack the well.
 - d. Reinstall the PVC liner and a test pump rated for 15 gpm from 450 feet.
 - e. Test the yield and drawdown of the well.
2. Test the yield and drawdown of the Sawmill Trail Well to verify that it is capable of providing the desired amount of water.
3. Consider construction of a new well at a more accessible location. Perhaps have a water system that is supplied by two low-yield wells where the wells are more easily accessible than the Sawmill Trail Well.

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FLFO Visitor Center Well
May 24-25, 1984

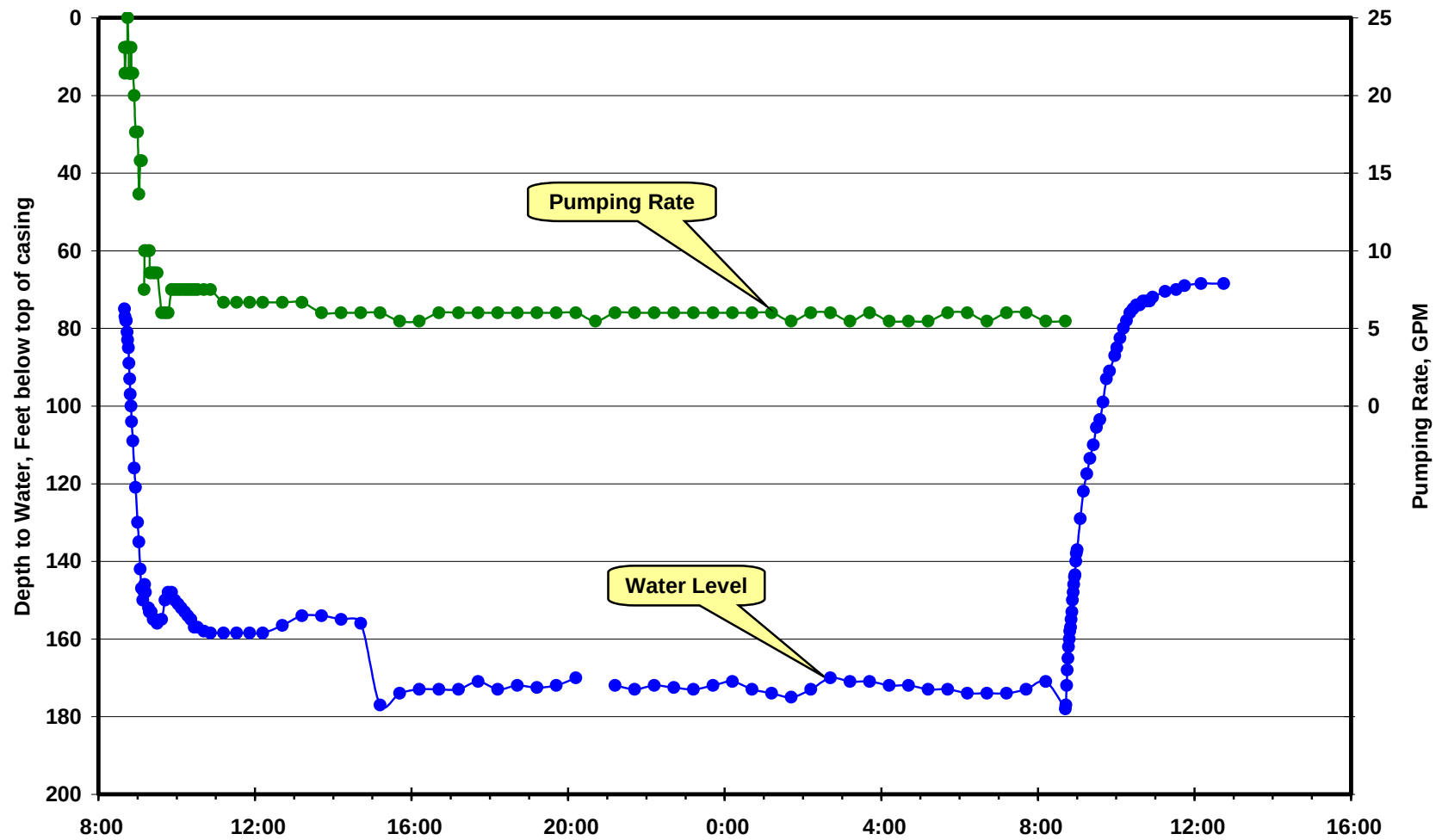


Figure 2. Pumping test data for Well No. 12 at FLFO, May 1984.

FLFO Visitor Center Well No. 12
December 6-8, 1989

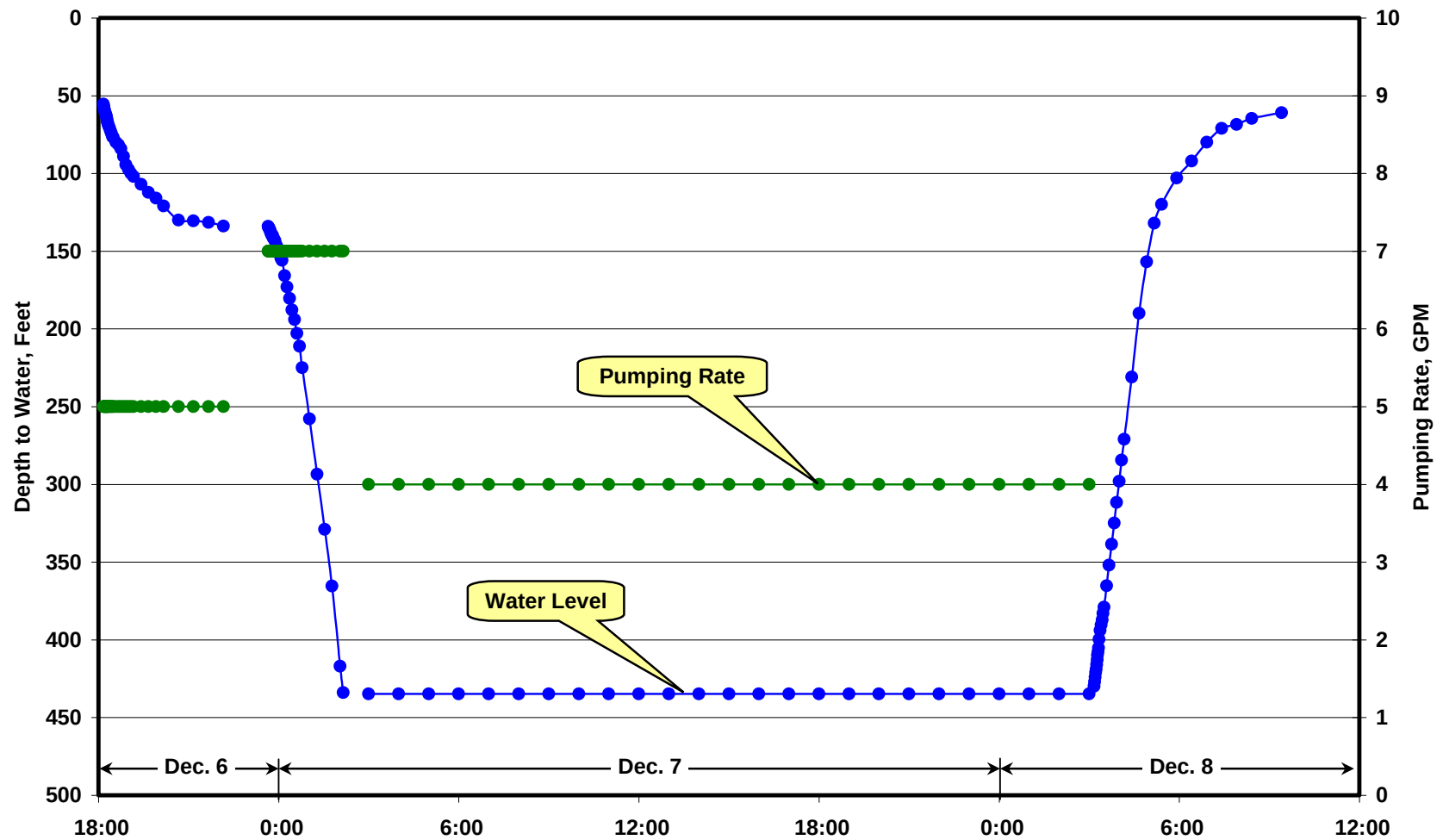


Figure 3. Pumping test data for Well No. 12 at FLFO, December, 1989.