

MEMO

State of Idaho

Department of Water Resources

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Date: January 9, 2014

To: Water Right File 63-33721 / *App for Permit / (Transfer 78338-43-2958 + 43-31988)*

From: Dennis Owsley *DO*

cc: Sean Vincent

Subject: Review of memorandum from Sherl Chapman (Chapman) dated November 17, 2013 in support of a petition to reconsider the permit for Hoot Nanny Farms, Inc.

The subject report was received by the Department on December 3, 2013 in support of a motion to reconsider the 200-foot total depth limitation on the production well. The depth limitation was stipulated as a permit condition in order to minimize additional stress on the deep aquifer system. The deep aquifer system has a slightly declining water level trend and appears to have limited recharge. In contrast, wells completed in the shallow aquifer have stable or slightly increasing water levels.

The report includes a hand-drawn geologic cross-section based upon review of 19 well driller's logs for wells located in Sections 2, 3, and 4 of Township 04N, Range 01W. Of those 19 driller's logs, Chapman indicates that only 13 provided information useful in determining the depths of the aquifer zones in the area of the proposed development. However, the IDWR online well construction database indicates that, in addition to the 19 well driller's logs reviewed by Chapman, geologic logs are available for 47 other wells located in Sections 2, 3, and 4.

In order to minimize impacts to a nearby domestic well, the applicant has agreed to seal and case the production well to approximately 125 feet. The agreement, in combination with the depth limitation imposed by the permit, restricts the open interval in the new well to depths between 125 feet and 200 feet. The possibility of obtaining an inadequate yield from this interval is the basis for the applicant appealing the depth limitation. However, the potential productivity of this interval was not discussed by Chapman and apparently it has not been evaluated.

Based upon review of the selected 13 geologic logs, Chapman contends that the top of the deep aquifer is between 263 and 318 feet deep within the area investigated and approximately 290 feet deep at the new well location. However, the report does not define a contact or sedimentary sequence that distinguishes the shallow and deep aquifers, so it is difficult to establish and/or verify aquifer depth based on the information provided in the report. In part, this is because most of the geologic descriptions included in the well driller's reports are vague and the interpretations appear to be inconsistent. As depicted in the cross-section by Chapman, the geology in the area is complex and

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heterogeneous, making it is difficult to correlate the sand, clay, and gravel sequences laterally across relatively closely spaced wells.

During testing, one of the applicant's existing wells produced 650 gallons per minute, nearly double the maximum permitted flow rate for the proposed well (359 gpm). The existing well is 188 feet deep, 16 inches in diameter, and has 60 feet of well screen (38-78' and 88-108'). Based on the production rate from the existing well, it seems plausible that a well drilled less than 200 feet below ground surface would be able to produce the flow required for this project. Moreover, the idea of attempting to complete a new well in the upper 200 feet prior to drilling deeper was originally proposed by the applicant. As stated in a March 12, 2013 report submitted by ERO (2013) on behalf of the applicant:

"Since the new well is not in the area of shallow ground water concern an attempt will be made to develop a successful well from the 50 to 200 feet depth range. Drilling deeper would only be pursued if a satisfactory well could not be completed in the 50 to 200 feet deep range."

However, since the applicant has agreed to case and seal the production well to 125 feet deep, the maximum open interval for a 200-foot well is only 75 feet, rather than 150 feet as contemplated in the March, 2013 report. Nonetheless, the applicant has not provided any geologic or aquifer testing information to support the assertion that the interval from 125 feet to 200 feet would fail to provide an adequate water supply. Moreover, the cross-section included in the Chapman report depicts a dipping sand horizon between 125-200 feet below land surface in the four wells closest to the proposed production well. One of those wells, a monitoring well located one-half mile to the southwest of the proposed production well that was installed by the Department, encountered approximately 25 feet of sands between the depths of 156 and 190 feet (Appendix A).

Using the geologic record collected during the drilling of the 704-foot deep IDWR monitoring well and a protestant's well located one-half mile to the northeast of the proposed POD, a geologic cross-section was developed to investigate the water bearing potential in the upper 200 feet (Figure 1). Based on the two wells used to develop the cross-section, it appears likely that sand units would be encountered in the interval between 125 and 200 feet at the location of the proposed POD. It is difficult to estimate how productive this aquifer horizon may be at the location of the proposed well owing to the complexity of the shallow sedimentary sequence in this area.

In conclusion, there is no basis for concluding that the aquifer between the depths of 125 and 200 feet lacks adequate productivity. The cross-section developed for this memo and the driller's reports used to develop the Chapman cross-section illustrate that there is moderate water bearing potential in the area of the proposed well.



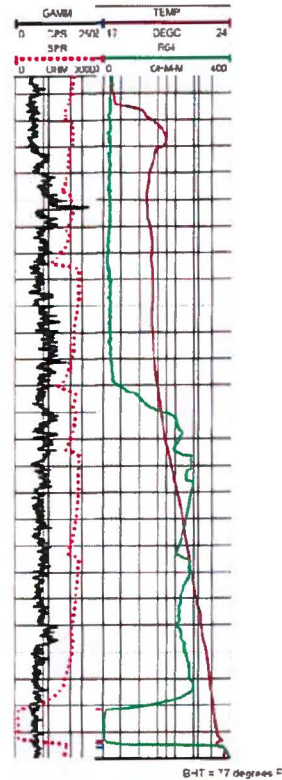
Figure 1. Map and cross section near the proposed point of diversion.

APPENDIX A

DRILLING LOG FOR IDWR MONTIORING WELL

North Ada County Monitoring Well #3 T. 4 N., R. 1 W., Section 04

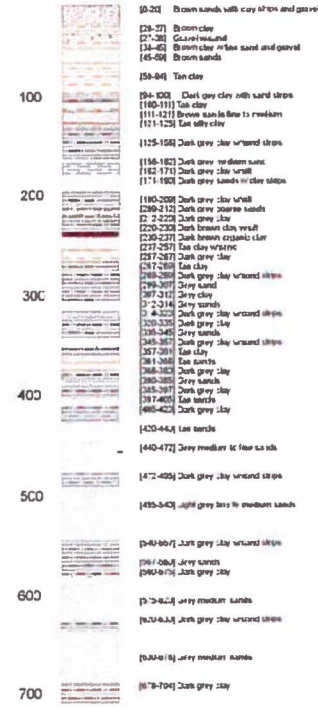
January 2011



Geophysics conducted by MTI following construction of the well.

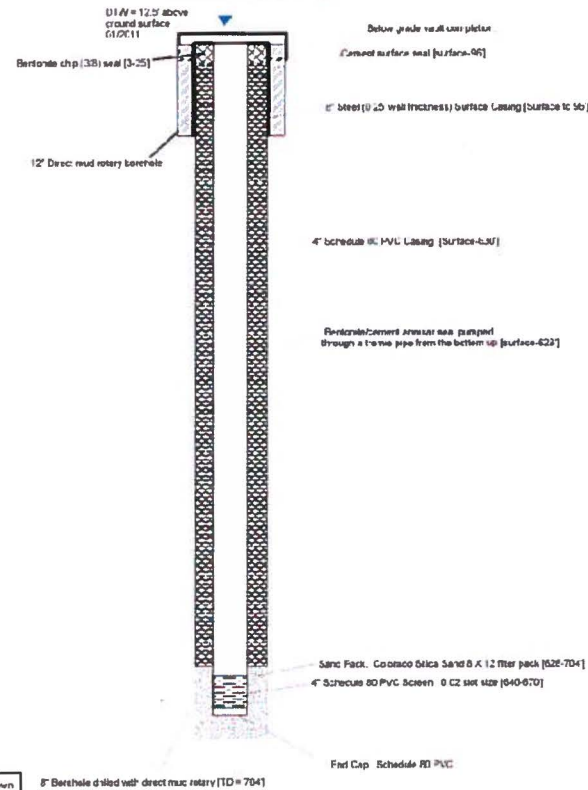
Lithology
Lithology based on drill cutting
analysis conducted by IDWR

Ground Surface



Well drilling and construction by Crown Right Drilling and Pump Company, Caldwell, Idaho

As-Built
Well Construction



Existing domestic well.
IU = 133'
SWL = 29.53' bwp (03/2011)

Water Chemistry Results

Analyte (mg/L, unless otherwise noted)	
Alkalinity as CaCO ₃	129
Ammonia	0.034
Arsenic	<0.014
Boron as B ₂ O ₃	11
Chloride	2.87
Conductivity (uS/cm)	318
Fluoride	0.524
Hardness	100
Iron	0.58
NO ₃ (dissolved nitrate)	0.19
Magnesium	6.7
Manganese	0.091
Manganese (dissolved)	0.09
Nitrate as N	<0.39
Nitrite as N	<0.11
Orthophosphate as P	0.036
pH (25°C)	7.36
Potassium	1
Silica	26
Sulfate	15
Sulfide	<0.10
Total Dissolved Solids	180
Total Kjeldahl Nitrogen	0.12
Total Organic Carbon	0.95
Water Temperature (°C)	16.7
Water Conductivity (uS/cm)	277
Water pH (25°C)	7.41