NEVADA WATER SCIENCE CENTER (NWSC)
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MEMORANDUM

May 11, 2012

To: Kip Allander, Groundwater Specialist, Nevada WSC, USGS

From: Jena Huntington, Hydrologist, Nevada WSC, USGS

Subject: WONDER WELL AQUIFER TEST—Analysis of a single-well aquifer test in Dixie Valley, Nevada, HA 128

Introduction

A private company was contracted to complete a constant rate pumping test in an isolated well in southern Dixie Valley, Nevada, hydrographic area 128 (fig. 1). Pumping data was analyzed as a single-well aquifer test. The aquifer test was 48 hours in duration and was preceded by a 6-hour step test. Testing was done from May 16th to May 19th, 2011. Transmissivity of basin-fill sediments from approximately 400-500 ft below land surface was estimated. Estimated hydraulic properties of this well fill in hydrogeologic data gaps in the valley and will help constrain calibration of a future groundwater flow model of the valley.

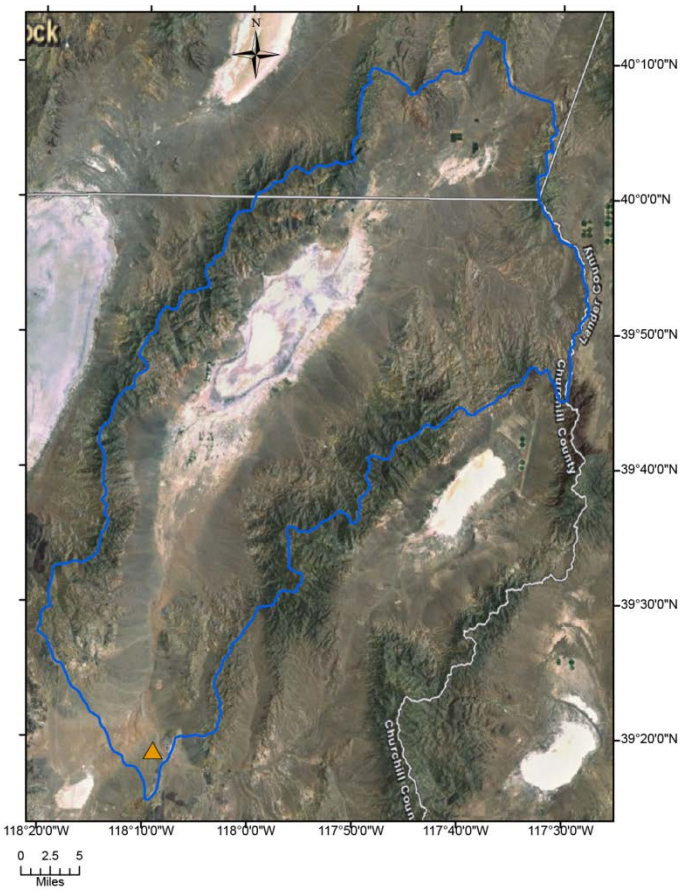

Figure 1. Location of well for aquifer testing in Dixie Valley, Nevada

Site and Geology

The single-well aquifer test occurred in southern Dixie Valley, Nevada (fig. 1) within alluvial basin-fill sediments on the valley floor. Well completion and aquifer material information was taken from well driller's logs (table 1 and Appendix A). The alluvial fill comprised cobbles, gravel, sand and small amounts of clay intervals from about 4,350 to 3,850 feet above North American Vertical Datum of 1988 (0 to 500 feet below land surface). The screened interval penetrated mostly gravel and sand.

Table 1. Location and construction of well used in Dixie Valley single-well aquifer test

[Geographic coordinates are given in latitude and longitude referenced to North American Datum of 1983 and vertical altitude data is referenced to North American Vertical Datum of 1988.]

Site ID	Well name	Latitude	Longitude	Land surface altitude, ft above sea level	Well depth, ft	Static water level, ft below land surface	Depth to Top of Screen, ft	Depth to Bottom of Screen, ft	Well Diameter, in
391900118085801	Wonder well	39° 18' 59.96"	118° 08' 58.35"	4,348.71	500	423.2	400	500	8

Procedures and Analysis

A preliminary step-drawdown test and a constant-rate pumping test were done in the Wonder well. The well was equipped with a submersible pump, discharge line, and flow meter. During the step-drawdown test, water levels were manually measured and pumping rates were adjusted periodically to ensure a constant rate was achieved (table 2 and fig. 2). Following the 6-hour step-drawdown test, the well was allowed to recover overnight and then pumped constantly for 48 hours. The Wonder well was allowed to recover for about six hours before the pump was removed from the well.

Data were analyzed using an Excel spreadsheet program (Halford and Kuniansky, 2002) and the Cooper-Jacob analysis (1946) (fig. 3).

Table 2. Aquifer test length, pumping rates and estimated transmissivity for Wonder well single-well aquifer test.

Site ID	Well name	Length of Test, hrs	Pumping rate, gpm	Water Level Change, ft	Transmissivity, ft^2/d
391900118085801	Wonder well	48	20	-48.1	2,500

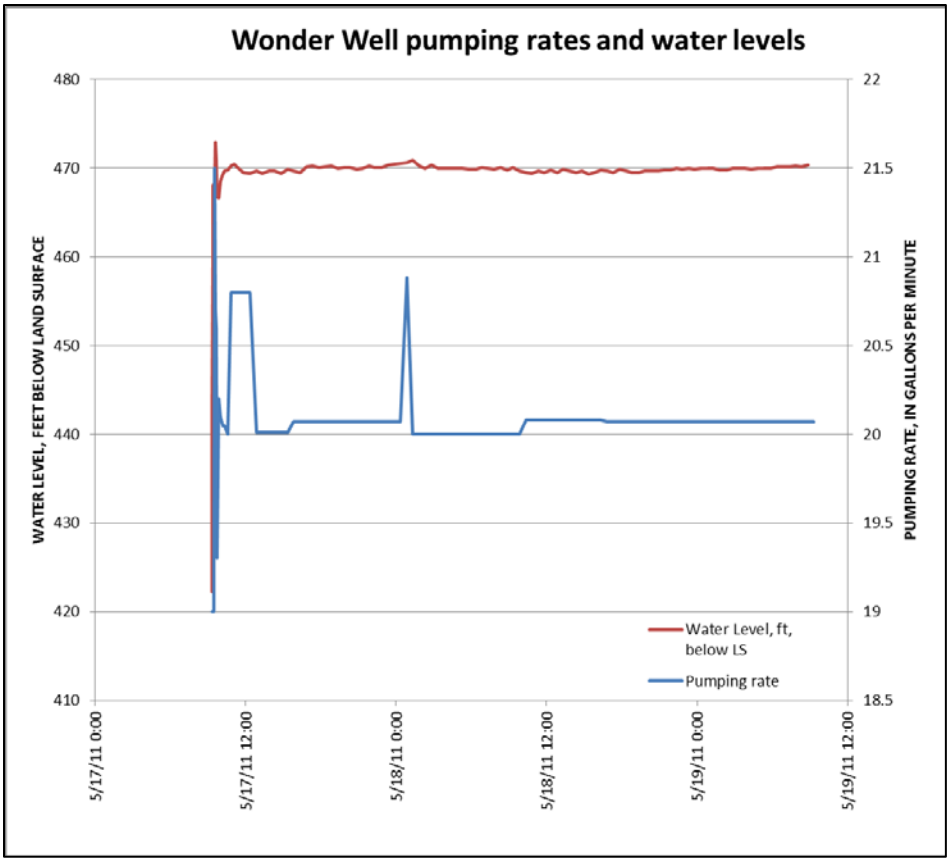

Figure 2. Graph showing pumping rates and water levels during Wonder Well aquifer test.

Hydraulic Property Estimate

The estimated transmissivity of the Wonder Well is about 2,500 ft^2/d for basin-fill sediments (table 2). Observations included in the transmissivity uncertainty include 1) the static water level was within the screened interval prior to the test start and 2) the saturated thickness within the screened interval decreased as the test progressed.

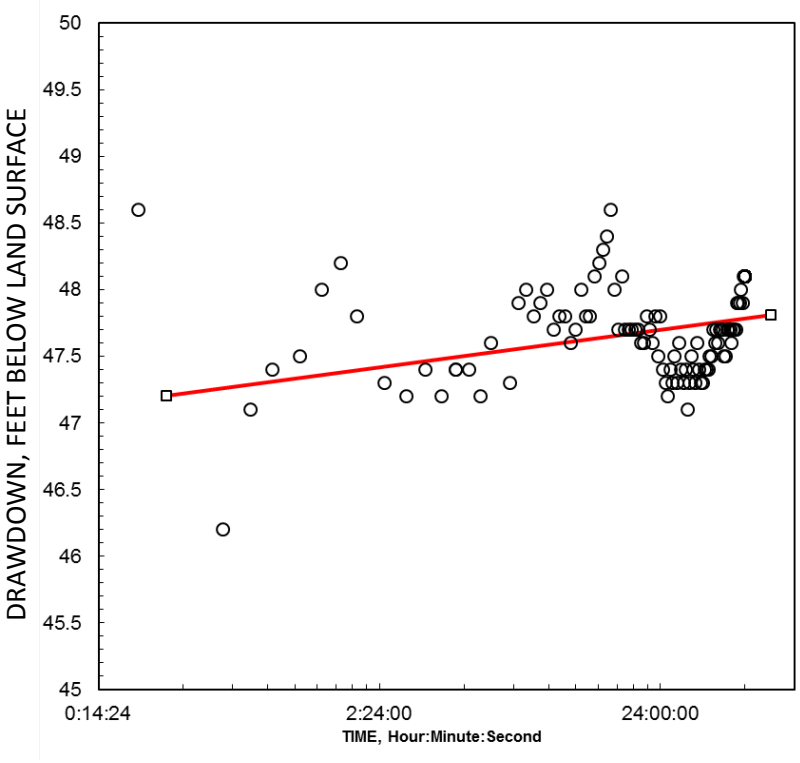

Figure 3. Cooper-Jacob analysis of the Wonder well in Dixie Valley, NV.

References

Cooper, H.H. and Jacob, C.E., 1946, A generalized graphical method for evaluating formation constants and summarizing well field history, American Geophysical Union Transactions, v. 27, 526–534.

Halford, K.J. and Kuniansky, E.L., 2002, Documentation of spreadsheets for analysis of aquifer-test and slug-test data, U.S. Geological Survey Open-File Report 02-197, 51 p.

Appendix A. Wonder Well's driller's log

STATE OF NEVADA
DIVISION OF WATER RESOURCES
WELL DRILLER'S REPORT

OFFICE USE ONLY
Log No. 112591
Permit No.
Basin 138 pg 1/2

PRINT OR TYPE ONLY
DO NOT WRITE ON BACK

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

NOTICE OF INTENT NO. 66560

1. OWNER U.S. Geological Survey
MAILING ADDRESS 2730 N Deer Run Road
Carson City, Nv, 89701

ADDRESS AT WELL LOCATION Dixie Valley Near Chalk Mountain
Subdivision Name: County: Churchill

2. LOCATION SE ¼ SE ¼ Sec 21 T 17N N/S R 34 E
PERMIT/WAIVER No. MO-1641 (Issued by Water Resources) Parcel No.

Latitude 39.327 Longitude 118.149
UTM E N ☐ NAD 27 ☐ NAD 83/WGS 84

3. WORKED PERFORMED
☒ New Well ☐ Replace ☐ Recondition ☐ Deepen ☐ Other

4. PROPOSED USE
☐ Domestic ☐ Irrigation ☐ Test ☐ Municipal/Industrial ☒ Monitor ☐ Stock

5. WELL TYPE
☐ Cable ☒ Rotary ☐ RVC ☐ Air ☐ Other Mud

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Dark colored gravel and sand, grading finer with depth		0	200	200
Small gravels and sand, small amount of silt and clay		200	310	110
Medium and fine sands mixed with silt and clay to 20%		310	395	85
Dark colored medium sands and gravels with10-15% silt/clay, coarser with depth	x	395	500	105

RECEIVED
2011 JAN 19 PM
STATE ENGINEER'S OFF

Date started: 20-Nov , 20 10
Date completed: 6-Dec , 20 10

9. WELL CONSTRUCTION
Depth Drilled 500 Feet Depth Cased 500 Feet

HOLE DIAMETER (BIT SIZE)

		From	To
13	Inches	0 Feet	500 Feet
	Inches	Feet	Feet
	Inches	Feet	Feet

CASING SCHEDULE

Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
8.625	16.96	0.188	0	500

Perforations:
Type of perforation: Machine slot
Size of perforation: .03"
From 400 feet to 500 feet
From feet to feet
From feet to feet
From feet to feet
From feet to feet

Annular Seal: ☐ Yes ☐ No

☒ Neat Cement	0 to 1	☐ Pumped	☒ Poured
☐ Cement Grout	to	☐ Pumped	☐ Poured
☐ Concrete Grout	to	☐ Pumped	☐ Poured
☒ ≥30% Bentonite Grout	1 to 379	☒ Pumped	☐ Poured

Gravel Pack: ☒ Yes ☐ No 380 to 500 ☐ Pumped ☒ Poured
Type: Large aquarium gravel
Bentonite Chips: ☒ Yes ☐ No 379 to 380 ☐ Pumped ☒ Poured
Type: Cetco coated tablets

7. Water Level
Static water level: 424.16 feet below land surface
Artesian Flow: G.P.M. P.S.I.
Water Temperature: cool °F
Quality: unknown

8. WELL TEST DATA
TEST METHOD: ☐ Bailer ☒ Pump ☐ Air Lift

G.P.M.	Draw Down (Feet Below Static)	Time (Hours)
30	60	8

10. DRILLER'S CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.
Name James L. Wood (Contractor)
Address 2730 N Deer Run Road (Contractor)
Carson City, Nv., 89701
Nevada contractor's license number issued by the *State Contractor's Board*
Nevada driller's license number issued by the Division of Water Resources / the *on-site driller* FP-2178
Signed (By driller performing actual drilling on site or contractor)
Date 12/30/2010

(Rev. 05-08)
USE ADDITIONAL SHEETS IF NECESSARY

39.377078°N
118.148037°W
NAD 27 (N)