Technical Data Information Report

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Document Title/Subject

EWDP Manual Water Level Measurements through November 2008 (Supersedes RIDs 7223 and 7421)

Data Originator/Preparer

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Data Description

Data package includes Nye County's Regional Groundwater Elevation Database (RGED V. 4.0.mdb) containing EWDP manual water level measurements through November 2008, field forms, hydrographs (available on request) and exported data from database: "Export EWDP QA Data 1108.xls" (posted to nyecounty.com website as "RID 7618.xls"). This data supersedes previous EWDP manual water level measurement data from 12/1/06 through 9/30/07 (RIDs 7223 and 7421) in order to add data limitations and data censoring, and adds additional data from 10/1/07 through 11/30/08.

Data Collection Method

NWRPO calibrated electric water level sounders in accordance with Work Plan 10 Rev. 0, Groundwater Level Monitoring and Evaluation, dated 8/20/03.

Data Collection Location

EWDP Wells: 1DX shallow, 1DX deep, 1S-Z1,1S-Z2, 2DB recompleted 7/08, 3D, 4PB, 5SB, 7S, 10P shallow, 10P deep, 12PA, 12PB, 12PC,13P, 15P, 16P, 18P, 19P, 19PB shallow, 19PB deep, 22PA shallow, 22PA deep, 22PB shallow, 22PB deep, 22PC shallow, 22PC deep, 22S-Z2, 23P shallow, 23P deep, 24P, 24PB, 27P, 28P, 29P, 32P shallow, 32P intermediate, 32P deep, 33P shallow, 33P intermediate, 33P deep, and Washburn-1X deep.

Data Collection Period

12/01/06 - 11/30/08

Data Sources

1) M&O derived latitude and longitude for well location and elevation data for well pad elevation; 2) Depth to groundwater measured with electric water level sounders as recorded either in the Scientific Notebook (SNB) dedicated to each well, EWDP Groundwater Level SNB #144, EWDP Westbay Instrumented Wells SNB #177, Site 22 Tracer Test SNBs #166 and 181, and/or on the NWRPO Water Level Measurement Field Form (Form TP-9.9-1 Rev 0, dated 9/4/03); 3) NWRPO approved Well Completion Diagrams for each EWDP well for casing type, diameter, and measuring point stickup (as established with engineers steel tape and recorded in Scientific Notebook).

Supporting Data: Metadata for prior submittals of manual water level measurements in EWDP wells (RIDs 6360, 6631, 7044, and 7122).

Data Censoring

Water level measurements in well 19PB, from both the shallow and deep piezometer strings, in the recompleted well (2/06) indicate that there is a hydraulic connection between these two zones. The heads in both zones are identical and appear to nearly represent the upper zone head. Details of the problems associated with this recompletion can be found in RID 7134, "NC-EWDP-19PB field "as-built" Well Recompletion and Wellhead Protection Diagrams." All data from wells 19PB Deep-recompleted-2/06, and 19PB Shallow-recompleted 2/06 have been censored.

Data Processing

Routinely, data processing consists of calculations made in the Access database (RGED v.4.0 mdb) and exports made from the database to MS Excel. Additionally, data are evaluated through the use of hydrographs to determine whether anomalous data exist. Anomalous data are investigated (through scientific notebooks, earthquake records, etc.) to determine the source of the anomaly. If the anomaly cannot be explained, the data are censored.

For quality assurance review, an in-depth reevaluation of the EWDP manual water level data was conducted. As a result, some data in this submittal has been updated, revised or censored. See Data Censoring and Data Limitations for details.

Data Limitations

The water level elevations presented must be considered approximate because of the potential error in the GPS-based elevation of the land surface at the well site which is believed to be on the order of +/- 1.75 ft. according to work performed by the Center for Nuclear Waste Regulatory Analyses. The potential error in the GPS-based elevations does not affect the depth to water nor the absolute change in water levels over time that may be calculated using the elevation datum for land surface. The potential error may, however, result in limitations in the use of these data for the calculation of hydraulic gradients between wells with the error induced in such calculations being inversely proportional to the distance between the two wells being used to perform the calculation.

Water level measurements in well 33P shallow piezometer may be impacted by the presence of polymer-based drilling fluids. The initial borehole for well NC-EWDP-33P was drilled by Department of Energy contractors as borehole USW VA-5, and used a modified conventional circulation system utilizing Baroid EZ Mud polymer. Details of the completion can be found in RID 7009, "NC-EWDP-33P Field "As-Built" Well Completion and Wellhead Protection Diagrams." Water levels have been steadily declining in this piezometer since it was developed by airlifting (7/17/07 to 9/20/07), and appear to indicate disequilibrium with the conterminous potentiometirc surface.

Water level measurements in well 32P shallow piezometer may be impacted by the presence of polymer-based drilling fluids. These drilling fluids were used in the drilling of the now abandoned USW VA-3 borehole, which was situated approximately 50 feet south of 32P. The borehole was drilled by Department of Energy contractor, under the Probabilistic Volcanic Hazard Analysis program for the Yucca Mountain project, on magnetic anomaly "g", with a modified conventional circulation system utilizing Baroid EZ Mud polymer.

Water level measurements in well 2DB recompleted 7/08 may not represent water levels of the Paleozoic carbonate aquifer completion as expected. Problems encountered after the completion of the piezometer in the Paleozoic carbonate, primarily clay swelling and/or caving of the open hole completion, likely have isolated the production casing from the aquifer. See RID 7559 for more details.

During one of Nye County's routine semiannual field sounder standardization procedures performed on January 31, 2007, sounder NC #1 failed to standardize in well 7S. The standardization procedure is outlined in TP-9.9, Measurement of Groundwater Levels Using Electric Well Sounders, section 5.1.1. The procedure states, "The field electric sounder shall be considered successfully standardized if it produces a water level that deviates from the master sounder level by less than 0.1 feet for every 100 feet measured." Applying this condition to well 7S, where Nye County's master sounder NC #6 measured the depth-to-water on this date at 24.72 feet, would have required an electric well sounder to measure the depth-to-water in the range of 24.70 to 24.74 feet. Sounder NC #1 measured the depth-to-water as 24.75 feet, failing standardization by 0.01 ft. However, sounder NC #1 did standardize in both deeper wells of 179.75 ft (1DX Deep) and 498.31 ft (16P), as measured by master sounder NC #6. For the subsequent standardization procedures performed on April 19, 2007, April 20, 2007, October 31, 2007, and April 21, 2008, sounder NC #1 passed standardization in all wells including well 7S. Sounder NC #1 again failed standardization in well 7S (by 0.01 ft), but passed in all other wells on October 15, 2008.

A joint USGS-Nye County corroboration/standardization took place on April 21, 2008 in which all Nye County sounders, including master sounder NC #6, were standardized against the USGS calibrated sounder. Measurements were performed both by the USGS and Nye County in EWDP wells 16P, 18P, 1DX Deep, and 7S. Wells were first measured using the USGS steel reference tape, followed by all of the Nye County sounders, and then finally re-measured with the USGS steel reference tape. All Nye County sounders (NC #1, NC #5, master sounder NC #6, NC #7, NC #8, NC #9, and NC #10) passed corroboration (standardization with respect to the USGS steel reference tape) in wells 16P, 18P, and 1DX Deep. All sounders also passed standardization with respect to master sounder NC #6 in the above mentioned wells. However, in well 7S, sounders NC #1 and NC #9 passed standardization with respect to master sounder NC #6, but did not pass corroboration. The USGS steel reference tape measured the depth-to-water at 24.51 ft for both the opening and closing reading. Sounder NC #1 measured the depth-to-water in the same well at 24.55 ft (out of corroboration by 0.02 ft), and NC #9 measured the depth-to-water in the same well at 24.54 ft (out of corroboration by 0.01 ft). As mentioned above, both sounder NC #1 and NC #9 did pass standardization with respect to the Nye County master sounder NC #6, which measured the depth-to-water in well 7S at 24.53 ft. Even though the USGS steel reference tape varied by 0.03 ft between the opening and closing measurements for well 1DX Deep (171.71 ft, and 179.69 ft), it was only after the USGS technician removed the weights from the bottom of the steel reference tape that the readings were in acceptable agreement with Nye County's master sounder NC #6 (which incidentally had a variation of only 0.03 ft between itself and all other Nye County sounders being standardized). The function of these weights is to ensure that the measurement tape hangs straight in the well so that accurate water level measurements can be taken. Similarly, the USGS steel reference tape varied by 0.02 ft between the opening and closing measurements for well 18P (779.18 ft, and 779.16 ft). Based on analysis of data and observations regarding the performance of the USGS steel reference tape, Nye County will seek an alternate "standard" to compare the Nye County master sounder NC #6 against.

All the hydrographs of wells that were measured using sounder NC #1 from the failed January 31, 2007 standardization to present were reviewed in order to identify any offsets that would indicate erroneous sounder measurements. This consisted of 37 measurements in 12 wells with a depth-to-water of 50 feet or less. No offsets were identified in these hydrographs, suggesting that the data collected with sounder NC #1 during this period of time are still valid. Similarly the hydrographs of wells that were measured using sounder NC #9 from the failed April 21, 2008 corroboration to present were

looked at. This consisted of 30 measurements in 8 wells with a depth-to-water of 50 feet or less. Again, no offsets were identified in these hydrographs, which supports the conclusion that the data collected with sounder NC #9 during the period of time in question are still valid. However, as a precautionary measure since both sounder NC #1 and sounder NC #9 did not pass corroboration on April 21, 2008, both have been taken out of service effective November 15, 2008.

According to TP-9.9 section 5.4, "Uncertainty attached to the acquisition of water levels includes the variability in sounder tapes, well construction characteristics, the nature of the water-bearing unit (i.e., confined versus unconfined), and the skill and judgment of the individual taking the measurements." In particular it is believed that the physical properties and/or the construction characteristics of well 7S may contribute to the slight variability in readings noted when taking depth-to-water measurements. Furthermore the use of well 7S for standardizing sounders with a 500 foot long tape (or any sounder with a tape longer than approximately 30 feet) is not recommended and deviates from the directive in section 5.1.1 which states, "The measurements shall be made in a well deep enough to accommodate the maximum length of sounder measurement tape possible." Therefore, well 7S will no longer be used to standardize sounders.

The table in the metadata attachment shows all 49 measurements taken in EWDP wells with sounder NC#1 after it failed to standardize on January 31, 2007. Also included in the table are all 6 measurements taken in EWDP wells with sounder NC#9 after it failed corroboration on April 21, 2008.

Governing QA Docs: WP-10 Rev. 0, TP-9.9 Rev. 3 Change Notice No. 1

Frequency of Transmittal: Annually or more frequently as determined by the Principal Investigator and approved by the Geoscience Manager.

Direct Questions About Data To: NWRPO QA Records Center