NYE County NWRPO -Technical Data Report

RID No.	Transmitter	Org.	Receiver	Org.	Key word1	Title/Description
7414	Gilmore	Nye County NWRPO	QARC	Nye	28P	NC-EWDP-28P Alluvium and Non-Alluvium Logging Forms

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Doc. Date 10/29/2007 **General Doc. Type** QA Program Doc **Keyword2** cuttings

Entry Date 1/31/2008 **Detailed Doc. Type** Alluvium/Non-Alluvium Logging **Keyword3** geology

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Title of Data NC-EWDP-28P Alluvium and Non-Alluvium Logging Forms

Description of Data Drill cuttings logging reports exported from drilling database (NC Drilling v3.6.mdb and v4.mdb) in .pdf format. (Alluvium and Non-Alluvium Logging Forms from 10/21/02 to 11/13/02).

Data Collection Method Borehole drilling and sampling, and borehole depth control procedures. Logs were reviewed for accuracy of field data.

Data Location(s) NC-EWDP-28P

Data Collection Period(s) 10/21/02 to 11/13/02

Data Source(s) Geologic logging of drill cuttings. Scientific Notebook #153 (RID 5525), pages 4-62, describes general drilling conditions.

Supporting Data: RIDs 5525, 6414, 6756.

Data Censoring Particle Size Distribution data (field estimates), USCS Group Symbols, and Density data recorded on Alluvium Logging Forms.

Data Processing Data from field logging forms were entered into the drilling database, reviewed, and transmitted to the QARC.

Data Limitations Samples collected from alluvium by reverse circulation air drilling methods are not entirely representative of in situ conditions due to several drilling related factors. The near surface (0 to 60 ft) alluvial drill cuttings samples are impacted as a result of hole erosion and related sample contamination resulting from the drilling of loose unconsolidated sediments in the near surface. Small amounts of injection water was necessary to stabilize these unconsolidated sediments and repeated clean-out was required to advance the borehole. Installation of a 61 ft surface casing eliminated these hole erosion problems. Below a depth of 60 ft, winnowing of fines at the air cyclone separator occurred during dry drilling of the unsaturated alluvium and could account for as much as a 50% loss of fines. The ideal sample volume for a 6 1/2 inch borehole is 4.3 gallons and sample yield was as low as 2 gallons in the unsaturated sediments. Evidence from other boreholes in alluvial sediments indicates that the mechanical action of the rotary bit results in sample degradation and particle size distribution bias (see discussion in the report for the Early Warning Drilling Program Phase III Boreholes, Section 2.1.2, RID 5579). In general, the mechanical action of the bit reduces large-size particles to smaller-size particles effectively decreasing the gravel-size component and effectively increasing the sand and "fines"-size component. This is a relatively minor problem in unsaturated alluvium and in the upper part of saturated alluvium where water production is low. In underlying saturated alluvium, this drilling impact renders particle size distribution data useless. Since this borehole penetrates unsaturated alluvium only, particle sizes in drill cuttings are impacted to some extent but are considered to provide a reasonable approximation of in situ conditions.

The Alluvium Logging Form includes preliminary field estimates of grain size distribution for the 240 ft of alluvium penetrated. The estimates are made on every 2.5 foot sample interval and used for preliminary layering information and general planning of wells prior to receipt of laboratory data. These field estimates of grain size distribution as well as USCS group symbol data should not be considered representative of geologic samples and have been censored. However, grain size distribution data determined by laboratory analysis on every second 2.5 foot sample interval are considered representative of the geologic samples (RID 5411).

In the saturated zone (below 420 ft), problems with bit plugging and lost circulation in clayey zones at 770 to 780 ft and 1180 to 1220 ft resulted in a

small loss of sample. In addition, the clayey zone at 1180 to 1220 ft was dry and rubbly and resulted in bit plugging, hole erosion and caving. Minor sample contamination originating from the eroding strata in the interval 1150 to 1200 ft was observed in cuttings for the remainder of the borehole (1280 to 2080 ft). Max-Gel (polymerized bentonite "mud") and liquid polymer (anionic polyacrylamide) was pumped down the annulus of the borehole for conditioning of this zone before drilling and sampling could resume. This borehole conditioning method was utilized throughout the remainder of the borehole. No contamination of geologic samples by drilling additives was detected in cuttings with the exception of sample interval 1460 to 1465 ft. In general, approximately 2% uphole sample contamination was noted in samples from 1280 to 2080 ft with the exception of approximately 10% contamination in the sample interval 1880 to 1885 ft.

In addition, some sample handling disturbance may have been introduced into samples by: 1) material accumulating on rotating splitter during wet drilling; and 2) unsaturated zone sample homogenization process and sample splitting.

Other limitations are related to water production measurements, as recorded on the logging forms, as follows: 1) unstable zones in the borehole necessitate the use of drilling additives which seal off pore space and thereby reduce the water production; and 2) in the lower 200 ft of borehole, the water production values recorded on the logging forms are probably less than actual due to leaking O-rings in the drill string that compromised lifting capacity.

Sample weights in sample density data do not include material that is lost to winnowing of unsaturated fines (dust) or material that was "cleaned out" of the borehole after each 20 foot drill run. Therefore, unsaturated zone sample weight data is not representative of the volume of the borehole drilled and should not be used in density calculations and has been censored.

In the upper section of the saturated zone from 420 to 700 ft, the water production data was estimated. Injection water was required to lift the sample and maintain a clean drill string. Beginning at 700 ft, timed volume water tests were conducted generally at 40 to 60 ft intervals to measure the production of water. Beyond 1280 ft, the use of polymerized bentonite mud for borehole conditioning likely lowered water production from the borehole.

Evaluations of cementation and structure as recorded on the logging forms are difficult to accurately determine because intact pieces of in situ material are not available in cuttings.

Sample recovery data (volumes) for the interval 420 to 695 ft are not available due to a field error.

In summary, laboratory measurements of grain size distribution of alluvium drill cuttings in this borehole are considered to be modified to some extent from in situ conditions due to a number of drilling-related factors. However, for the most part, these factors were unavoidable. Disturbance from sample handling related factors is considered minimal. Except for censored data mentioned above, geologic drill cutting samples from NC-EWDP-28P are considered approximately representative of in situ conditions. The geologic data recorded in these geologic logs are used to produce a Summary Lithologic Log.

Governing QA Docs.	TP-7.0 Rev. 3, TP-8.0 Rev. 4
Frequency of Transmittal	once per borehole
Direct Questions About Data To-	NWRPO QA Records Center