

# Technical Data Information Report

RID Number	Transmitter	Transmitter Organization	Receiver	Receiver Organization	Keyword 1
7604.01	Kryder	Nye County NWRPO	QARC	Nye County NWRPO	4PC

Document Date	7/1/2008	General Document Type	QA Program Doc	Keyword 2	ALF
Entry Date	3/18/2010	Detail Document Type	Alluvium/ Non-Alluvium Logging	Keyword 3	Report
Document Title/Subject	NC-EWDP-4PC Alluvium Logging Reports.				
Data Originator/Preparer	Levi Kryder				
Data Description	Drill cuttings logging reports exported from drilling database (NC Drilling v3.6_4_24_09) in .pdf format. (Alluvium Logging Forms from 6/9/2008 to 7/1/2008).				
Data Collection Method	Borehole drilling and sampling and borehole depth control procedures (see governing QA procedures/plans).				
Data Collection Location	NC-EWDP-4PC				
Data Collection Period	6/9/2008 to 7/1/2008				
Data Sources	Geologic logging of drill cuttings. Scientific Notebook # 151 (RID 7657) describes general drilling conditions for 4PC. Supporting Data: RID 7604, 7657				
Data Censoring	None				
Data Processing	Data from field logging forms were entered into the drilling database, reviewed, and transmitted to QARC.				
Data Limitations	<p>Samples collected from alluvium by reverse circulation air drilling methods are not entirely representative of in situ conditions due to several drilling related factors. No alluvial drill cuttings sample were collected from 0 to 5 ft due to the difficulty in establishing reverse circulation in a shallow borehole and returns were poor from 5 to 50 ft. The ideal sample volume for a 5 ft interval in a 5 1/2 - inch borehole is 6.2 gallons and sample yield was as low as 2 gallons from 5 to 50 ft. There was also a complete absence of returns from 18.3 to 25 ft. Many of the drill cuttings samples from 0 to 460 ft are impacted as a result of hole erosion and related sample contamination resulting from the drilling of loose unconsolidated sediments. Injection water ranging from 2.5 to 25 gpm was used during drilling to stabilize these unconsolidated sediments and frequent clean-out was required to advance the borehole. The samples from 100 to 105, 160 to 165, 180 to 185, 205 to 210, 320 to 330, and 455 to 460 ft were impacted by the presence of a polymeric drilling additive that was used to condition the borehole. The sample from 180 to 185 ft was impacted by the polymer to the degree that certain logging parameters could not be determined. Installation of a 62 ft surface casing eliminated the near surface hole erosion problems. From 385 to 460 ft sample size decreased to as little as .25 gallons due to the presence of thin clayey layers that would plug the bit and inhibit circulation. This stratigraphic horizon also produced thick interbeds of flowing sand composed of fine, poorly graded sand that had no clay content to serve as a binder. At 410 ft the flowing sand began creating difficult conditions in the borehole as it fell down the annular space and formed a boot around the drill bit and thereby placed the drilling tools in jeopardy. As a result, at 460 ft the decision was made to abandon the borehole, move the rig a short distance to the east, and drill a new borehole (NC-EWDP-4PD). Full Return samples are shown on the drill cuttings form with the acronym "FR" displayed as part of the sample number. The FR samples were collected as the third 5 foot sample interval on each drilling rod. Full Return samples are bulk drill cuttings samples that are not biased by extracting sub samples for the purpose of field logging. Full Return samples are not field logged and the sample water is not siphoned off so as to retain the fine particles (silt and clay) that are held in suspension. These samples were sent to the NWRPO lab in 5-gallon</p>				

plastic buckets with sealed lids and were subsequently dried, sieved, and hydrometer tested. The FR samples were collected as one sample per 20 foot advance throughout the entire drilled interval with the last Full Return sample being collected at 450 ft. Not all Full Return samples are shown on the drill cuttings log because the decision was made in the field after the 90-93.6 FR sample was recorded to discontinue entering them on the log because of the fact that logging parameters are not recorded for these particular samples and to eliminate any possible confusion regarding these samples. However, all FR samples collected are noted in the Comments field on the drill cuttings forms. Evidence from other boreholes in alluvial sediments indicate that the mechanical action of the rotary bit results in sample degradation and particle size distribution bias (see discussion in 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 a saturated alluvium where water production is low. In underlying saturated alluvium this drilling impact renders particle size distribution data useless. The Alluvium Logging Form includes preliminary field estimates of grain size distribution for the 460 ft of alluvium penetrated. The estimates are made on every 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 be considered reasonably representative of geologic samples and have not been censored. Grain size distribution data determined by laboratory analysis on every second 5 foot sample interval are considered representative of the geologic samples. In addition, some sample handling disturbance may have been introduced into samples as a result of material accumulating on wet drill pipe and rotating splitter during wet drilling. Sample density and weight data were not collected due to the fact that wet drilling methods were employed. As a result, unsaturated zone sample weight data would not be representative of the volume of the borehole drilled and would not be useful in density calculations. Moisture content in the unsaturated zone could not be determined as wet drilling methods were employed to advance the borehole. In the saturated zone, beginning at about 340 ft, water production data was not estimated due to the fact that injection water was used to stabilize the borehole and to lift the sample. Injection water and associated drilling air suppresses water flow from the formation and renders water production measurement inaccurate. Evaluations of cementation and structure as recorded on the logging forms are difficult to accurately determine because intact pieces of in-situ material are usually not available in cuttings. 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. Geologic drill cutting samples from NC-EWDP-4PC 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 4, TP-8.0, Rev. 6

Frequency of Transmittal: Once per borehole

Direct Questions  
About Data To: NWRPO QA Records Center