

# Drill Hole NC-EWDP-22SA

Location= Latitude: 36° 42' 15.132", Longitude: 116° 25' 06.636"

Compiled and interpreted by Richard W. Spengler, 9/04/02

Elevation= 2849.0 feet (ground)

Nomenclature of lower volcanic units and Tertiary sedimentary strata, for the most part, follows that found in Wahl and others (1997).

Geophysical logs developed by Nye County are based on raw counts of geophysical logs. Geophysical measurements from Nye County drill holes are currently (9/2002) considered non-Q data. The Borehole gravity meter density log (BHGM), obtained by Schlumberger, is considered Q data (MOL.20021021.0120).

<u>Stratigraphy</u>	<u>Lithologic Description</u>	<u>Petrographic and Trace Element Characteristics</u>	<u>Geophysical Signature</u>	<u>Confidence Assessment</u>	<u>Unit Top (feet)</u>	<u>Unit Base (feet)</u>	<u>Thickness (feet)</u>	<u>Elevation of Base of Unit (feet)</u>
QTu	Quaternary and Tertiary Alluvium		Log responses are only available beginning at a depth of approximately 75 feet.	High confidence that this thin interval exists based on conspicuous decrease in the amount of sand-size particles.	0	5	5	2844
QTu	Quaternary and Tertiary Alluvium		Log responses are only available beginning at a depth of approximately 75 feet.	High confidence that this interval exists, based on conspicuous change in the amount of sand in cutting samples	5	30	25	2819
QTu	Quaternary and	Mixture of gravel and	Log responses are	Medium confidence	30	35	5	2814

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	Tertiary Alluvium	sand, grayish orange pink (10YR 7/2) and minor medium gray (N5). Interval composed of sub-equal proportions of gravel size fragments and medium to coarse-grained sand.	only available beginning at a depth of approximately 75 feet.	that the interval exists based on variations in gravel/sand mixtures.				
QTu	Quaternary and Tertiary Alluvium	Gravels, volcanic, commonly light brownish gray (5YR6/1), and light gray (N6) to medium light gray (N6), composed of a highly variable mixture of volcanic rock fragments of variable characteristics, dominantly devitrified, tuff fragments are non-to densely welded, some zeolitic and silicified. Processed samples composed of 70 percent gravel size fragments and 30 percent medium to	Log responses are only available beginning at a depth of approximately 75 feet.	Only low confidence that the change in the proportion of sand size material (as detected in cutting samples) is representative of in-situ conditions, and not just due to sampling and processing.	35	58	23	2791

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		coarse sand.							
QTu	Quaternary and Tertiary Alluvium	Mixture of gravel and sand, grayish orange (10YR 7/4) and minor medium gray (N5). Interval composed of subequal proportions of gravel size fragments and medium to coarse-grained sand.		Log responses are only available beginning at a depth of approximately 75 feet.	Only moderate confidence that the change in the proportion of sand size material (as detected in cutting samples) is representative of in-situ conditions, and not just due to sampling and processing.	58	75	17	2774
QTu	Quaternary and Tertiary Alluvium	Gravels, volcanic, commonly light brownish gray (5YR6/1) to brownish gray (5YR 4/1), light gray (N7) to medium light gray (N6), pale red (10R 6/2), pale reddish brown (10R 5/4), and grayish red (5Y 4/2). Interval is composed of a mixture of volcanic rock fragments of variable characteristics, dominantly non- to densely welded, vitric	No conspicuous variation in types of clasts or gravel/sand proportions could be detected within this interval. Therefore, subdivision of this thick interval is based dominantly on geophysical characteristics.	An abrupt decrease in the temperature log occurs at 471 feet and may represent the top of the water table. Based on the caliper log, large "wash-outs" occur from 150 to 254 feet, 425 to 697 feet, 735 to 852 feet, and 884 to 1000 feet. Moisture log indicates an abrupt decrease in values from 695 to 768 feet.	A significant proportion of the gravel rock fragments have a light brown matrix material adhering to surfaces beginning at a depth of 715 feet. However, these may have been eroded from the underlying interval and is interpreted not to represent the same type of deposit that is described in the	75	1050	975	1799

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	<p>to devitrified, some zeolitic and silicified. Fragments vary in shape from sub-angular to well-rounded. Processed samples composed of 80 percent coarse gravel size fragments and about 20 percent medium to coarse sand. Rock fragment types within this interval appear to be significantly more variable than in succeeding interval. Notable increase in brownish gray (5YR 4/1) fragments of basalt occur within the intervals of 105-110 feet, 150-152.5 feet, 210-215 feet, 257.5-265.0 feet, 277.5-280.5 feet, 320-322.5 feet.</p>		<p>The BHGM density log indicates that this thick interval of similar rock types and grain sizes can be divided into 4 zones, occurring from 260 to 395 feet, 395 to 769 feet, and 769 to 893 feet, and 893 to 1050 feet. The uppermost zone exhibits consistently low densities of about 2.05 g/cc beginning directly below the inferred water table (at 270 feet). Zone 2 displays a progressive increase in density with depth from 2.05 to a maximum of about 2.2 g/cc. The third zone displays a density reversal, where densities remain consistently low at about 2.1 g/cc. Zone 4 shows</p>	<p>succeeding interval. A significant difference between this deposit and the underlying deposit is that clast types in this deposit exhibit greater variability. These types of gravel fragments could not be identified in gravel deposits seen in nearby drill holes NC-EWDP-19IM1 or NC-EWDP-19IM2.</p> <p>Because of the existence of matrix material, adhering to some fragments, a volcanic breccia deposit within this interval cannot be completely ruled out.</p>				

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			<p>extreme and abrupt variability in density. Densities in zone 4 vary from 2.1 g/cc to over 2.2 g/cc. The base of this unit was selected where the density abruptly increases and, for the most part, remains at about 2.2 g/cc.</p> <p>Other geophysical logs support this segmentation into 4 zones. The temperature log displays a steep gradient from a low at about 197 feet to about 356 feet, close to the base of zone 1. The moisture log indicates a zone of relatively constant moisture from 399 to 710 feet, which corresponds to zone 2. Probably the most conspicuous zone</p>					

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			that is supported by other geophysical logs is zone 3. In contrast to abrupt variability in density (density log), between 742 and 889 feet, the resistivity logs indicate very few abrupt variations. The top and base of this interval of low variability in resistivity approximately coincides with the top and base of zone 3. Near the base of zone 3 at a depth of 860 feet, the temperature log shows an inflection of higher temperature.						
Tab	Tertiary Sedimentary Rocks	Volcanic breccia; tuffaceous, matrix is grayish orange (10YR 7/4), crystal rich, generally composed of fine to medium grained	Welded rock fragments contain about 2 percent phenocrysts, composed of quartz, plagioclase,	Density log values indicate a conspicuous decrease at 1052 feet. Values begin to increase at a depth of 1066 feet.	This interval represents the first appearance of nonwelded tuffaceous material and cement composed of calcium	1050	1200	150	1649

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	plagioclase, sanidine and quartz phenocrysts, contains rare very pale orange (10YR 8/2) pumice clasts. Clasts are commonly pale red (5YR 6/2) phenocryst poor densely welded tuff and rare grayish orange (10YR 7/4) phenocryst-rich welded tuff. Fragments are interpreted to be embedded in the matrix material based on a number of bit-cutting fragments that have matrix material adhering to fracture faces. Bit-cutting fragments are angular to subangular. The dominant crystal-poor welded tuff lithology is interpreted to represent fragments of the Tiva Canyon Tuff. The presence of distinctive fracture faces on many of the bit-cutting	and alkali feldspar.  XRF analysis of a sample from 1100 to 1105 feet indicates that rock fragments contain 871 ppm of Ti, 188 ppm of Zr, and 126 ppm of Ba.  The matrix of the volcanic breccia appears to be quite unique. Matrix or fracture filling is composed of about 6 to 7 percent phenocrysts of quartz, alkali feldspar, and plagioclase, minute fragments of the crystal-poor welded pyroclastic flow material, as well as a significant proportion of calcium carbonate	Gamma ray log indicates a decrease in counts per second beginning at a depth of 1051 feet, where values reach a low at 1066 feet and then increase again.  The highest densities recorded from the BHGM density log occur within this interval. Densities between 2.2 and 2.3 occur from 1067 to 1160 feet	carbonate in borehole samples. Volcanic rocks in cuttings above interval are generally lithologies that are more resistant to erosion, such as welded tuffs and devitrified rhyolitic flow deposits. Some contamination of samples by uphole lithologies may have occurred, however, medium to high confidence is given to the existence of a volcanic breccia, based on the unique lithologic characteristics of the deposit. High confidence is given to the interpretation that the larger rock fragments are from the Tiva Canyon Tuff, based on the proportions of trace				

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	fragments may indicate that many are large in size and are broken during the drilling process.	lithic clasts and calcium carbonate cement.		<p>elements Ti, Zr, and Ba.</p> <p>Only moderate confidence is given to identifying the interval as a breccia and not a conglomerate because some fragments are rounded and smaller in size. In-situ roundness of large fragments remains uncertain based on the size of bit-cutting samples.</p> <p>An alternative hypothesis that this deposit represents highly fractured Tiva Canyon Tuff with unique infilling of fractures with reworked tuff and calcium carbonate cannot be completely ruled out.</p>				

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Total depth of hole was 1200 feet. Hole was originally designated as NC-EWDP-22S using reverse circulation drilling. After hole was reamed to a larger diameter, it was designated as NC-EWDP-22SA. Samples were collected at 2.5-foot intervals from 0 to 560 feet and at 5-foot intervals from 560 to 1200 feet. Although samples are labeled as NC-EWDP-22SA, they were collected during the initial reverse circulation drilling. All examined samples were initially processed at the Sample Management Facility prior to examination. Material larger than 8mm (in alluvium) and 4.75 mm (in bedrock) and smaller than 0.045 mm is discarded before samples are oven dried. Therefore, all processed samples will not include any estimates of very fine nor very coarse sample material. Samples from depths of 1185 to 1200 are considered unqualified and were used only to corroborate the samples collected above 1185 feet.

Reference: Wahl, Ronald R., Sawyer, David A., Minor, Scott A., Carr, Michael D., Cole, James C., Swadley, WC, Laczniak, Randell J., Warren, Richard G., Green, Katryn S., and Engle Colin M., 1997, Digital Geologic Map Database of the Nevada Test Site area, Nevada, U.S Geological Survey Open-File Report 97-140, 47 p. (TIC #247201).