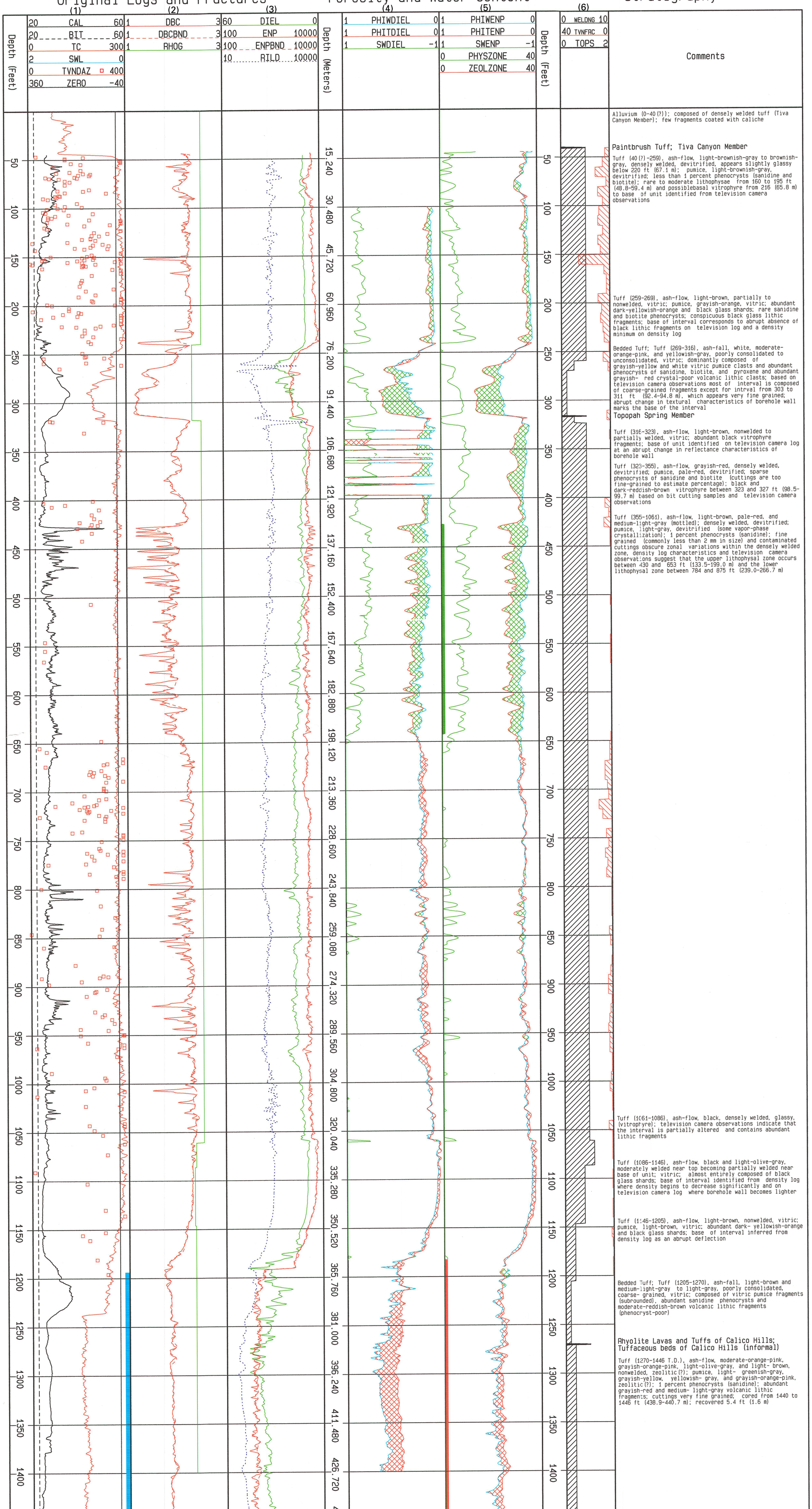
Open-File Report 2014–1023
Plate 18 of 27

U.S. Department of the Interior
U.S. Geological Survey

USW WT-11

Original Logs and Fractures — Porosity and Water Content — Stratigraphy



BOREHOLE USW WT-11, YUCCA MOUNTAIN, NEVADA

Compiled by Philip H. Nelson and Joyce E. Kibler
U.S. Geological Survey, Denver, Colorado

Borehole USW WT-11 was completed in August, 1983 to a total depth of 1446 feet. The hole was rotary drilled using air foam consisting of air, detergent, and water (Muller and Kibler, 1985). Depth on the plot is measured along hole, and has not been corrected for deviation. Hole deviation is as great as 3.1 degrees at 1375 feet, (Plate 24 in Nelson and others, 1991): at a measured depth of 1375 feet, the computed true vertical depth is 1374.4 feet, and the computed horizontal offset is 32.4 feet.

Original logs in columns 1-3, acquired on August 7-8, 1983, were described and presented by Nelson and others, 1991. USW WT-11 was drilled for the purpose of monitoring water levels; the static water level is indicated by a cyan bar in column 1 (Robison, 1984).

Porosity and water content computed from the dielectric and density logs are shown in column 4 as phitdiel and phiwdiel, using a method described by Nelson, 1993. Porosity and water content computed from the epithermal neutron and density logs are shown in column 5 as phitenp and phiwenp (Nelson, 1994). Green hatching between the porosity and water content curves denotes air-filled porosity. Red hatching appears where water content exceeds porosity, often indicating the presence of zeolitic minerals.

Saturation (swdiel in column 4, swenp in column 5) is computed as the ratio of water content to porosity. It has been nulled in zones flagged as zeolzone. The flags physzone and zeolzone (green and red bars in column 5) denote the presence of abundant lithophysae and extensive alteration, respectively. Their depth extent is taken from inspection of the green and red hatch areas in columns 4 and 5 and from consideration of other logs, especially resistivity, rild.

Stratigraphic tops and degree of welding, given in column 6, and the geologic description, in the text column, are from R. Spengler, U.S. Geological Survey, written communication, 1995. The degree of welding (weldng) increases to the right, in accordance with the geologic description.

Plots of individual fractures, (tvndaz, column 1), observed on television logs are plotted to show the azimuth of the dip of each fracture. The same data are plotted as fracture density (tvnfrc) in column 6.

EXPLANATION OF CURVES AND SYMBOLS

Column 1
- CAL — Caliper in cm, black curve.
- BIT — Bit size in cm, black dash line.
- SWL — Static water level, vertical cyan bar.
- TC — Gamma ray in API units, red curve.
- TVNDAZ — Dip azimuth of fractures, from television, red squares. Undetermined azimuth is coded as 380 or 390 degrees.

Column 2
- DBC — Density in g/cc, red curve.
- DBCBOUND — Density bound in g/cc, red dash curve.
- RHOG — Grain density in g/cc, green curve.

Column 3
- ENP — Epithermal neutron in counts/sec, red curve.
- ENPBND — Epithermal bound, red dash curve.
- RILD — Induction resistivity in ohm-m, blue dot curve.
- DIEL — Dielectric permittivity, ratio, green curve.

Column 4 [fractional volume of whole rock, increasing to left]
- PHIWDIEL — Water content, from DIEL and DBCBOUND logs, cyan curve.
- PHITDIEL — Porosity, from DIEL and DBCBOUND logs, red curve. (green hatch where PHITDIEL > PHIWDIEL, red hatch where PHITDIEL < PHIWDIEL).
- SWDIEL — Water saturation, ratio of PHIWDIEL to PHITDIEL, green curve.

Column 5 [fractional volume of whole rock, increasing to left]
- PHIWENP — Water content, from ENPBND and DBCBOUND logs, cyan curve.
- PHITENP — Porosity, from ENPBND and DBCBOUND logs, red curve. (green hatch where PHITENP > PHIWENP, red hatch where PHITENP < PHIWENP).
- SWENP — Water saturation, ratio of PHIWENP to PHITENP, green curve.
- PHYSZONE — Lithophysal zone, picked from logs, green bar.
- ZEOLZONE — Zeolitic zone, picked from logs, red bar.

Column 6
- TOPS — Stratigraphic boundaries, black ticks.
- WELDNG — Degree of welding from core inspection, black slant.
- TVNFRC — Number of fractures per 10 feet, from television, red.

NOTES

Date of last computation: May 1996
Plot Date: May 1996
Scientific Notebook: SN-0092

REFERENCES

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Petrophysical Properties, Mineralogy, Fractures, and Flow Tests in 25 Deep Boreholes at Yucca Mountain, Nevada

By Philip H. Nelson and Joyce E. Kibler