

FORMATION EVALUATION LOG

Scale: 2" = 100'

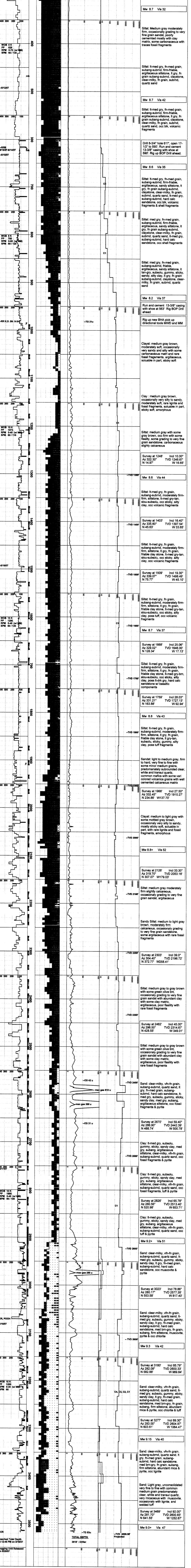
COMPANY: NORTHWEST NATURAL
WELL: IW 23ach-3-65
Field: Bruer Pool Inject/WD Storage
COUNTY: Columbia, OR
Location: SE 1/4 Sec. 3, T6N-R5W; WB&M
Coordinates: 2346.8' N 86°26' W and
 1593.8' N 3°33' E from
 SE corner. Y: 874129.60 X:1292487.90 FIN
API No.: 36-009-00366
Spud Date: 5/11/07
Total Depth: 5/18/07
Elevation: K.B. 1047.3'
 G.L. 1033.3'
Company Geologist: Jack Meyer
Company Engineer: Clayton Roth
Company Pusher: Ed Vader
Directional Engineer: Scientific Drilling
Mud Company: Beaver Drilling Fluids
Mud Engineer: Ed Vader
Drilling Contractor: TD Well Service
Rig Pusher: Jerry Gann
Rig No.: 101
Geolog Unit No.: 19
Logging Geologists: Jim Ferguson

LOG INTERVAL
DATES: 5/11/07 TO 5/25/07
DEPTHS: 50' TO 3518'
MUD TYPES
 Gel Chem TO 3518'
 TO
MUD PUMPS
PUMP #1: EMSCO DB 550 (16" x 5-1/2")
PUMP #2: OILWELL H 560 37 (8" x 5-1/2")

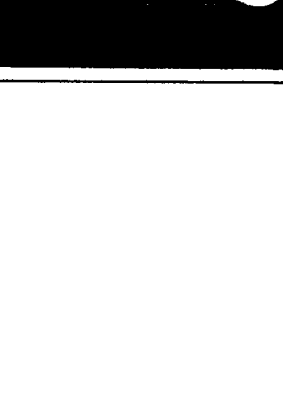
TOTAL DEPTH
MEASURED: 3518'
TRUE VERTICAL: 2599.08'
HOLE SIZE
 17-1/2" TO 590'
 12-1/4" TO 626'
 8-3/4" TO 3518'
CASING DATA
 20" AT 20'
 13-3/8" AT 563'
 AT

LEGEND
 BG - Background Gas
 CB - Core Bit
 CG - Connection Gas
 CK - Filler Cake
 CKF - Check for Flow
 CI - Salinity, ppm Cl
 CR - Circulate Returns
 DB - Diamond Bit
 DC - Depth Correction
 DDB - Diamond Core Bit
 DF - Derrick Floor
 DG - Drilling Gas
 DS - Directional Survey
 DST - Drill Stem Test
 EL - Electric Log
 E.M.A. - Equivalent Methane
 F - Filtrate API sec/ci
 F/T - Flowing Temperature
 GCM - Gas Cut Mud
 GCW - Gas Cut Water
 G & OCM - Gas and Oil
 GL - Ground Level
 KB - Kelly Batching
 LAT - Logged After Trip
 NB - New Bit
 NCB - New Core Bit
 NR - No Returns
 PDC - Polycrystalline Diamond
 Compact Bit
 LC - Lost Circulation
 PPM - Parts Per Million
 PR - Poor Returns
 PP - Pump Pressure
 PV - Plastic Viscosity
 RM - Mud Resistivity, Ohm-Meter
 RFM - Mid-Filtrate Resistivity
 RPM - Revolutions Per Minute
 RRB - Return Bit
 RT - Rotary Table
 SD - Sand %
 SO - Show of Oil
 SCL - Solids %
 SVG - Surveys Per Minute
 STG - Short Trip Gas
 SWG - Swab Gas
 S/T - Suction Temperature
 TD - Total Depth
 TCL - Trip Chicks
 TG - Trip Gas
 TVD - True Vertical Depth
 V - Viscosity API seconds
 W - Weight of Mud, ppg/ppf
 WOB - Weight on Bit

CEMENT **COAL & LIGNITE** **FINE SAND** **KAOLINITE** **VOLCANIC**
LIMESTONE **CLAY** **MEDIUM SAND** **TUFF** **IGNEOUS**
DOLOMITE **SHALE** **CONGLOMERATE** **DIATOMITE** **METAMORPHIC**
GYPSUM **SILTSTONE** **SANDSTONE** **PORCELANITE**
ANHYDRITE **SANDY SILTSTONE** **CHERT**



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