EPOCH WELL LOGGING, INC.

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COMPANY	NAHAMA & WEAGANT ENERGY CO.
WELL	FISHHAWK/WILSON 11A-5-65 RD #1
FIELD	MIST
LOCATION	1385' East and 274'South from the Northwest corner of section 5 T6N, R5W, W., W, M.
COUNTY, STATE	Columbia, Oregon
API WELL INDEX NO.	
ELEVATION	604' GL. 615' KB.
DATES	10-20-92 TO 10-25-92
DEPTHS	600' TO 2770'
SPUD DATE	10-12-92
DRILLING CONTRACTOR	Taylor Drilling RIG #7
COMPANY GEOLOGIST	Jeff Vaughan
COMPANY DRILLING SUP.	Rob Lucas
MUD COMPANY	Beaver Drilling Fluids
MUD TYPE	Gel/Polymer
LOGGING UNIT #	5
LOGGING GEOLOGISTS	Jim Eastes John Riddle

ABBREVIATIONS

NB	NEW BIT (MILL TOOTH/INSERT)	MW	MUD WEIGHT
PDC	PC DIAMOND CUTTER	VIS	FUNNEL VISCOSITY
RRB	RERUN BIT	PV	PLASTIC VISCOSITY
RTB	RETIP BIT	YP	YIELD POINT
CB	CORE BIT	FL	FLUID LOSS
TG	TRIP GAS	CL	PPM CHLORIDE ION
SG	SURVEY GAS	Rm	MUD RESISTIVITY
WG	WIPER GAS	Rmf	FILTRATE RESISTIVITY
CG	CONNECTION GAS	LAT	LOGGED AFTER TRIP
KG	KELLY CUT GAS	LAS	LOGGED AFTER SURVEY
WOB	WEIGHT ON BIT	NR	NO RETURNS
RPM	ROTARY REV/MIN	PR	POOR RETURNS
PP	PUMP PRESSURE	LCM	LOST CIRC. MATERIAL
SPM	STROKES/MIN	CO	CIRCULATE OUT

CASING RECORD

8 5/8"	TO	509'
	TO	
	TO	
	TO	

HOLE SIZE

12 1/4"	TO	509'
7 7/8"	TO	T.D.
	TO	
	TO	

SAND	CLAYSTONE	LIMESTONE	TUFF	GLAUCONITE
SANDSTONE	CLAY	DOLOSTONE	FOSSIL	PYRITE
SHALE	DIATOMITE	VOLCANICS	MICA	MARL
SILTSTONE	CONGLOMERATE	BASALT	LIGNITE	

PENETRATION

DRILL RATE (FT/HR)

drilling data

DEPTH

ANALYSIS OF RETURNS

LITHOLOGY

OIL: TRACE, STRONG TRACE, SHOW, STRONG SHOW

GAS — UNITS: DITCH — TOTAL GAS; CUTTINGS GAS; CALIBRATION 100 units = 2% methane by volume

CHROMATOGRAPH — PPM: METHANE, C-1; ETHANE, C-2; PROPANE, C-3; BUTANES, C-4, 4; PENTANES, C-5, 5

REMARKS

LITHOLOGIC DESCRIPTION
MUD PROPERTIES
SURVEYS, OTHER TEST DATA

All colors are referenced to GSA Rock Color Chart. All connection, carbide, survey and wiper gases reported as units above background; trip gas reported as maximum units. All gas detection equipment calibrated to SPWLA standards.

Cement: pl to med grysh brn; frm to crumbly; gummy consistency; silty to sl sandy; v sticky and coh; wk to noncalc.

Clay: pl yelsh brn to grysh brn; thick gummy consistency; sl frm to sft; v adhes and coh; gd pliab; gd plast; poorly sol; micaceous; occ pl orgsh brn tuff, rr fossil frags; sl to mod arer.

Tuff: orgsh brn; mod hd to well ind; tough; ang to blky ctgs; hackly app; sl silty; loc marly; tr mica and volc debris; rr pyr.

Siltstone: grysh brn to pl yelsh brn; frm; clay rich; platy to sbrndd ctngs; dk brn strks of carb mat; crumbly; sl sol; dull to vfn sparkly lus; sl gritty tex; wk calc; tuffaceous + tr marly; tr mica; tr pyr; tr lt grn min inclns.

Sand: clr to cloudy; vfnL to medL gr; dom vfn; ang to sbrndd; lo to mod spher; mod to well sort; occurs as matrix in clay groundmass; tr mica; tr to loc com tuff; tr pl grn volc app min inclns.

Clay: pl grysh brn; sft to frm; lrg rndd clumps and nodules; gd pliab; gummy consist; sl to noncalc; sl to loc v aren; v adhes and coh; v p sol; tr mica; tr fossil frags; tr lig assoc w/siltstone; tr to loc com org brn tuff; tr agg anh pyr; tr to rr glauc.

Marl: pl gry to silvery gry; tough, mod hd to well ind; ang to blky ctngs; hackly app; dull waxy lus; smooth tex; tr mica.

Tuff: pl orgsh brn to yelsh brn; tough to well ind; ang blky ctgs; dull lus; sucrosic tex; sl silty to tr sandy; sl grit tex; noncalc; micaceous; tr scat glauc and fossil frags; tr lig.

Sand: clr to cloudy, wht; vfnL to tr crs gr; dom vfnL to fnU; ang to rndd; lo to mod sher; mod to mod well sort; clay supp; dom qtz and fspr w/com mica; wk calc; tr to loc com shell frags; tr euh pyr; tr to loc com lig.

Clay: med yelsh brn, sli grysh hue; thick pasty consistency; v plastic; poor solubility; good adhesion; silty/sandy; micaceous w/com fnly disseminated carbonaceous debris

Siltstone: mod to dk yel-brn, loc grysh brn; poorly ind, friable; clay-rich, hydrates to thick pasty clay; earthy Lstr w/dist micaceous sparkle; fn grainy Tex; arenaceous w/pervasive v fnL to fnL floating sand - com sand intbds; v com v fn organic/Lig debris; loc thin pl or-brn tuff lenses.

Tuff: pl orsh brn to yelsh org; mod wl ind, tough to sli brtl; pred tab ctgs w/sli rndd edges; matte Lstr w/fnly abrasive Tex; welded; com mixed w/argillaceous mat grad to tuffaceous mudst - com brn organic mat, occ mica, exhibits subtle bed lin.

Sand: cloudy. clr; v fnL to fnU, pred v fnU; sbang; wl srtd where bedded; fri; grain to Mtrx supported; noncalc; Qtz & Fspr(abd) w/com mica(Musco, occ Biot) & org mat.

Clay: mod yelsh brn; thick, plastic nodules over shaker; poor solubility; gd adhesion; silty/sandy w/v com org mat & mica.

Mudstone: med olv gry(brnsh hue) · mod ind, sli brtl - breaks w/dl snap; tab to blky ctgs; sli waxy Lstr w/subtle trnslncy; extr fn grainy Tex; Tuffaceous; loc lams pl org tuffaceous debris; non to wkly calc f/discreet sources - forams; incr tr pl blu volc debris w/depth below Sagar Creek.

Mudstone: olv gry w/grnsh hue; mod ind, sli brtl to occ tough; dl waxy Lstr w/v fn grainy Tex; noncalc; Tuffaceous (ltr colored ctgs) spty pl blu and or volc debris; tr fn Glauc, forams.

Siltstone: olv gry w/grnsh hue, grysh brn; mod tough; sl brit; blky to platy ctngs; cly rich; sl vfn sparkly to dull sbwaxy lus; sl smooth to sl gritty tex; grds to mudstone; vwk to noncalc; scat vfnL sand; tr lt grn and brt or volc inclns; up to 30% clay manufac f/mudstone/siltstn.

Clay: pl grysh brn to olv gry brn; sft; mushy pasty consist; sl silty; dull waxy lus; smooth graesy feel; readily to mod sol; noncalc; tr micromica; pr to mod pliab; pr plast; incr amounts @ 1475'.

Mudstone: tuffaceous lams; med to dk olv grybrn w/patches of yel to yelsh brn; frm to mod well ind; snappy, crnchy and brit; tough; dull earthy lus; grainy to sucrosic whre tuff; tr mica and lig; rr org and grn volc app min inclns.

Tuff: occurs as lams; pl yelsh brn to pl gry; well ind to v tough; v crunchy to sl brit; sl to mod silty; noncalc; rr volc.

Sandstone: overall pl gry wht, lt to med grn, blk; dom vfnL; mod ind to sl fri; com calc; abd marly mat @ 1499'; tr grn volc; tr mica.

Siltstone: olv gry brn w/com grn specs; tr or ; rr blk; grds to vfnL sandstone; mod ind to sl fri; cly rich; vfn sparkly lus; fnly abras tex; sl to mod calc; loc com grn volc inclns; tr or min; also grds to mudstone.

Note: Dramatic incr in siltstone @ 1563'; incr in pyr, glauc, or and grn volc, lig and mica.

Siltstone: pl brn to med grysh brn; blk, brn, grn, and rr or inclns; frm to sl fri; sl to loc mod sndy; dull to vfn sparkly lus; sl to loc mod gritty tex; sl calc; tuffaceous @ 1613'; tr fnly dism pyr; tr woody carb mat; cont tr grn volc debris; rr forams; tr micromica.

Mudstone: mod olv gry w/brnsh hue, bcm subtly more gnsh w/depth; mod ind, pred brtl to loc tough; earthy to pred dl waxy Lstr w/ extm fn grainy Tex; exhibits sli trnslncy wheretuffaceous; intbd w/v fnL - v fnU, silty ss w/v fn org mat; com v fn gn & or volc incl w scat foram, rr frmbdl pyr.

Tuff: pl yelsh gry, v pl brn, occ yelsh-or; hd; tough; tab ctgs; pred matte Lstr, occ sbrsns, fnly abrasive Tex, aphanitic, rr granular; trnsl on thin edges; mod calc; com mixed w/argil mat; com spty or(?) derbis; assoc mudstone exhibit incr ind, ltr color and v fn lams/varves/bedding.

Mudstone: med olv gry w/gnsh hue, ltr gry where silty or tuffaceous; mod ind, brtl to tough; blky to tab ctgs w/dl, sli waxy Lstr(espc when scored); incr rough grainy Tex, bcm incr silty w/occ v fn sand lams; rrly calc; com v fn pl blu, gn and or volc debris; tr frambiod pyr Repl of microfos; occ phos fish debris.

Siltstone: lt to mod gnsh gry, pl olv gry; pr to mod ind, crumbly to occ tough; earthy Lstr; fnly abrasive, loc sandy grad to v fn ss; noncalc; incr vis volc mat - com exhibits bed lin; spty Glauc, org debris; com tuffaceous.

Sandstone: pl gry w/subtle gn hue; v fnL to fnL, silty; sbang; wl srtd; mod to wl ind; grain supported; noncalc; abd Fspr w/v com volc debris, occ Glauc; loc tuffaceous; as thin intbds in silty mudstone.

Sandy Siltstone: pl grysh brn, yelsh brn; olv gry brn; vfnL to occ upper med gr; dom sly/silt to vfnU gr; ang to sbrndd; mod sort; wk calc; dom cly supp; frm to sl fri and crumbly; fn carb mat; tr or and grn volc debris; tr forams + shell frags; tr fnly dism pyr; micromicaeous.

Note: vfnL to occ med gr sand w/ pyr, glauc, forams, shell frags, volc debris, lig and mica @ 1988.

Sandstone: pl grysh brn; sl fri to mod ind; clay rich; vfnL to med gr; mod sort; tr pyr, glauc, volcs; mica; and tuff; sl to loc hi calc.

Sandy Siltstone: overall pl grysh brn, clr to cloudy, med to dk grn, brn, blk; clay rich; fri to crumbly; vfnL to med gr; ang to sbang; lo spher; mod sort; com to mnr calc; dom qtz and fspr; incr glauc; tr pyr, mica volc and carb mat.

Note: dom fn gr sandstone w/calc cem @ 2085'

Clay: pl to med gry brn w/olv hu; v sft, incr pliab and plast; sl silty; mod sol; v adh and coh; smooth tex; dul waxy lus; noncalc.

Mudstone: med to dk olv gry brn, med grn and or specs, brn incls, frm to mod well ind; irreg angblky to sbplaty ctngs; dull to vfn sparkly lus f/mica; grainy tex; non to vsl calc; tr volc; rr glauc; tr fnly dism pyr; rr forams; grds to siltstone.

Sand: lt gry; v fnL to fnL; sbang; wl srtd; fri to occ mod ind w/ calc cmt; pr ap por; abd Fspr w spty Qtz and volc debris; as thin lams & intbds in brnsh gry Mdst + v com wl pres forams in Mdst

Mudstone: olv gry w/variable hues f/brnsh gry to gnsh gry; mod ind crumbly to pred sli brtl; dl earthy Lstr, waxy when scored; v fn grainy Tex, loc silty; occ flaky partings(pr fis); mod to v calc; loc tuffaceous; cont'd com v fn pl blu, grn & or volc debris; occ anhdl pyr nods; v com foram,tr macrofos.

Note: Decr volc debris in Mdst assoc w/ltr color f/2285'

Mudstone: pl to mod brnsh olv - lighter than above; mod ind, incr bly; dull sli waxy Lstr; crushed ctgs exhibit sli trnslncy; cont'd mod calc; tr vis volc debris;incr com v fn dissem & anhdl nod pyr; gd tr Glauc, forams.

Clay: mod olv gry, bcmg subtly ltr; pasty, sli gummy consistency; mod soluble; mod plasticity; wkly expansive.

Mudstone: pl olv gry, v pl grysh brn; pr - mod ind, fri, crumbly; incr silty, loc sandy; waxy Lstr w/dist trnsl quality; non to wkly calc; flaky partings; spotty or volc debris w/gd tr anhdrl pyr, Glauc, carb mat & macrofos frags.

Siltstone: yelsh brn to olv gry brn, or and grn inclns, tr brn; frm to fri; crumbly; sl to loc mod sandy; fn gritty tex; vfn sparkly lus; wk calc; tr grn and or volc debris; rr glauc; tr woody carb mat; abd fnly dism pyr.

Sandstone: med-dk gry(vl hue) overall w/multi -col Gr; fnU to v crs, tr Gran; sbang - wl rndd; lo - hi spher; pr srtd; var ind, fri - hd; loc calc; pred Gr sprtd, occ gry tuffaceous Mtrx; 60% Fspr w/Qtz, 40% volc clasts - welded tuff, basalt, fresh & wthrd, ehdrl Fspr; com mica alts, epidote; overlies gry-brn silty Mdst w/dissme org debris/lig; v com sbhdrl pyr nods.

Sand: lt gry, grysh-wht overall w/ pred clr to cldy Grs; v fnU to crsL, pred fn to medL; sbang - sbrndd; lo spher; mod srtd; unconsol; arkosic w/v com/abd Fspr; scat volc clasts, poss slough; abd Musco, sbhdrl Pyr; com intbd calc cmtd ss; strong tr brn carb sltst @ 2615', 2630'.

Sand: lt gry; v fnL to medU, pred fn; sbang; lo spher; mod wl srtd; fri; arkosic; sbd Musco, Pyr.

Siltstone: mod yel-brn; pr-mod ind, crumbly; earthy to sli waxy Lstr; occ floating sand Grs; dissem org carb mat w/tr pyr Lig frags.

Sand: lt gry, cldy; v fnL to crsL, pred fn; ang - sbrnd; lo spher; mod wl srtd; pred loose w/intrmit calc cmts ss; arkosic w/v com mica, pred Musco, occ Biot and v com sbhdrl Pyr nods; ss v ti, Gr packed w/lo pors; ss com assoc w/pasty wht Kaolin clay.

Siltstone: yel-brn; mod ind; com carb mat; intbd fn-med ss w/LIG lams; pl gry/blu volc clasts in ss f/2748'.

Basalt: (altrd/wthrd) lt-med gry w/variable pl blu, grn and violet hues; hd; v fn grained; altered, bcmg fresher w/depth; microbrec, fractured w/abd calcite veining; abd 2ndry sbhdrl Pyr; rr zeolite filled vesicules, altrd Fspr phenocrysts.