HORIZON WELL LOGGING

COMPANY: NAHAMA & WEAGANT ENERGY CO.
WELL: "SALMON BERRY" H.N.R. #24-22-64
LOCATION: 2208.6' E and 384.4'N from the SW corner of Sec. 22, T6N, R4W, W., W. M.
ELEVATION: 1107' G.L. 1117' K.B.
FIELD: MIST
COUNTY: Columbia, Oregon
API NUMBER: 36-009-00312
SPUD DATE: 10-13-93
LOGGING DATES: 10-13-93 to 10-21-93
LOGGING DEPTHS: 30' to 2553'
GEOLOGIST: Jeff Vaughan
COMPANY MAN: Rob Lucas
CONTRACTOR: Taylor Drilling Inc.
RIG: 7
LOGGING GEOLOGISTS: Dan Cross, Jim Eastes
BIT SIZE: 12.25" to 505'; 7.875" to 2553'
CASING: 8.625" @ 503'
DRILLING FLUID Engineer: Enterprise, Rick Jones
CALIBRATION: 2% METHANE = 100 UNITS

ABBREVIATIONS

CO	Circulate Out
LAT	Logged After Trip
LAS	Logged After Survey
CG	Connection Gas
KC	Kelly Cut gas
WG	Wiper Gas
TG	Trip Gas
SG	Survey Gas
WR	Wiper Run
	CORE INTERVAL
WOB	(100,000# full scale)
	TRIP

SYMBOLS

PEBBLES >2mm, SAND, SANDSTONE, SILTSTONE, MUDSTONE, SHALE, MARL, CLAY, CHERT, DOLOSTONE, LIMESTONE, VOLCANICS, TUFF, BASALT

DRILL RATE	LITHOLOGY	MINERAL	GASES	CHROMATOGRAPH	REMARKS
ROP 0; WOB 100K 0		GLAUCONITE, PYRITE, MICAS, LIGNITE, SHELL FRAGS, TUFF	DITCH GAS, OFFSCALE, CUTTINGS GAS, OFFSCALE (20 40 60 80)	METHANE, ETHANE, PROPANE, BUTANE, PENTANE (1000 10000 100K)	DESCRIPTIONS, SURVEYS, MUD CHECKS, MISCELLANEOUS

Pump Output (bbls/stk)
#1=.115
#2=.115
(.115 bbls = 4.8 gal)

Spud 1415, 10-13-93

MINERAL COLUMN (Highlights)
m = occ mica
M = com mica
M = abd mica

MW 8.6
VIS 40

Note: Hole taking fluid incr water to keep up volume.

MW 8.5
VIS 42

Note: Fluid loss decr volume appr holding

Note: Lost circ on conn @ 440'; mix & pump LCM. Drill to 489' w/ poor, partial returns; lose returns @ 489'; mix & pump LCM; Pull up above suspected loss zone; build volume, RIH, drill to 505' w/ partial returns.

Note: Drill 30' out of shoe before any noticable mud loss

Note: lost approx 40 bbls to this point, 570'.

MW 8.6
VIS 65

Note: Lost all returns @ 624'; mix & build volume, pump LCM; swabbing hole while moving pipe - POOH, drop 3 stabs; RIH to shoe, mix mud, build volume; bypass shaker, drill to 707' w/partial returns. Pull to shoe, build volume; RIH, drill to 829' w/partial & occ no returns

Note: Drill to 829'; POOH, pick-up drill pipe, RIH open-ended to set cement plug. Set total of 3 cement plugs

Carbide Lag 10 min @ 814', 74u GPM #1-198, 153% Theor. 7 min

MW 8.5
VIS 36

Note: Lost approx 25 bbls of mud to 945'; add LCM run 1" stream water.

Note: Lost all returns @ 968'; Pull to shoe: build volume, mix LCM; Hole stays full while building vol; RIH, pump LCM, drill ahead

MW 8.9 VIS 42 PV 10 YP 14
pH 10 FL 20 Cl 600ppm

Carbide Lag 12 min @ 1091' 83u GPM #1-212, 126% Theor, 8 min

S @ 1122' 0°45'

Lost all returns @ 1154'; circ, work pipe(swabbing) regain circ, mix mud, drill on.

Begin losing returns while reaming @ 1185'; work pipe, regain circ; build vol, drill.

Carbide Lag 11 min @ 1216' 84u GPM 275, 150% Theor, 4 min dur

POOH chng jets: 3-18-3-12's

MW 8.4
VIS 43

MW 8.7+
VIS 41

Carbide Lag 12 min @ 1557' GPM 270, 129% Theor, 5 min

MW 8.7
VIS 39

Lost 15-20bbls on Wiper Trip @ 1650'

MW 8.8 VIS 37 PV 11 YP 6 pH 9.5 FL 6.8 Sol 3.2 Sd 4 Cl 500

- Add 30gal/min H_2O to maintain volume

Slow ROP assoc w/incr mud loss - stabs packed-off, no weight to bit, pump mud into formation - work pipe hi - to incr ROP

- Add 40gal/min

-Add 120gal/min H_2O Mix LCM losing mud!

Note: decr mud loss; reduce water added to mud; fluid level stable.

Note: incr fluid loss to hole; incr H_2O

Carbide Lag 14 min @ 2121' 115u GPM 285, 112% Theor 5 min dur

Note: Lost approx 128bbls in 5 hrs - 18gal/min

MW 8.9 VIS 48 PV 12 YP 10
Gel 3/8 pH 7 FL 8 Sol 4.2
Sd .3 Cl 400

Decreasing LCM in SPLS

Run Schlumberger E-Logs: DIL, BHC, GR, FMS

REMARKS

Siltstone: dk brnsh gry to olv gry-brn; v firm, sli brtl; blky ctgs w/wl defined edges; dl Lstr, waxy when scored; com - abd carbonaceous debris; loc varve-like lams v fn SS; tr volc debris; loc com anhdrl Pyr; grades to Mdst- bcms smooth Tex'rd, waxy Lstrd w/cont'd carb mat.

Congolmerate: dk grnsh gry; med to gran, pred v crs; sbrnd-rndd; mod - hi spher; pr srtg; fri - mod ind; noncalc, com Pyr as cmt; 30-50% rndd volc clasts w/qtz & fspr; spty mica; 2-3" lig seam; overlies fn, silty SS; calc ss bone @ 116-122'.

Sandstone: med grnsh gry overall w/ opq, dk gry to clr grs; pred fnL to fnU w/intrmnt crs to gran intrbds; sbang to rndd; wl srtd; fri; qtz, abd Fspr, 5-10%lithic clasts, (volc), spty Chlor, Biot & Pyr; dist incr orange volc debris @ 160'; spty fn carbonaceous mat.

Sandstone: med grnsh to olv gry; v fnL to fnU, loc silty w/tr argil Mtrx; sbang to sbrnd; wl srtd; fri; noncalc; arksc w/v com Fspr; com fn lt to dk grn & or volc debris, tr Chlor, Biot, Pyr; imtrmnt com carb mat; loc shell frags; bcmg incr silty w/incr organic mat; tr varve-like bedding.

Siltstone: med olv gry, loc sli brn hue; mod ind, sli brtl to crumbly; dl, earthy Lstr, sli waxy when scored; fn grainy Tex, loc bcmg rough where sandy; noncalc; com fn carb/lignite debris, spty mica & med grn volc(?) grains; rr parting lineation; loc grades to Mdst.

Mudstone: brnsh gry, olv gry; firm to crumbly; sli waxy Lstr; v fn grainy Tex; loc silty; loc v com organic/lig debris; occ incipient fiss; grades to Sltst.

Siltstone: med olv gry, loc grnsh & brnsh hues; mod ind, sli crumbly to tough; dl sli waxy Lstr, shiny when scored; rough; abrasive Tex, com sandy, loc grdg to fn SS; noncalc; spty v fn grn & or volc debris; gd tr Glauc where sandy; cont' com organic mat, fn lignite; loc com anhdrl to framboid Pyr(espc where sandy); rr bed lin.

Siltstone: olv gry to occ gry-grn; pred firm, tough ctgs, occ sli fri, crumbly; dl waxy Lstr w/ fn grainy to loc v gritty Tex; loc grades to Mdst; spty to com organic mat & variable amts volc debris; occ thin sandy lams w/tr Glauc.

Siltstone: med to dk olv gry; firm, sli tough; rndd to sharp edges; dl Lstr, waxy when scored; rough abrasive Tex, sandy in part; com v fn volc debris, mica & lesser amts carb mat, tr Pyr; pred as above but sli more gry, less olv.

Siltstone: med gry-grn to olv gry; mod ind, firm, sli brtl ctgs; dl waxy Lstr, espc when scored; rough gritty Tex, sandy grading to argil SS; com accessory debris - carb mat, grn & orange volc clasts, loc com Glauc &/or Celadonite; tr anhdrl Pyr; no distinct bed lin; rr rndd hvy mnrl frag; com subtle chngs in hue - various grys, olv's.

Sandstone: med grnsh gry w/clr to cldy qtz & Fspr, dk grn acces mnrls. v fnL to fnU; sbang; lo spher; wl srtd; silty, argil, grdg to Mtrx spprtd ss & sandy siltstone; com spty grn & or volc debris, poss fn Glauc & carb/lig debris.

Note: SS @ 610' apprs much less argil w/incr pors than abv.

Note: No sample returns w/partial mud returns; Gas trap placed in sand trap - insufficient flow to pass through gas trap.

Siltstone: med olv gry; mod ind, crumbly to pred sli brtl; dl, sli waxy Lstr, shiny, waxy Lstr when scored or brkn; rough grainy Tex; tr v fn sand incrl - dist less sand than spls abv; poss tuffaceous; spty dk grn & or volc debris; more com v fn lig; no bed lin; tr foram.

Siltstone/Mudstone: spls appr as abv w/lt olv hue & waxy Lstr but are dist softer, more clay-rich; ctgs easily crumbly; cont'd spty v fn volc debris, less organic mat; scat shell frags; rr Pyr; tr marly lams.

Siltstone: olv gry, lt to med grysh grn; crumbly to incr Brtl, incr ind f/abv; rough Tex w/incr fn volc debris; sli sandy @ 935'; bcms calc w/marly streaks @ 940-947' & cont'd sli sandy; tr med, sbrndd volc clast tr foram & shell frags.

Siltstone: med olv gry to incrly grysh grn (subtle); variable ind - sft, pasty to firm, sli brtl; ctgs appr hydrated; rough gritty Tex, loc sli sandy; non to wkly calc; cont'd com v fn waxy dk grn inclusions, prob altrd volc debris, poss Glauc; spty org mat; tr foram & occ framboid Pyr; loc gd tr shell frags

Siltstone: lt to med grysh grn, sli olv hue; crumbly to occ sli brtl; dl, sli waxy Lstr; incr abrasive Tex - incr v fn sand inclusions; com lt to dk grysh grn (sli bluish hue) & lesser orange volc debris; v fn clr qtz; tr foram, shell frags & framboid Pyr; intrmit thin marly lenses.

Sand: lt grnsh gry; v fnL to fnL; sbang to sbrnd; wl srtd; pred as "floating grains in Sltst, loc as thin lams of fri, grain-spprtd SS; qtz w/com grn waxy clasts, prob altrd volc; tr calc biogenic debris

Siltstone: bcms subtly dkr grn, less gritty, more clay rich f/1120'; cont'd com grn volc(?) inclu, tr Pyr

Sand: med bluish gry overall w/clr to multicolored grains; fmL to v crsU (poss gran); sbang to rndd; lo to mod spher; pr srtd; unconsol/fri w/tffcs Mtrx; Lithic arkose w/ 20-35% volc frags(wthrd Bslt, gry tff); spty Chlor, epid alts of FSPR occ Pyr, abraded shell feags.

Sand/Sandstone: med gry w/subtle blu & grnsh hues; pred fnL to medL, loc congl w/scat granules; sbang - rndd; mod srtd; fri to loc wl ind; grain packed w/pl gry to whtsh ash Mtrx, occ calc vein; 20-40% volc clasts; loc com epd, wthr Aug; inbdd gry & gry-brn tffcs Sltst.

Sand: med gry overall, loc bcmg dk brnsh gry; abd multicolored grs, pred gry & grn hues; fnL to v crs, loc granular intrbds; sbang-rndd; lo spher; pr - mod srtd; Lithic arkose w/20-40%(+?) wthrd basalt clasts w/calc & tffcs Mtrx; abd Hvy mnrl, espc Aug, Epid; loc com shell frags; crs to granular wthrd Bslt clasts @ 1300-1315' - base of Keasey(?).

Clay: pl olv gry, incr lt brnsh gry; v sft; mod thick consistency w/gd plasticity; pr solubility; gd adhesion(sticky); sli expansive; sandy in part w/incr com fn to occ crs sand grs; com anhdral Pyr; scat loose shell debris; decr amt dk grn volc debris(prob slough).

Sand: lt gry, clr; v fnU to fnU; ang to sbrnd; lo spher; wl srtd; unconsol/fri; arkosic, v com Fspr; v com loose anhdrl Pyr nods; spty volc clasts(poss slough); assoc w/ pl brnsh gry sticky clay abv.

Claystone: pl brnsh gry; pred firm pasty, plastic ctgs, loc hd, brtl & marly(calc); dl Lstr, waxy when scored or sheared; v fn grainy Tex on fresh surfs; loc micaceous; rr bed lin; persistent strong tr fn - crs anhdrl Pyr nods & brkn shell debris; rr visible organic mat.

Clay: pl brnsh gry; thickpasty consistency w/hi plasticity; pr solubility; sticky; sli expansive; loc calcw/10-20% less soluble Clyst ctgs; tr mica; cont'd Pyr, brkn shell debris & occ foram.

Claystone: bcms dk brn f/1510', grdg to yelsh brn; firm, pasty to v firm, sli brtl ctgs; waxy Lstr & extrm fn Tex; flaky when brkn; non to loc v calc; tr Glauc, Pyr.

Claystone: med to loc dk grysh brn, tr yelsh brn; incr firm, sectile to crumbly ctgs; dl, earthy Lstr, waxy when scored or sheared; v fn grainy Tex; loc silty; non to mod calc; loc pl yel-gry calc tuff lams; loc tr fn-med, rndd volc clasts; cont'd but decr anhdrl Pyr nods; incr silty w tr v fn sand; loc v com foram; tr thin walled shell debris; gd tr trnslu, waxy pl gry volc ash.

Sand: lt gry overall w/clr to cldy grs; fnL to medL, pred fnU; sbang to sbrnd; mod spher; wl srtd; appr loose, unconsol; arkosic w/v com FSPR; v com fn Musco; tr pl grn, pink & yel access mnrls.

Clay: becms dkr brnsh gry; v sft; thick pasty consist; prly solu; gd plasticity; strong tr v fn carbonaceous debris & trnsl waxy devit ash; gd tr fn sand as abv.

Claystone: bcms ltr olv gry / brn-gry f/1700'; grdg back to med gry-brnw/depth; sft, pasty to mod firm; sectile to infreq brtl; extrm fn grainy Tex; variably calc; spty carb mat, foram & mica; calcite vein @ 1705'; tr shell debris; cont'd, but decr Pyr, fn sand.

Claystone?mudstone: med grysh brn to infreq olv gry; sft to firm, pasty to sli sectile; earthy to waxy Lstr; bcmg subtly coarser, more silty w/ incr tr fn sand; spty fn carb mat, mica & brkn shell debris; tr volc ash; spty foram.

Sand/SS lt brnsh gry; v fnU to fnU; sbang to sbrnd; lo spher; wl srtd; fri to loc v wl ind w/calc cmt; grain spprtd; arksc w/v com Fspr; com mica (Musco, poss Biot); spty (1-3%) volc debris; tr shell.

Clay/Claystone: pl brnsh gry; v sft; thick plastic consistency; prly solu; washes down to 10-20% sectile claystone: com v fn carb debris; loc silty/sandy; sli expansive.

Sand/Sandstone: lt to med gry, loc grysh wht; fnL to loc crsU, pred fn - med; sbang to occ rndd; mod wl srtd; loose to loc wl ind w/calc cmt; qtz w/v com Fspr, arkosic; 2-5% volc lithics(ploished Bslt) & hvy mnrls(epid); com Musco; loc abd bivalve frags; rr Pyr.

Sand/SS: lt gry, incr whtsh; fn to med;pred as abv w/subtle incr alts of Fspr to kaolin; appr Sltst intrbds, gd tr fn lignite; tr shell.

Siltstone: dk brnsh gry; crumbly; earthy; com carb mat, spty mica; tr bed lin; poss contam f/LCM sweep.

Sand/SS: lt gry, pred clr to trnsl grs; fnL to occ crsU, pred fn to med; sbang to rndd; mod srtd; pred loose fri w/loc ss intrbds; arkosic loc crs, sbrnd volc clasts; spty mica; com anhdrl Pyr(tr calcopyr); scat hvy mnrls, shell debris, fn lig frags.

Lignite: brnsh blk; firm, sli brtl frags; earthy to dl silky Lstr; fn woody Tex; com Pyrtc atls; loc pitted w/sand; assoc w/gry-brn, silty Mdst: Note: anomalous amts lig & Sltst in spl coincide w/ addition of LCM(pr spl Quality)

Note: pr spl quality f/1910' assoc w/addition of LCM; v com brnsh gry Sltst/Mdst ctgs - sme slough, sme questionable as to origin.

Sand/SS: lt gry, loc sli brnsh hue; fnL to medU, occ crsL; ang to rndd, pred sbang - sbrnd; lo spher; mod srtd; pred loose, loc calc cmtd; arksc w/2-5% lithics & hvy mnrls; com mics, tr pyr, shell frag, lig.

Lignite: brn-blk; sft, sli brtl; tab w/fn woody Tex; com Pyrtc alts.

Sand: pl brnsh gry overall, pred clr to cldy grs; v fnU to medU, pred fnU to medL; ang to sbrnd, pred sbang; lo spher; wl srtd; apprs loose, unconsol; arkosic w/ spty to com Musco, lesser fn anhdral Pyr; tr abraded shell frags; loc tr med, rndd volc clasts.

Sand: lt gry overall w/sli brnsh hue; fnL to medU, pred fnU - medL; ang to sbrnd; lo spher; mod wl srtd; pred loose sand w incr amts calc cmtd SS; arkosic, v com Musco; 2-3% volc lithics & hvy mnrls; spty Pyr, tr shell debris, lig; spl apprs clean (due to bypass shaker).

Lignite: incr brtl; dl to sbvit Lstr apprs better grade than abv.

Mudstone: lt grysh brn; sft, prly ind; sli calc; com fn carb mat; assoc w/thicker lig beds; loc abd Pyr; sand apprs finer assoc Lig.

Sand: lt gry; fnU to crsL; sbang to sbrnd; lo spher; mod srtd, crs grs appr to be loc events; pred loose w/tr ss; arkosic w/v com Fspr; no dist kaolin alts; spty access mnrl; v com Pyr, tr lig, shell debris.

Sand: lt gry, subtle brnsh hue; fnL to scat v crsL, pred fnU to medL; sbang to rndd; lo to locc hi spher; mod srtd; pred loose grs; bulk spl mod calc; arkosic w/v com Fspr; 1-3% crs, rndd volc(Bslt) clasts; spty Musco, tr chloro-musco; tr Pyr; loc intrbd Sltst w carb mat; sand appr crsns downward.

Sand: lt gry; fines f/2415', intrbd w/sandy, carb-rich Sltst, fn lig lams.

Sand: lt gry; fn to v crs; sbang - rndd; wl to loc pr srtd; pred loose w/loc wl ind calc SS; arksc w/com rndd gry Bslt clasts; spty mica, hvy mnrls; Loc abd shell frag.

Sand: lt to med gry(subtle dkr); fnU to medU; sban - sbrnd; mod wl srtd; apprs unconsol; bulk spl mod calc; arkosic w/com fn mica; cont'd but decr rndd Bslt clasts; com bivalve shell debris; com Pyr; tr brn Sltst.

Siltstone: dk yel-brn; crumbly, fri; earthy Lstr; v micaceous & abd dk brn carb debris; assoc w Lig @ 2500'; com v fn Pyr alts.

Sand: lt gry; v fnU to fnU; sbang; wl srtd; loose; arkosic w/v com cldy Fspr; 1-3% access mnrls, prec mica; cont'd tr shell debris; spls below Lig @ 2500' assoc w/ thick pasty dk brn clay(carb rich).