1-3
MUD LOG

GEOIL®
TGT GAMAS LTDA.

LO6-25

REGISTRO GEOLOGICO DE PERFORACION
(DRILLING'S GEOLOGICAL LOG)

PETRO-TECH
PERUANA S.A.

Company / **Compañia**: PETRO-TECH PERUANA S.A.
Location / **Localización**: N: 9.508.648.51 m ; E: 459.052.57 m
State / **Depto**: PIURA
Area: LOBITOS OFFSHORE
GL: (WD) : 335'
Spud Date / **Iniciación**: March 13, 2001 at 16:00 Hrs
Interval Logged / **Intervalo Registrado**: 565' - 9790'
Crew / **Grupo**: A. Garro/J. Ortiz

Well / **Pozo**: Z2B-24-079-D-LO6 (LO6-25)
Country / **Pais**: PERU
Field / **Campo**: LOBITOS
RT: 50'
T.D. Date / **Finalización**: April 16, 2001 at 02.30 Hr
Mud Type / **Tipo de Lodo**: FLO-DRILL
Vert. Scale ft / **Escala Vertical**: 1: 600

WELL SITE FILE

WELL SITE FILE

WORKING FILE
GEOSCIENCES

LITHOLOGIC SYMBOLS
SIMBOLOS LITOLOGICOS

- ▨ Anhidrite / Anhidrita
- ▨ Sandstone / Arenisca
- ▨ Dolom. Lmst / Caliza Dolom
- ▨ Dolomite / Dolomita
- ▨ Halite / Halita
- ▨ Marl / Marga
- ▨ Gypsum / Yeso
- ▨ Claystone / Arcillolita
- ▨ Congl.Sands / Arenisca con
- ■ Coal / Carbon
- ▨ Extrusive / Extrusiva
- ▨ Siltstone / Limolita
- ▨ Plutonic / Plutonica
- ▨ Fossils / Fosiles
- ▨ Sand / Arena
- ▨ Limestone / Caliza
- ▨ Chert / Chert
- ▨ Gypsum / Yeso
- ▨ Shale / Lutita
- ▨ Siderite / Siderita
- ▨ Metamorphic / Metamorfico

ABBREVIATIONS
ABREVIATURAS

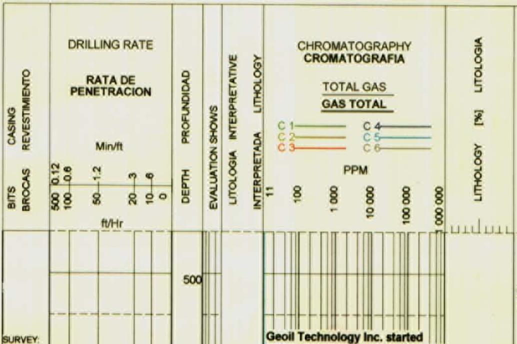
NB - NEW BIT
ST - SHORT TRIP
DS - DEVIATION SURVEY
◢ CASING SHOE
▨ CORE
LC - LOSS CIRCULATION
DST - DRILL STEAM TEST
LAT - Logged After Trip

MUD
MW - WEIGHT (ppg)
P - Pore Pressure
F - Fracture Gradient
V - VISCOSITY (secs)
PV - PLASTIC VISC (cps)
YP - YIELD POINT
Ca - CALCIUM (ppm)
Cl - CHLORIDES (ppm)
F - FILTRATE (cc)
Rm - MUD RESISTIVITY
Rmf - Mud Filtrate Resistivity

DRILLING CONDITIONS
WOB - WEIGHT ON BIT
RPM - REV./MIN
PP - PUMP PRESSURE
SPM - STROKES/MIN
GPM - GALLONS/MIN

GAS
- 1 - METHANE = C1
- 2 - ETHANE = C2
- 3 - PROPANE = C3
- 4 - BUTANE = C4
- 5 - PENTANE = C5
- 6 - HEXANE = C6
TG - TRIP GAS
CG - CONN GAS
SG - SWABB GAS

WELL SITE FILE



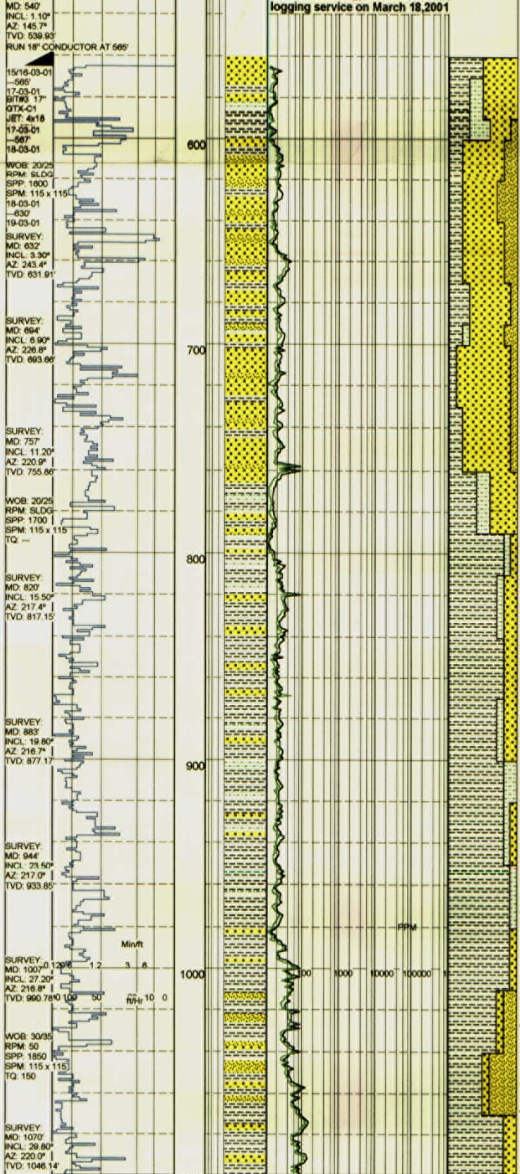
SAMPLE DESCRIPTION

DESCRIPCION DE MUESTRAS

DRILLING SPUDDED ON MARCH 13th, 2001 AT 16.00 HRS.

GEOIL WELL Z2B-24-079-D-LO6 (LO6-25) COMPANY PETRO-TECH PERUANA

logging service on March 18,2001



MD: 540'
INCL: 1.10°
AZ: 145.7°
TVD: 539.93'
RUN 18" CONDUCTOR AT 565'

15/16-03-01
—565'
17-03-01
BIT#3 17"
GTX-C1
JET: 4x18
17-03-01
—567'
18-03-01

WOB: 20/25
RPM: SLDG
SPP: 1600
SPM: 115 x 115
18-03-01
—630'
19-03-01

SURVEY:
MD: 632'
INCL: 3.30°
AZ: 243.4°
TVD: 631.91'

SURVEY:
MD: 694'
INCL: 6.90°
AZ: 226.8°
TVD: 693.66'

SURVEY:
MD: 757'
INCL: 11.20°
AZ: 220.9°
TVD: 755.86'

WOB: 20/25
RPM: SLDG
SPP: 1700
SPM: 115 x 115
TQ: —

SURVEY:
MD: 820'
INCL: 15.50°
AZ: 217.4°
TVD: 817.15'

SURVEY:
MD: 883'
INCL: 19.80°
AZ: 216.7°
TVD: 877.17'

SURVEY:
MD: 944'
INCL: 23.50°
AZ: 217.0°
TVD: 933.85'

SURVEY:
MD: 1007'
INCL: 27.20°
AZ: 216.8°
TVD: 990.78'

WOB: 30/35
RPM: 50
SPP: 1850
SPM: 115 x 115
TQ: 150

SURVEY:
MD: 1070'
INCL: 29.80°
AZ: 220.0°
TVD: 1046.14'

TALARA FM. AT SURFACE

SANDSTONE: gy, 100% v f gr, w srt, v arg mtx, v calc, mod hd, drty, some w/. lam coal & dk gr incl, v p vis por
Acc: tr tab coal

SAND: hyal, wh, trnsl, qtz, 30% f, 60% m, 10% c grs, sbang, fr srt, fw dk & gn grs.
Acc: tr mass calc

SANDSTONE: gn'sh gy, gn'sh wh, mnr lt gy, 70% f, 30% m gr, sbrd, arg mtx, calc, mod consl, w/. some dk & gn gr incls, p vis por
Acc: tr mass calc

SANDSTONE: lt gy, gy, 70% f, 30% m gr, sbang-sbrd, w srt, arg mtx, calc, sl fri,
w/. dk gr & tr lam coal incls, p vis por
Acc: fw calc

CLAYSTONE: brn, brn'sh gy, sbblky-blky, sl sft, v sl calc, micrmic, micrcarb, smt tex
Acc: tr mass calc

CLAYSTONE: brn, blky, sft-mod frm, non calc, micrmic, micrcarb, loc slty
Acc: tr dol, mass calc

CLAYSTONE: brn, blky, sft-mod frm, non calc, micrmic, micrcarb, loc slty
Acc: tr dol

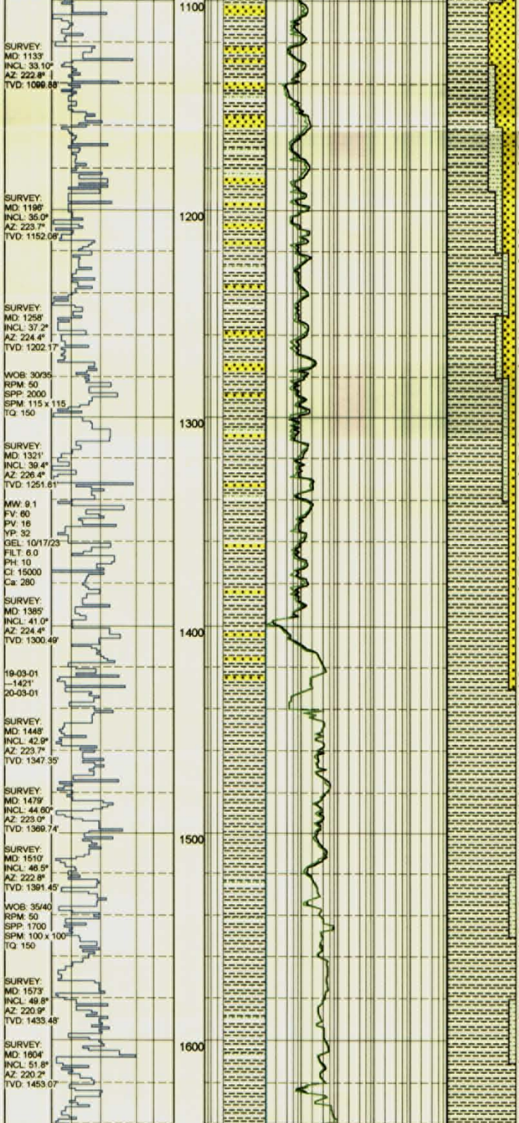
SILTSTONE: brn, blky, sft, sl calc, occ mic.
Acc: tr dol

CLAYSTONE: brn, sbblky-blky, mod frm, non calc, micrmic, mnr micrcarb, slty
Acc: tr dol

SAND: hyal, mnr wh, trnsp, qtz, 20% v f, 40% f, 30% m, 10% c gr, sbang-sbrd, fr srt.
Acc: fw dol

SAND: hyal, mnr wh, trnsp, qtz, 20% v f, 40% f, 30% m, 10% c gr, sbang-sbrd, fr srt, tr smky & gn grs.
Acc: tr dol

GEOIL WELL Z2B-24-079-D-LOG (LOG-25) COMPANY PETRO-TECH PERUANA



SURVEY:
MD: 1133'
INCL: 33.10°
AZ: 222.8°
TVD: 1099.88'

SURVEY:
MD: 1196'
INCL: 35.0°
AZ: 223.7°
TVD: 1152.08'

SURVEY:
MD: 1258'
INCL: 37.2°
AZ: 224.4°
TVD: 1202.17'

WOB: 30/35
RPM: 50
SPP: 2000
SPM: 115 x 115
TQ: 150

SURVEY:
MD: 1321'
INCL: 39.4°
AZ: 226.4°
TVD: 1251.61'

MW: 9.1
FV: 60
PV: 16
YP: 32
GEL: 10/17/23
FILT: 6.0
PH: 10
Cl: 15000
Ca: 280

SURVEY:
MD: 1385'
INCL: 41.0°
AZ: 224.4°
TVD: 1300.49'

19-03-01
—1421'
20-03-01

SURVEY:
MD: 1448'
INCL: 42.9°
AZ: 223.7°
TVD: 1347.35'

SURVEY:
MD: 1479'
INCL: 44.60°
AZ: 223.0°
TVD: 1369.74'

SURVEY:
MD: 1510'
INCL: 46.5°
AZ: 222.8°
TVD: 1391.45'

WOB: 35/40
RPM: 50
SPP: 1700
SPM: 100 x 100
TQ: 150

SURVEY:
MD: 1573'
INCL: 49.8°
AZ: 220.9°
TVD: 1433.48'

SURVEY:
MD: 1604'
INCL: 51.8°
AZ: 220.2°
TVD: 1453.07'

SANDSTONE: gy'sh wh, lt gy, 90% v f, 10% f gr, sbang-sbrd, w srt, arg mtx, v calc, mod hd, drty, occ mic, dk & gn gr incls, p vis por
Acc: tr dol, mass calc

CLAYSTONE: brn, brn'sh gy, sbblky-blky, mod frm, v sl calc, micrmic, sl micrcarb.
Acc: tr dol, calc

CLAYSTONE: brn, brn'sh gy, sbblky-blky, mod frm, v sl calc, micrmic, sl micrcarb.
Acc: tr dol

SANDSTONE: lt gy, gy'sh wh, 100% v f gr, w srt, arg mtx, calc, mod hd, drty, w/. dk & gn gr incls, v p vis por
Acc: fw dol

CLAYSTONE: brn, brn'sh gy, sbblky, mod frm, v sl calc, micrmic, sl micrcarb, some w/. lam coal incl.
Acc: tr dol, mass calc

CLAYSTONE: brn, brn'sh gy, sbblky, mod frm, v sl calc, micrmic, sl micrcarb, some w/. lam coal incl, slty in part.
Acc: fw dol, tr mass calc

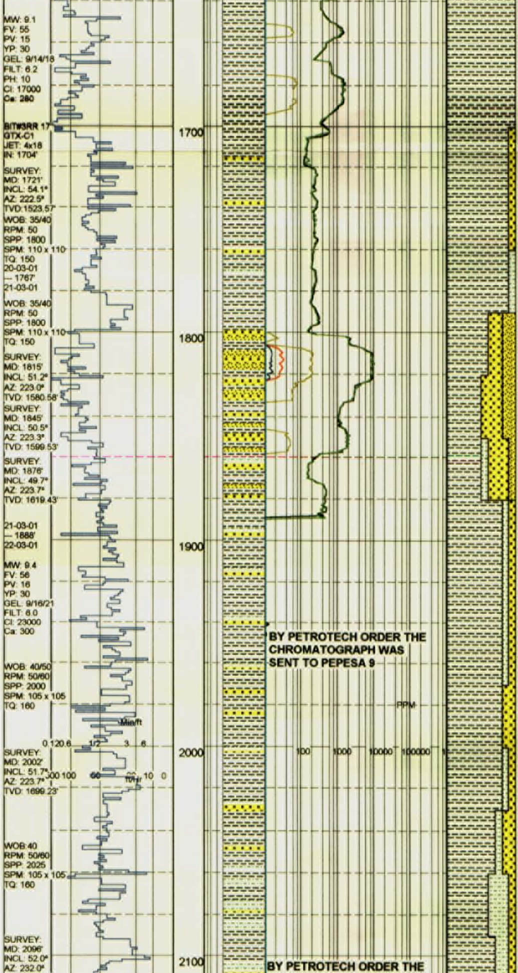
CLAYSTONE: brn, brn'sh, mnr md gy, sbblky, mod frm, v sl calc, micrmic, loc micrcarb, slty in part
Acc: tr dol, mass calc

CLAYSTONE: brn, brn'sh gy, sbblky occ sbplty, mod frm, v sl calc, micrmic, loc micrcarb, slty in part
Acc: tr dol, micfos

CLAYSTONE: brn, mnr brn'sh gy, sbblky occ sbplty, mod frm, v sl calc mnr non calc, micrmic, sl micrcarb, smt tex
Acc: tr calc

CLAYSTONE: brn, mnr brn'sh gy, sbblky mnr sbplty, mod frm, v sl calc mnr non calc, micrmic, sl micrcarb, smt tex
Acc: tr dol

GEOIL WELL Z28-24-079-D-LOG (LOG-25) COMPANY PETRO



CLAYSTONE: brn, mnr md gy, sbblky-blky, mod frm, non calc, micrmic, mnr micrcarb, loc slty
Acc: tr dol

CLAYSTONE: brn, mnr md gy, sbblky-blky, mod frm, non calc, micrmic, mnr micrcarb, loc slty
Acc: tr dol

CLAYSTONE: brn, mnr md gy, sbblky, mod frm, v sl calc, micrmic, mnr micrcarb, sl rog on surf
Acc: tr dol

SAND: hyal, wh, trnsp, qtz, 60% f, 40% m gr, sbrd-sbang, w srt, tr gn grs.
Acc: tr dol, calc

SANDSTONE: gy'sh wh, wh, 70% v f, 30% f gr, sbrd, w srt, arg mtx, calc, fri occ mod hd, w/. dk & gn gr incls, p vis por
Acc: tr dol

CLAYSTONE: brn mnr brn'sh gy, md gy, sbblky-blky, mod frm, non calc, micrmic, micrcarb, loc w/. lam coal incl.
Acc: fw calc, dol

CLAYSTONE: brn, sbblky-blky, mod frm, v sl calc, micrmic, micrcarb, mnr md gy, sbblky, mod frm, non calc, micrmic, micrcarb, some w/. lam coal incl.
Acc: fw calc, dol

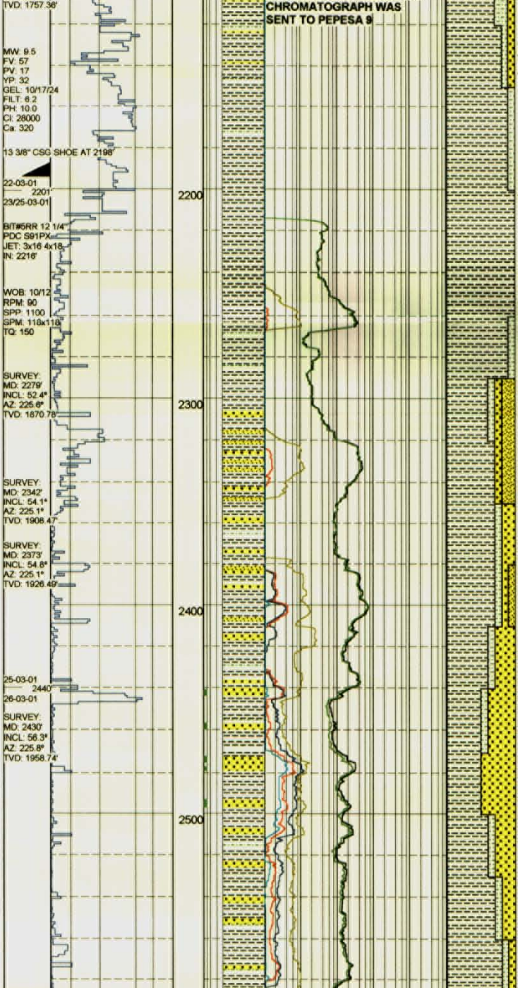
SANDSTONE: lt gy, gy, 90% v f, 10% f gr, sbrd, w srt, arg mtx, calc, mod fri, drty, v p vis por
Acc: fw mass calc, dol

SANDSTONE: gy'sh wh, occ lt gy, 100% v f, w srt, slty mtx, v calc, fri, sl drty, occ mic, dk gr incls, p vis por
Acc: fw dol, tr micfos

SILTSTONE:gy, sbblky, mod sft, non calc, sl micromic, occ microcarb, sdy in pt.
Acc: few dol.

- TECH PERUANA

GEOIL WELL Z2B-24-079-D-LOG (LOG-25)



CLAYSTONE: gy, mnr brn'sh gy, sbblky-blky, sft & mod frm, non calc, v micrmic, micrcarb, r w/. lam coal incl.
Acc: fw dol

CLAYSTONE: gy, mnr brn'sh gy, brn, sbblky-blky, sft & mod frm, non calc, v micrmic, micrcarb, some w/. lam coal incl.
Acc: tr dol

CLAYSTONE: gy, lt gy, mnr brn'sh gy, sbblky - sbplty, sft, v sl - non calc, micrmic, micrcarb.
Acc: tr mass calc & dol.

SAND: hyal, wh, trnsl, qtz, 30% f, 60% m, 10% c gr, sbrd-sbang, fr srt.
Acc: tr mass calc.

SANDSTONE: gy'sh wh, occ lt gy, 80% v f, 20% f gr, w srt, arg mtx, calc cmt, sl hd, sl drty, dk gr incls, p vis por
Acc: fw dol & tr mass calc.

CLAYSTONE: gy, lt gy, mnr brn'sh gy, sbblky - sbplty, sl sft, non calc, micrmic, micrcarb, smt surf.
Acc: tr mass calc.

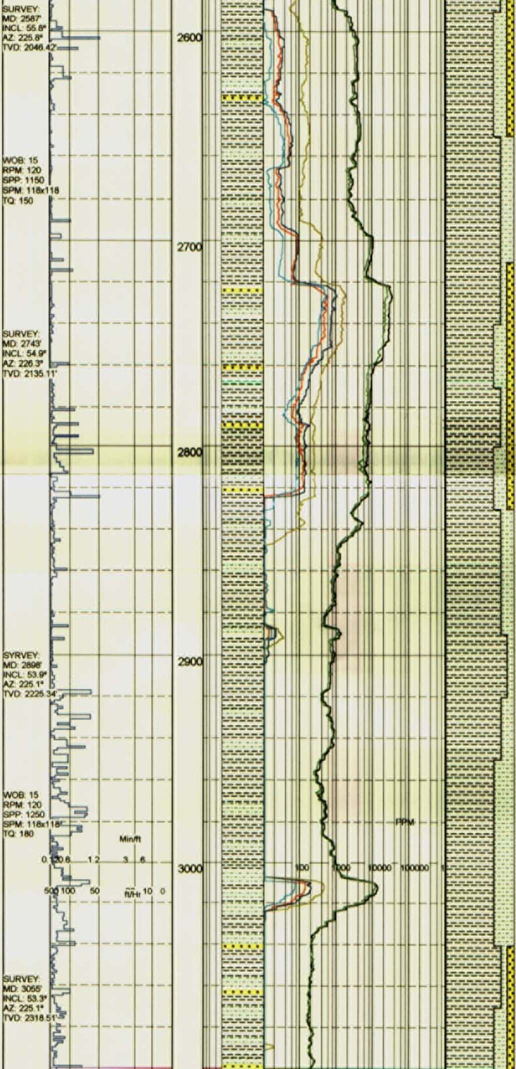
SANDSTONE: gy'sh wh, occ lt gy, 90% v f, 10% f gr, w srt, arg mtx, calc cmt, mod hd, sl drty, dk & gn gr incls, p vis por
Acc: tr mass calc & pyr.

SANDSTONE: gy'sh wh, occ lt gy, 100% v f gr, sbrnd, w srt, arg mtx, calc cmt, mod hd, sl drty, dk & gn gr incls, p vis por
Fluor: tr sl yelsh wh nat fluor, slow weak strmg sl mlky wh cut, fair res ring.
Acc: tr mass calc & pyr.

CLAYSTONE: gy, mnr brn'sh gy, sbblky occ sbplty, sl frm, non calc, micrmic, micrcarb, smt surf.
Acc: tr mass calc.

COMPANY PETRO-TECH PERUANA

GEOIL WELL Z2B-24-079-D-LOG ILLO



SURVEY:
MD: 2587'
INCL: 55.8°
AZ: 225.8°
TVD: 2046.42'

WOB: 15
RPM: 120
SPP: 1150
SPM: 118x118
TQ: 150

SURVEY:
MD: 2743'
INCL: 54.9°
AZ: 226.3°
TVD: 2135.11'

SYRVEY:
MD: 2898'
INCL: 53.9°
AZ: 225.1°
TVD: 2225.34'

WOB: 15
RPM: 120
SPP: 1250
SPM: 118x118
TQ: 180

SURVEY:
MD: 3055'
INCL: 53.3°
AZ: 225.1°
TVD: 2318.51'

SILTSTONE: gy, lt gy, sbblky, sl sft, sl calc, micmic, miccarb, occ lam coal incl.
Acc: tr mass calc.

CLAYSTONE: gy, lt gy, brn'sh gy, sbblky - sbplty, sl frm, non calc, micrmic, micrcarb, sl rough surf.
Acc: tr mass calc.

SILTSTONE: gy, lt gy, sbblky, sl sft, sl calc, micmic, miccarb, occ lam coal incl.
Acc: tr mass calc.

CLAYSTONE: pred gy, lt gy, mnr brn'sh gy, sbblky - sbplty, sl frm, non calc, micrmic, micrcarb, sl rough surf.
Acc: tr mass calc.

SILTSTONE: gy, lt gy, sbblky, mod frm, sl calc, micmic, miccarb, occ lam coal incl.
Acc: tr mass calc.

CHACRA FM AT 2830'

CLAYSTONE: gy, lt gy, brn'sh gy, sbblky occ sbplty, sl frm - frm, non calc, micrmic, micrcarb, sl rough surf.
Acc: tr dol.

CLAYSTONE: pred gy, lt gy, mnr brn'sh gy, sbblky - sbplty, sl frm, non calc, micrmic, micrcarb, sl rough surf.
Acc: tr mass calc.

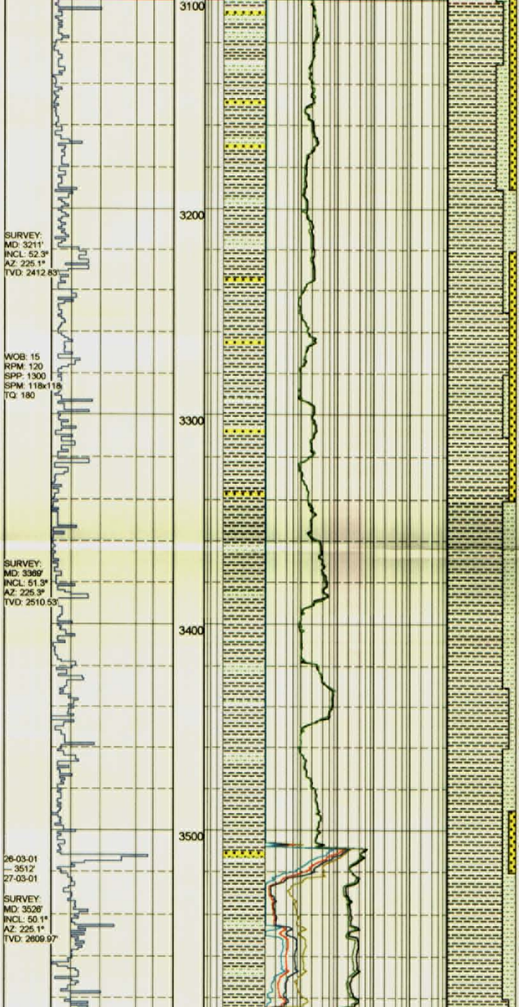
SILTSTONE: gy, lt gy, sbblky, mod frm, sl calc, micmic, miccarb, occ lam coal incl.
Acc: tr mass calc & dol.

CLAYSTONE: pred gy, lt gy, mnr brn'sh gy, sbblky - sbplty, sl frm, non calc, micrmic, micrcarb, sl rough surf.
Acc: tr dol & mass calc.

SANDSTONE: gy'sh wh, occ lt gy, v f gr, sbrnd, w srt, arg mtx, calc cmt, mod hd, sl drty, dk & gn gr incls, p vis por
Acc: tr mass calc.

-251 COMPANY PETRO-TECH PERUANA

GEOIL WELL Z2B-24-07



CLAYSTONE: pred gy, mnr brn'sh gy, sbblky - blky, sft, mod frm in pt, non calc, micrmic, micrcarb, sl rough surf.
Acc: few dol, tr mass calc.

SILTSTONE: brnsh gy, md gy, sbblky, mod frm, sl calc, micmic, miccarb, occ lam coal incl.
Acc: tr mass calc & dol.

CLAYSTONE: gy, brn'sh gy, sbblky - blky, mod frm, non calc, micrmic, micrcarb, w/ few lam coal incl, silty.
Acc: few dol, tr mass calc.

CLAYSTONE: gy, brn'sh gy, sbblky - sbblky, mod frm, non calc, loc v micrmic, micrcarb, w/ some lam coal, sl rough surf.
Acc: few dol, tr mass calc.

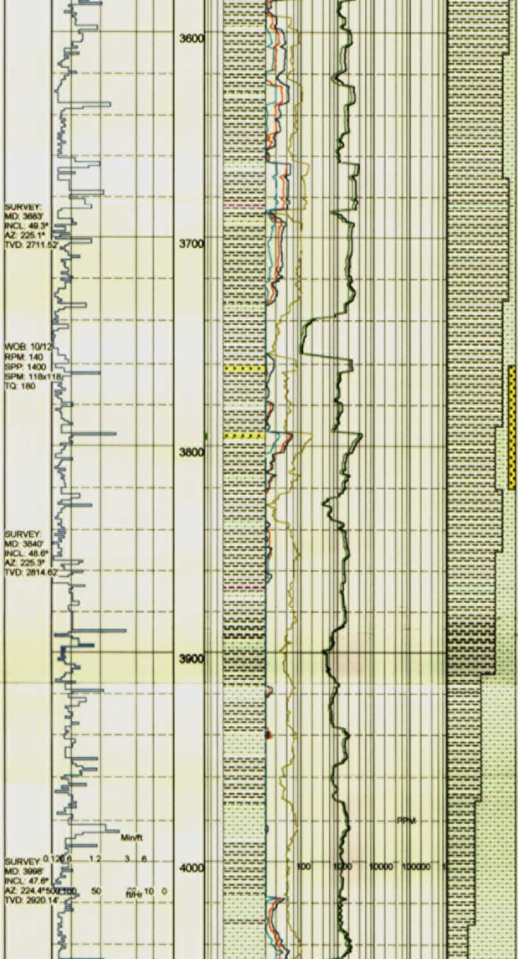
SILTSTONE: lt gy, gy, sbblky - blky, mod frm, sft in pt, sl calc, micmic, miccarb, occ lam coal inc, sdy.
Acc: tr dol & mass calc.

CLAYSTONE: gy, md gy, sbblky - sbblky, mod frm, non calc, loc v micrmic, micrcarb, w/ some lam coal, mod slty.
Acc: tr dol & mass calc.

SANDSTONE: lt gy, 100% v f gr, sbrnd, w srt, slty mtx, in pt calc cmt, mod hd, sl drty, dk gr incls, p vis por.
Acc: tr mass calc.

SILTSTONE: lt gy, gy, sbbky, mod frm, sft in pt, sl calc, micmic, miccarb, occ sdy.
Acc: tr dol & mass calc.

9-D-LO6 (LO6-25) COMPANY PETRO-TECH PERUANA GEOIL



CLAYSTONE: gy, md gy, sbblky, occ sbplty, mod frm, non calc, loc v micrmic, micrcarb, rough surf.
Acc: tr dol & mass calc.

CLAYSTONE: gy, md gy, sbblky, occ sbplty, mod frm, non calc, loc v micrmic, micrcarb, occ lam coal incl, rough surf, loc smooth surf.
Acc: tr dol & mass calc.

SILTSTONE: lt gy, gy, sbbky, mod frm, sft in pt, sl calc, micmic, miccarb, occ sdy.
Acc: tr dol & mass calc.

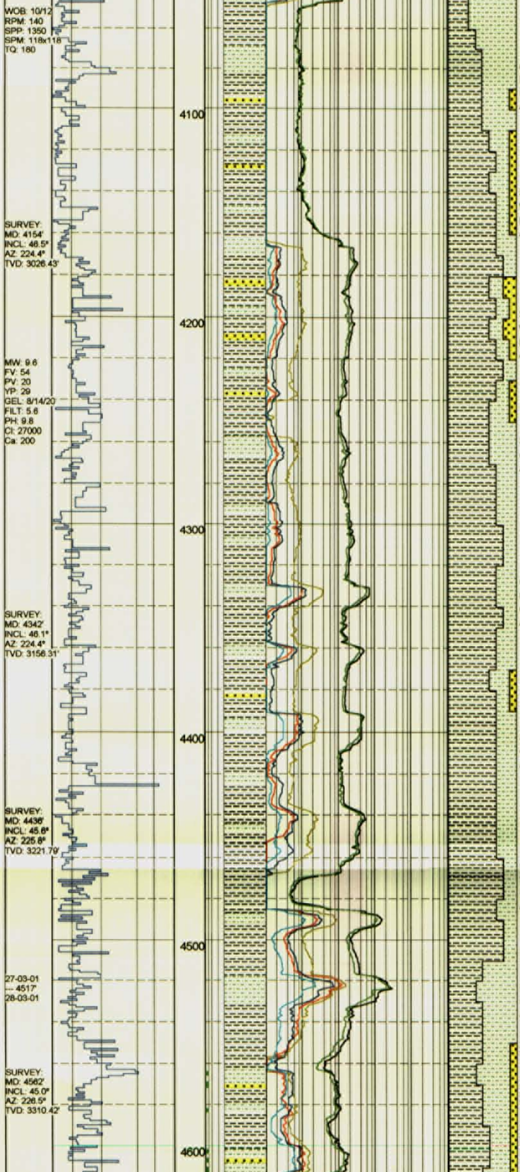
SANDSTONE: gy'sh wh, occ lt gy, 100% v f gr, sbrnd, w srt, arg mtx, calc cmt, mod consl, sl drty, dk gr incls, v p vis por
Fluor: tr sl yelsh wh nat fluor, slow weak strmg sl milky wh cut, sl yelsh wh res ring.
Acc: tr mass calc & dol.

CLAYSTONE: gy, md gy, sbblky, occ sbblky, mod frm, loc sof, non calc, loc v micrmic, micrcarb, occ lam coal incl, rough surf, loc smooth surf.
Acc: tr dol & mass calc.

SILTSTONE: brn'sh gy, sbbky - blky, mod frm, v sl - non calc calc, micmic, miccarb, occ sdy.
Acc: tr mass calc & glauc.

SILTSTONE: brn'sh gy, sbbky - blky, mod frm, v sl - non calc calc, micmic, miccarb, occ sdy.
Acc: tr mass calc.

WELL Z2B-24-879-D-LO6 (LO6-25) COMPANY PETRO-TECH PERUANA GEOIL W



WOB: 10/12
RPM: 140
SPP: 1350
SPM: 118x118
TQ: 180

SURVEY:
MD: 4154'
INCL: 46.5°
AZ: 224.4°
TVD: 3026.43'

MW: 9.6
FV: 54
PV: 20
YP: 29
GEL: 8/14/20
FILT: 5.6
PH: 9.8
Cl: 27000
Ca: 200

SURVEY:
MD: 4342'
INCL: 46.1°
AZ: 224.4°
TVD: 3156.31'

SURVEY:
MD: 4436'
INCL: 45.6°
AZ: 225.8°
TVD: 3221.79'

27-03-01
--- 4517'
28-03-01

SURVEY:
MD: 4562'
INCL: 45.0°
AZ: 226.5°
TVD: 3310.42'

CLAYSTONE:brn'sh gy, sbblky, occ sbblky, mod frm, loc sof, non calc, loc v micrmic, micrcarb, occ lam coal incl, rough surf, slty.
Acc: tr mass calc.

SANDSTONE: gy'sh wh, occ lt gy, 100% v f gr, sbrnd, w srt, arg mtx, calc cmt, mod consl, sl drty, dk gr incls, v p vis por
Acc: tr mass calc.

SANDSTONE: gy'sh wh, occ lt gy, 100% v f gr, sbrnd, w srt, arg mtx, calc cmt, mod hd, sl drty, w/dk gr incls, v p vis por.
Acc: tr glauc & mass pyrl.

SILTSTONE: brn'sh gy, sbbky - blky, mod sft - sft, non calc calc, micmic, miccarb, occ sdy.
Acc: tr mass calc.

CLAYSTONE:gy lt gy occ brn'sh gy, sbblky, occ sbplty, mod frm, loc sof, non calc, micrmic, micrcarb, occ lam coal & glauc incl, rough surf, slty.
Acc: tr mass calc.

SILTSTONE:gy, lt gy, sbbky - blky, mod sft - frm, non calc, micrmic, micrcarb, occ sdy.
Acc: tr mass calc.

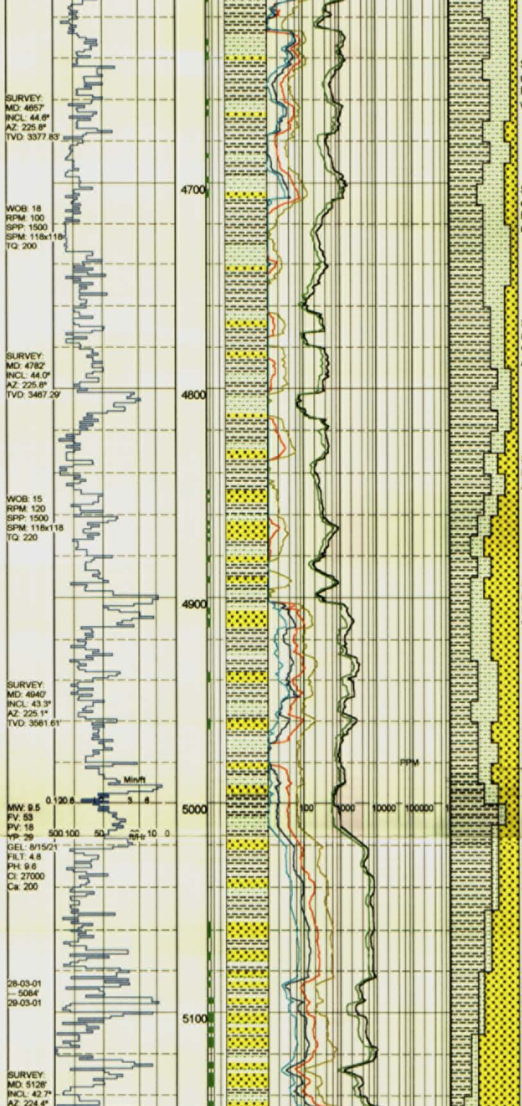
CLAYSTONE: md gy, brn'sh gy, sbbky - blky, sft to mod frm, non calc, micrmic, micrcarb, some w/. lam coal incl.
Acc: fw dol, tr glau.

SILTSTONE: gy, brn'sh gy, sbblky-blky, sft, sl calc, micrmic, micrcarb, w/ glau incl.
Acc: tr glau

RIO BRAVO FM. AT 4550'

SANDSTONE: gy'sh, lt gy, 100% v f gr, w srt, arg mtx, calc, sl fri, drty, dk gr incl, p vis por
FLUOR: tr sl bri yel'sh wh nat fluor, slow wk strm mky wh cut, no vis res ring

ELL Z2B-24-079-D-LOG (LOG-25) COMPANY PETRO-TECH PERUANA GEOL



SILTSTONE: gy, brn'sh gy, sbblky-blky, sft, non calc, micrmic, micrcarb
FLUOR: tr sl bri yel'sh wh nat fluor, slow wk strm sl mky wh cut, no vis res ring

SANDSTONE: lt gy, 100% v f gr, w srt, arg mtx, calc, fri occ mod hd, drty, mic, r w/ lam coal incl, p vis por
FLUOR: tr sl bri yel'sh wh nat fluor, v slow v wk strm sl mky wh cut, no vis res ring

SANDSTONE: lt gy, gy, 100% v f gr, w srt, v arg mtx, non calc, fri-mod hd, drty, mic, loc w/ lam coal incl, v p vis por, grdg to slty ss.
Acc: tr mass calc

SANDSTONE: lt gy, gy'sh, 100% v f gr, w srt, v arg mtx, non calc, fri-mod hd, drty, mic, dk gr incl, v p vis por.
Acc: tr mass calc, mass pyr

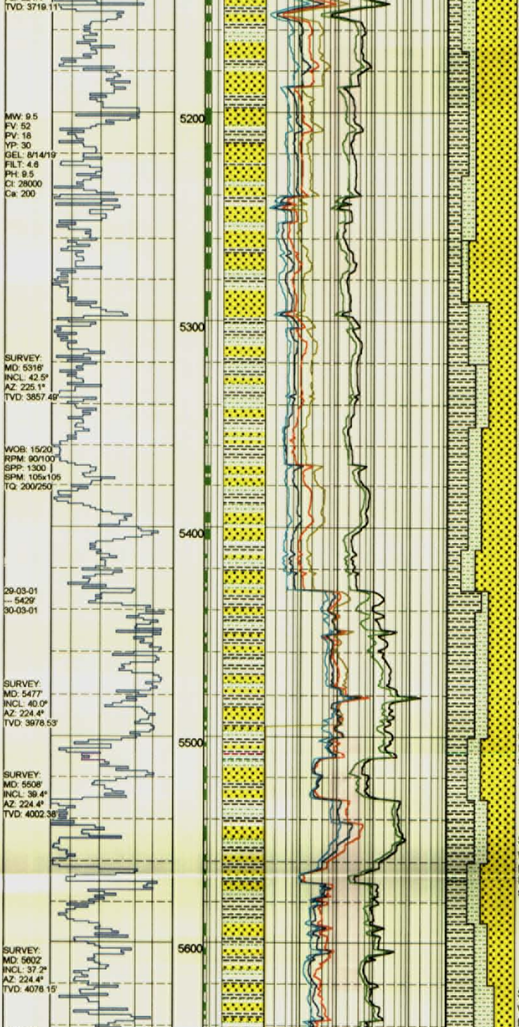
SANDSTONE: gy'sh, gy'sh wh, 100% v f gr, w srt, arg mtx, calc, fri, sl drty, mic, dk gr incl, p vis por.
FLUOR: tr sl bri yel'sh wh nat fluor, slow wk strm sl mlky wh cut, no vis res ring

SANDSTONE: gy'sh wh, lt gy, 80% v f, 20% f gr, sbang-sbrd, w srt, arg mtx, calc, fri, sl drty, dk & gn gr incl, p vis por.
Acc: ~~fw mass calc~~

SANDSTONE: lt gy, mnr wh'sh, 80% v f, 20% f gr, sbang-sbrd, w srt, arg mtx, calc, fri, sl drty, some w/ lam coal & dk gr incl, p vis por.
Acc: tr mass calc

SANDSTONE: gy'sh, gy'sh wh, 100% v f gr, w srt, arg mtx, calc, fri occ mod hd, sl drty, dk & gn gr incl, p vis por.
FLUOR: 10% sl bri yel'sh wh nat fluor, slow wk strm mlky wh cut, no vis res ring

WELL Z2B-24-879-D-LOG (LOG-25) COMPANY PETRO-TECH PERUANA



TVD: 3719.11'

MW: 9.5
FV: 52
PV: 18
YP: 30
GEL: 8/14/19
FILT: 4.6
PH: 9.5
Cl: 28000
Ca: 200

SURVEY:
MD: 5316'
INCL: 42.5°
AZ: 225.1°
TVD: 3857.49'

WOB: 15/20
RPM: 90/100
SPP: 1300
SPM: 105x105
TQ: 200/250

29-03-01
--- 5429'
30-03-01

SURVEY:
MD: 5477'
INCL: 40.0°
AZ: 224.4°
TVD: 3978.53'

SURVEY:
MD: 5508'
INCL: 39.4°
AZ: 224.4°
TVD: 4002.38'

SURVEY:
MD: 5602'
INCL: 37.2°
AZ: 224.4°
TVD: 4076.15'

SANDSTONE: gy'sh, gy'sh wh, 90% v f, 10% f gr, w srt, arg mtx, calc, fri occ mod hd, sl drty, dk & gn gr incl, p vis por.
FLUOR: 20% sl bri yel'sh wh nat fluor, slow wk strm mlky wh cut, no vis res ring

SANDSTONE: gy'sh, gy'sh wh, 90% v f, 10% f gr, w srt, arg mtx, sl calc, fri occ mod hd, sl drty, dk & gn gr incl, p vis por.
FLUOR: 15% sl bri yel'sh wh nat fluor, slow wk strm mlky wh cut, sl yel'sh wh res ring

SANDSTONE: gy'sh, gy'sh wh, 90% v f, 10% f gr, w srt, arg mtx, sl calc, fri occ mod hd, sl drty, dk & gn gr incl, p vis por.
FLUOR: 10% sl bri yel'sh wh nat fluor, mod fst mod strg strm mlky wh cut, sl yel'sh wh res ring

SANDSTONE: gy'sh, 100% v f gr, w srt, arg mtx, calc, sl fri, sl drty, dk & gn gr incl, p vis por.
FLUOR: 5% sl bri yel'sh wh nat fluor, mod fst mod strg strm mlky wh cut, sl yel'sh wh res ring

SANDSTONE: gy'sh wh, gy'sh, 90% v f, 10% f gr, sbang-sbrd, w srt, arg mtx, calc, sl fri, sl drty, dk & gn gr incl, p vis por.
FLUOR: 10% sl bri yel'sh wh nat fluor, mod fst mod strg strm mlky wh cut, sl yel'sh wh res ring

TG: 3861 u TG at 5429'

CONN GAS: 2098 u TG

SANDSTONE: sl gy'sh wh, gy'sh, 100% v f gr, w srt, arg mtx, calc, fri, dk & gn gr incl, p vis por.
FLUOR: tr sl bri yel'sh wh nat fluor. mod fst mod strg strm mlky wh cut, sl yel'sh wh res ring

SANDSTONE: gy'sh wh, gy'sh, occ wh'sh, 100% v f gr, w srt, arg mtx, calc, fri occ mod hd, dk & gn gr incl, p vis por.
FLUOR: tr sl bri yel'sh wh nat fluor, mod fst mod strg strm mlky wh cut, sl yel'sh wh res ring

SANDSTONE: gy'sh wh, gy'sh, occ wh'sh, 100% v f gr, w srt, arg mtx, calc, fri occ mod hd, dk & gn gr incl, p vis por.
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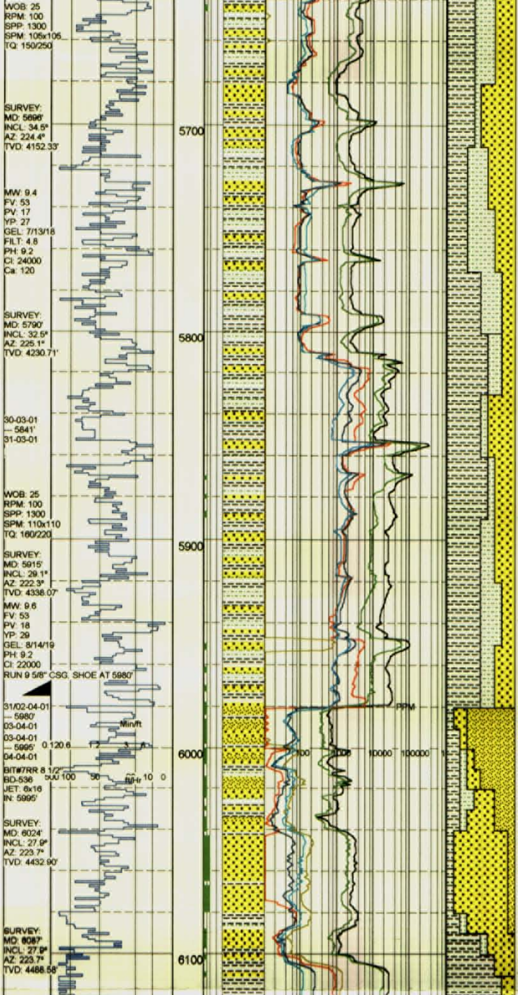
GEOIL WELL Z2B-24-079-D-LO6 (LO6-25) COMPANY PETRO-TECH PERUANA



WOB: 25
RPM: 100
SPP: 1300
SPM: 105x105
TQ: 150/250

SURVEY:
MD: 5696'
INCL: 34.5°
AZ: 224.4°
TVD: 4152.33'

MW: 9.4
FV: 53
PV: 17
YP: 27
GEL: 7/13/18
FILT: 4.8
PH: 9.2
Cl: 24000
Ca: 120

SURVEY:
MD: 5790'
INCL: 32.5°
AZ: 225.1°
TVD: 4230.71'

30-03-01
— 5841'
31-03-01

WOB: 25
RPM: 100
SPP: 1300
SPM: 110x110
TQ: 160/220

SURVEY:
MD: 5915'
INCL: 29.1°
AZ: 222.3°
TVD: 4338.07'

MW: 9.6
FV: 53
PV: 18
YP: 29
GEL: 8/14/19
PH: 9.2
Cl: 22000
RUN 9 5/8" CSG. SHOE AT 5980'

31/02-04-01
— 5980'
03-04-01

03-04-01
— 5995'
04-04-01

BIT#7RR 8 1/2"
BD-536
JET: 6x16
IN: 5995'

SURVEY:
MD: 6024'
INCL: 27.9°
AZ: 223.7°
TVD: 4432.90'

SURVEY:
MD: 6087'
INCL: 27.9°
AZ: 223.7°
TVD: 4488.58'

FLUOR: tr sl bri yel'sh wh nat fluor, mod fst mod strg strm mlky wh cut, sl yel'sh wh res ring

SANDSTONE: gy'sh wh, 70% v f, 30% f gr, sbang-sbrd, w srt, sl arg mtx, v calc, fri-mod hd, occ mic, dk gr incl, p vis por & lt gy, 100% v f gr, w srt, arg mtx, sl calc, fri-mod hd, mic, drty, dk gr incl, p vis por
Acc: tr mass calc

CONN GAS: 710 u TG

SILTSTONE: brn'sh gy, sbblky-blky, sft, non calc, micmic, micrcarb, loc sdy.
Acc: tr mass calc

SANDSTONE: sl gy'sh wh, lt gy, 100% v f gr, w srt, arg mtx, v calc, fri occ mod hd, sl drty, dk gr incl, p vis por
Acc: tr mass calc

STG: 4154 u TG at 5853'

SANDSTONE: wh, sl gy'sh wh, 90% v f, 10% f gr, w srt, sl arg mtx, calc, fri, some w/ lam coal incl, p vis por & gy'sh wh same as above.
FLUOR: tr yel'sh wh nat fluor, v slow v wk strm sl mlky wh cut, no vis res ring

SILTSTONE: gy, sbblky, mod sft, sl calc, micrmic, micrcarb, occ w/ lam coal incl.
Acc: tr mass calc

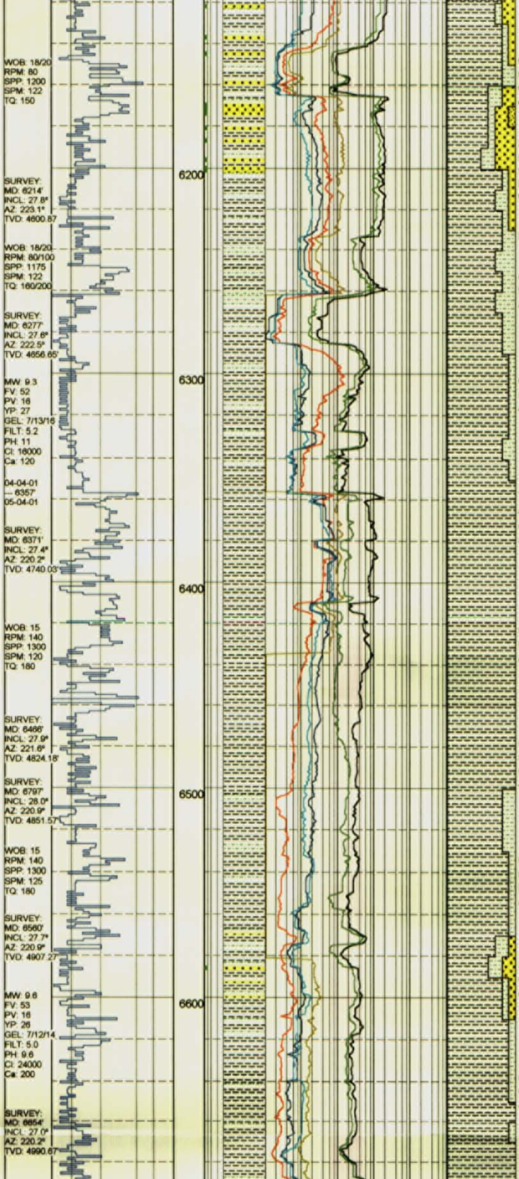
SAND: wh, hyal, trnsl, qtz, 20% f, 50% m, 30% c gr, sbang-sbrd, fr srt, 15% dk grs
FLUOR: 5% v sl bri yel'sh wh nat fluor, slow wk strm mlky wh cut, no vis res ring

CARBIDE CHECK AT 6016'

SANDSTONE: gy'sh wh, wh'sh, 90% v f, 10% f gr, sbang-sbrd, w srt, sl arg mtx, calc, sl fri, some drty, dk gr incl, p vis por
FLUOR: 20% sl bri yel'sh wh nat fluor, mod fst mod strg strm mlky wh cut, yel'sh wh res ring.

CLAYSTONE: brn'sh gy, md gy, sbblky-sbplty, sft-sl frm, non calc, v micrmic, micrcarb, loc w/ lam coal incl.
Acc: mass calc

GEOIL WELL Z2B-24-079-D-L06 (LO6-25) COMPANY PETRO-TECH PERUANA



WOB: 18/20
RPM: 80
SPP: 1200
SPM: 122
TQ: 150

SURVEY:
MD: 6214'
INCL: 27.8°
AZ: 223.1°
TVD: 4600.87

WOB: 18/20
RPM: 80/100
SPP: 1175
SPM: 122
TQ: 160/200

SURVEY:
MD: 6277'
INCL: 27.6°
AZ: 222.5°
TVD: 4656.65'

MW: 9.3
FV: 52
PV: 16
YP: 27
GEL: 7/13/16
FILT: 5.2
PH: 11
Cl: 16000
Ca: 120

04-04-01
— 6357'
05-04-01

SURVEY:
MD: 6371'
INCL: 27.4°
AZ: 220.2°
TVD: 4740.03'

WOB: 15
RPM: 140
SPP: 1300
SPM: 120
TQ: 180

SURVEY:
MD: 6466'
INCL: 27.9°
AZ: 221.6°
TVD: 4824.18'

SURVEY:
MD: 6797'
INCL: 28.0°
AZ: 220.9°
TVD: 4851.57'

WOB: 15
RPM: 140
SPP: 1300
SPM: 125
TQ: 180

SURVEY:
MD: 6560'
INCL: 27.7°
AZ: 220.9°
TVD: 4907.27'

MW: 9.6
FV: 53
PV: 16
YP: 26
GEL: 7/12/14
FILT: 5.0
PH: 9.6
Cl: 24000
Ca: 200

SURVEY:
MD: 6654'
INCL: 27.0°
AZ: 220.2°
TVD: 4990.67'

CLAYSTONE: gy, brn'sh gy, occ lt gy, sbblky mnr sbplty, mod frm, non calc, v micrmic, micrcarb, rough on surf.
Acc: mass calc

SANDSTONE: gy'sh, gy'sh wh, 60% v f, 40% f gr, sbang-sbrd, w srt, arg mtx, calc, sl hd, drty, dk gr incl, p vis por
FLUOR: tr sl bri yel'sh wh nat fluor, slow wk strm sl mlky wh cut, no vis res ring

PALEGREDA FM. AT 6230'

CLAYSTONE: gy, brn'sh gy, sbblky mnr sbplty, mod frm, non calc, v micrmic, micrcarb, sl rough on surf.
Acc: tr mass calc

CLAYSTONE: gy, md gy, sbblky mnr sbplty, mod frm, non calc, v micrmic, micrcarb, sl rough on surf.
Acc: tr mass calc

TG: 170 u TG at 6357'
CLAYSTONE: gy, md gy, sbblky mnr sbplty, sft, non calc, v micrmic, micrcarb, sl rough on surf.
Acc: tr mass calc

CLAYSTONE: gy, md gy, mnr brn'sh gy, sbblky-blky, mod frm-frm, non calc, v micrmic, micrcarb, slty in pt.
Acc: tr mass calc

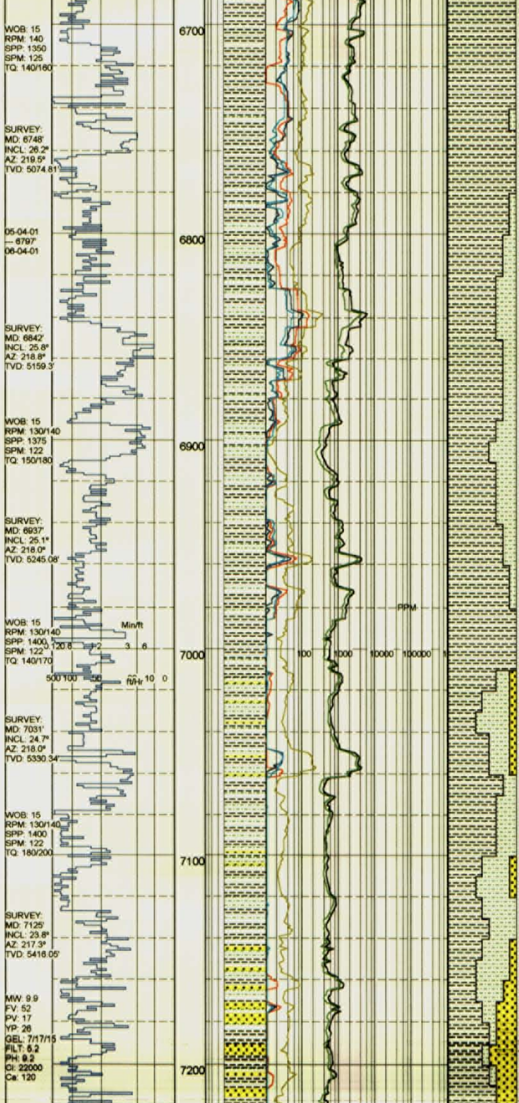
CLAYSTONE: gy, lt gy, mnr brn'sh gy, sbblky occ sbplty, mod frm, non calc, v micrmic, micrcarb, occ lam coal incl.
Acc: tr tab coal

CLAYSTONE: gy, lt gy, mnr brn'sh gy, sbblky occ sbplty, mod frm, non calc, v micrmic, micrcarb, occ w/ lam coal incl.
Acc: tr tab coal

SANDSTONE: gy'sh wh, 100% v f gr, w srt, arg mtx, calc, fri-mod hd, drty, fw dk gr & lam coal incl, v p vis por
Acc: tr mass calc

CLAYSTONE: gy, md gy, mnr brn'sh gy, sbblky-blky, mod frm, non calc, micrmic, micrcarb, sl smt tex.
Acc: tr mass calc

GEOIL WELL Z2B-24-079-D-LO6 (LO6-25) COMPANY PETRO-TECH PERUANA



CLAYSTONE: gy, brn'sh gy, cc lt gy, sbblky-blky, occ sbplty, mod frm, non calc, micrmic, micrcarb, sl smt tex.
Acc: tr mass calc

CLAYSTONE: gy, brn'sh gy, lt gy, sbblky-sbplty, mod frm, non calc, v micrmic, micrcarb, fw w/ lam coal incl.
Acc: tr mass calc

CLAYSTONE: brn'sh gy, brn'sh, sbblky-sbplty, mod frm, non calc, v micrmic, micrcarb, v r w/ lam coal incl, slty.
Acc: tr mass calc

SILTSTONE: gy, sbblky-blky, sft-mod frm, non calc, micrmic, some w/ lam coal incl
Acc: tr mass calc, micfos

SILTSTONE: gy, sbblky-blky, sft, non calc, micrmic, v r w/ lam coal incl, loc sdy.
Acc: tr mass calc

CLAYSTONE: gy, md gy, brn'sh gy, sbblky-blky, mod frm, non calc, micrmic, micrcarb, some w/ lam coal incl.
Acc: tr mass calc

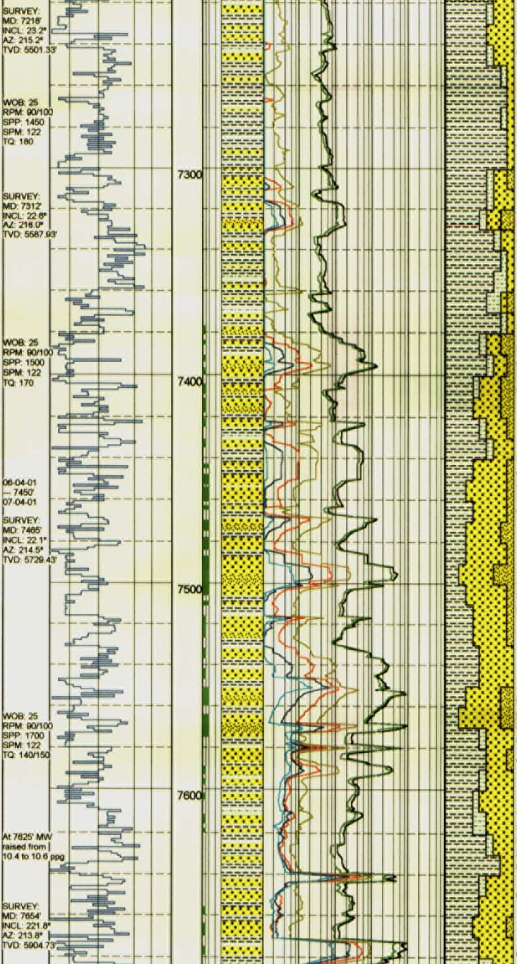
MOGOLLON FM. AT 7010' MD, -5260 VSS
S: 2981 N: 2880 , 4145 HD

SANDSTONE: gy'sh wh, gy'sh, 100% v f gr, sbang-sbrd, w srt, arg mtx, calc, mod hd, drty, dk gr incl, v p vis por
Acc: tr tab coal

CLAYSTONE: brn'sh gy, occ dk brn, sbblky mnr sbplty, mod frm, non calc, micrmic, micrcarb, r w/ lam coal incl
Acc: tr mass calc & pyr

SILTSTONE: lt gy, gy, sbblky-blky, frm, non calc, micrmic, micrcarb, some w/ lam coal incl, loc sdy
Acc: tr mass calc

SANDSTONE: sl gy'sh wh, 90% v f, 10% f gr, sbang-sbrd, w srt, arg mtx, sl calc, fri-mod hd, sl drty, dk gr incl, p vis por
~~Acc: tr mass calc~~



SANDSTONE: sl gy'sh wh, lt gy, 100% v f, w srt, arg mtx, calc, fri-mod hd, sl drty, some w/ lam coal & dk gr incl, v p vis por
Acc: fw mass calc

CLAYSTONE: gy, brn'sh gy, sbblky mnr sbplty, mod frm, non calc, micrmic, micrcarb, loc w/ lam coal incl
Acc: tr calc

SAND: hyal, wh, trnsp, qtz, 40% v f, 60% f gr, sbang-sbrd, w srt, fw dk grs
Acc: tr shell frag, mass pyr

SANDSTONE: gy'sh wh, gy'sh, 100% v f gr, sbang-sbrd, w srt, arg mtx, sl calc, mod hd, sl drty, dk & gn gr incl, p vis por
FLUOR: tr sl bri yel'sh wh nat fluor, slow wk stream sl mky wh cut, no vis res ring

SANDSTONE: gy'sh wh, wh'sh, 50% v f, 40% f, 10% m gr, sbang-sbrd, w srt, sl arg mtx, some cln, sl calc, fri, dk & gn gr incl, p vis por
FLUOR: 20% sl bri yel'sh wh nat fluor, mod slow mod wk stream mky wh cut, yel'sh wh res ring

SAND: hyal, wh, trnsp, qtz, 50% f, 40% m, 10% c gr, sbang-sbrd, fr srt, some dk grs
FLUOR: 30% sl bri yel'sh wh nat fluor, fst strg stream mky wh cut, yel'sh wh res ring

SANDSTONE: sl gy'sh wh, wh'sh, 50% v f, 50% f, tr m gr, sbang-sbrd, w srt, sl arg mtx, sl calc, mic, dk gr incl, p vis por
FLUOR: 25% sl bri yel'sh wh nat fluor, fst strg stream mky wh cut, yel'sh wh res ring

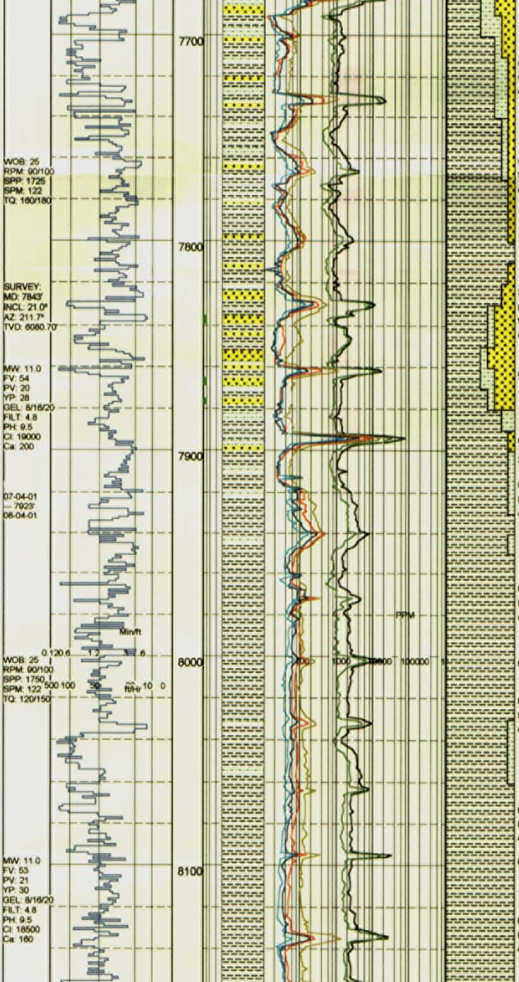
At 7572' GCM 9.9 - 9.7 ppg MW raised to 10.5 ppg

SANDSTONE: gy'sh wh, gy'sh, 80% v f, 20% f gr, sbang-sbrd, w srt, arg mtx, calc, occ w/ lam coal & dk gr incl, p vis por
FLUOR: 5% sl bri yel'sh wh nat fluor, slow wk stream sl mky wh cut, yel'sh wh res ring

CONN GAS: 473 u TG

CONN GAS: 931 u TG
]

G E O I L W E L L Z 2 B - 2 4 - 0 7 9 - D - L O G (L O G - 2 5) C O M P A N Y P E T R O



CLAYSTONE: gy, brn'sh gy, sbblky-blky, mod frm, non calc, micrmic, micrcarb, slty.
Acc: tr mass calc, mass pyr

CLAYSTONE: md gy, brn'sh gy, sbblky-blky, mod frm-frm, non calc, micrmic, micrcarb, loc slty
Acc: tr mass calc

SANDSTONE: lt gy, gy'sh wh, 70% v f, 30% f gr, sbrd mnr sbang, w srt, arg mtx, calc, mod fri, mnly drty, some w/ lam coal & dk gr incl, v p vis por
Acc: tr mass calc

CONN GAS: 197 u TG

CONN GAS: 813 u TG

SAN CRISTOBAL FM. AT 7900'

CLAYSTONE: md gy, brn'sh gy, sbblky-blky, loc sbplty, mod frm-frm, non calc, micrmic, micrcarb, loc slty
Acc: tr mass calc & rare coal.

CLAYSTONE: md gy, brn'sh gy, sbblky-blky, loc sbplty, sft-mod frm, non calc, micrmic, micrcarb, loc slty
Acc: tr mass calc

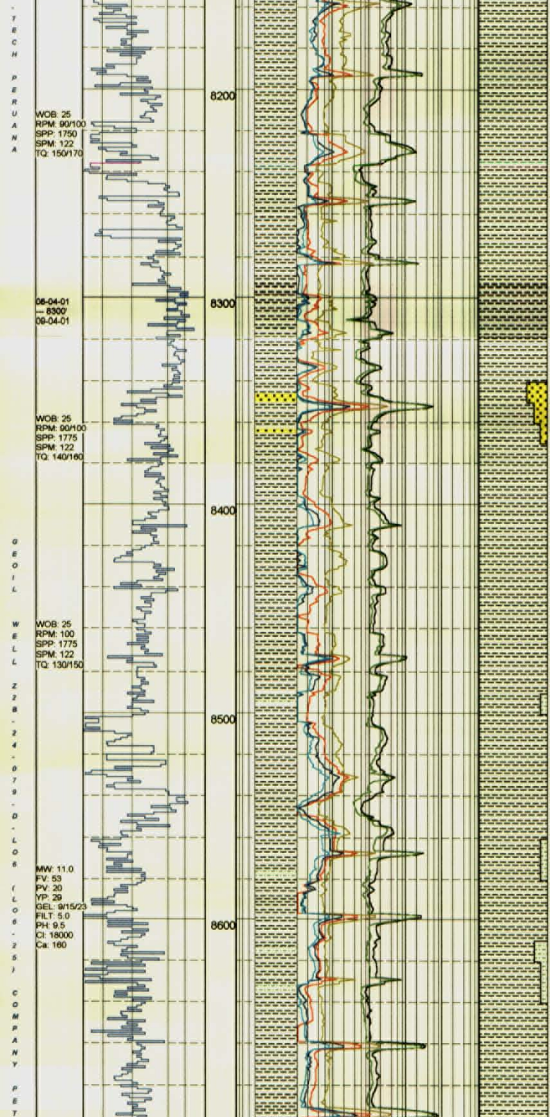
CONN GAS: 160 u TG

CLAYSTONE: gy, brn'sh gy, sbblky-blky, occ sbplty, sft-mod frm, non calc, micrmic, micrcarb, sl slty
Acc: tr micfos, mass pyr

CLAYSTONE: gy, brn'sh gy, sbblky-sbplty, sft-mod frm, non calc, micrmic, micrcarb, sl slty
Acc: tr mass calc

CONN GAS: 230 u TG

CLAYSTONE: gy, brn'sh gy, sbblky-sbplty, sft-mod frm, non calc, micrmic, micrcarb, sl smt tex
Acc: tr mass calc, micfos



CLAYSTONE: gy, brn'sh gy, sbblky-blky mnr sbplty, mod frm, non calc, micrmic, micrcarb, loc w/ lam coal incl.
Acc: tr mass calc

CLAYSTONE: gy, brn'sh gy, sbblky-blky mnr sbplty, sft-mod frm, non calc, micrmic, micrcarb, loc w/ lam coal incl.
Acc: tr mass calc

CONN GAS: 210 u TG
CLAYSTONE: gy, mnr brn'sh gy, sbblky mnr sbplty, sft occ mod frm, non calc, v micrmic, micrcarb, slty.
Acc: tr mass calc

SANDSTONE: gy'sh wh, lt gy, 90% v f, 10% f gr, sbrd - sbang, w srt, arg mtx, calc, fri - mod hd, sl drty, some w/ lam coal & dk gr incl, v p vis por
Acc: tr mass calc & coal gr.

CLAYSTONE: gy, mnr brn'sh gy, sl dk gy, sbblky - blky, occ sbplty, mod frm, non calc, micrmic, micrcarb, sl earthy surf.
Acc: tr mass calc

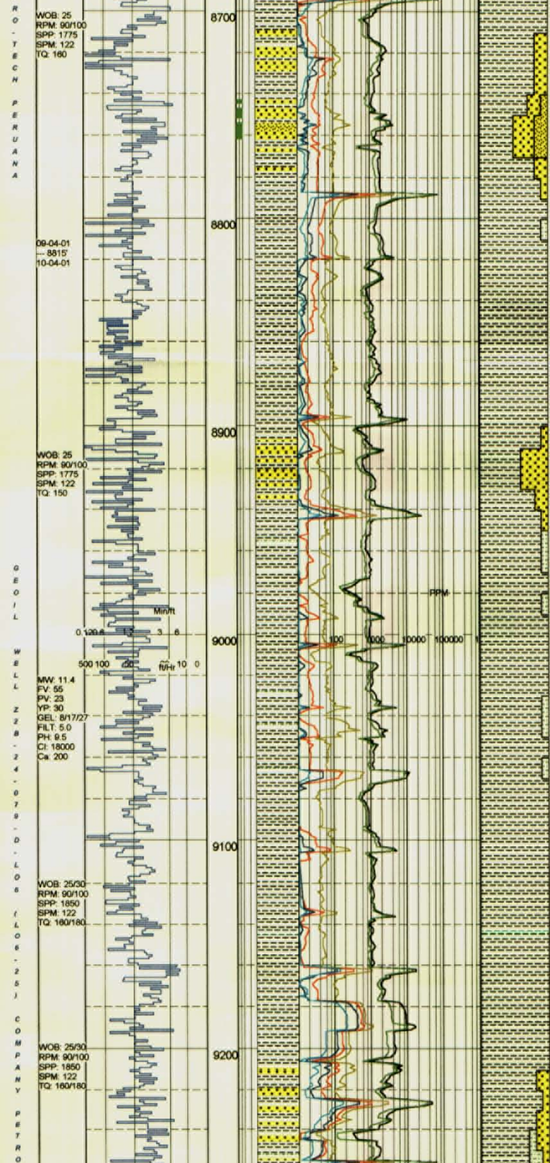
CLAYSTONE: gy, md gy, brnsh gy sbblky - sbplty in pt, mod sft, non calc, micrmic, mod micrcarb, sl earthy surf, loc slty.
Acc: tr mass calc

CLAYSTONE: gy, md gy, sbblky - sbplty, mod frm, non calc, micrmic, micrcarb, w/ few lam coal incl, sl rough surf, slty in pt.
Acc: tr mass calc

CONN GAS: 275 u TG
CLAYSTONE: gy, md gy, occ dk gy, sbblky, loc sbplty, mod frm, non calc, micrmic, micrcarb, sl rough surf, slty.
Acc: tr mass calc
CONN GAS: 234 u TG

SILTSTONE: gy, sbblky - blky, mod frm, sl calc, micrmic, loc micrcarb, tr coal incl occ sdy.
Acc: tr mass calc

CONN GAS: 315 u TG
CLAYSTONE: gy, md gy, mnr brnsh gy, sbblky - sbplty in pt, mod sft, non calc, micrmic, micrcarb, mod rough surf, loc slty.
Acc: tr mass calc



CONN GAS: 813 u TG

SANDSTONE: gy'sh, gy'sh wh, 90% v f, 10% f gr, sbang-sbrd, w srt, fri mnr mod hd, calc, sl drty, dk & gn gr incl, occ w/ lam coal incl, p vis por
Acc: tr mass calc, lam coal

SAND: hyal, wh, trnsp, qtz, 30% f, 40% m, 30% c gr, sbang-sbrd, fr srt, some hckly, some dk & tr smky grs.
FLUOR: 25% sl bri wh'sh yel nat fluor, mod fst mod strg stream mky wh cut, no vis res ring

CONN GAS: 813 u TG

CLAYSTONE: gy, md gy, sbblky-blky mnr sbplty, mod frm, non calc, v micrmic, micrcarb, slty in pt
Acc: tr mass calc

CLAYSTONE: gy'sh brn, mnr brn'sh, sbblky mnr blky, mod frm, non calc, v micrmic, mnr micrcarb, v slty
Acc: tr mass calc

SANDSTONE: gy'sh wh, lt gy, 100% v f gr, w srt, arg mtx, v calc, mod hd, drty, mic, occ w/ lam coal incl, v p vis por
Acc: tr mass calc

CLAYSTONE: gy, brn'sh gy, sbblky-blky mnr sbplty, mod frm, non calc, v micrmic, micrcarb, smt tex
Acc: tr mass calc, mass pyr

CLAYSTONE: gy, sl dk gy, sbblky-blky mnr sbplty, mod frm, non calc, v micrmic, micrcarb, smt tex
Acc: tr mass calc

CLAYSTONE: gy, sl dk gy, sbblky-blky mnr sbplty, mod frm, non calc, v micrmic, micrcarb, smt tex
Acc: tr mass calc

CLAYSTONE: md gy, brn'sh gy, sbblky-blky mnr sbplty, mod frm, non calc, v micrmic, micrcarb, smt tex
Acc: fw mass calc

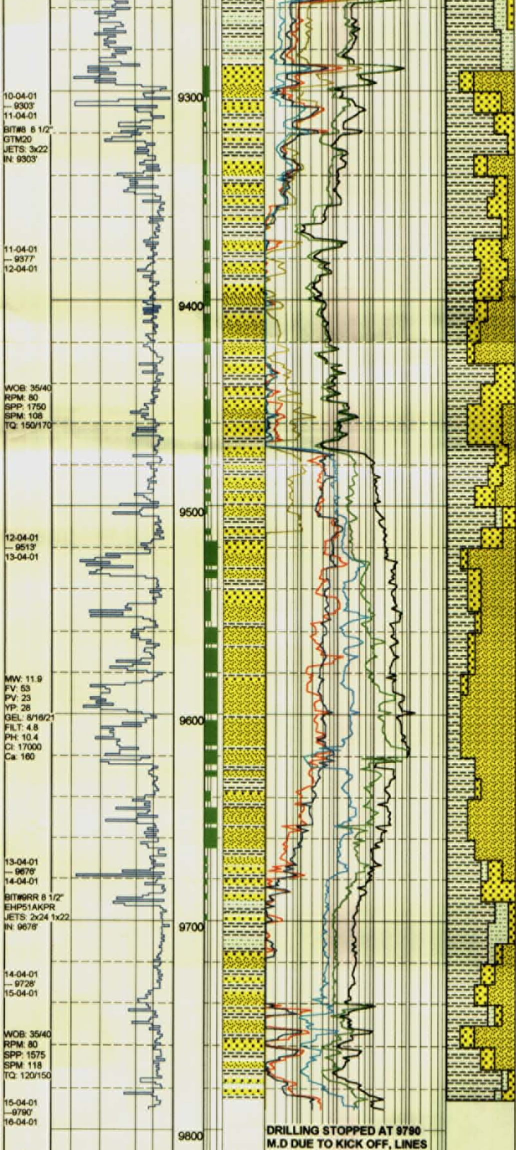
SHORT TRIP AT 9161'
CLAYSTONE: gy, sl dk gy, sbblky-blky mnr sbplty, mod frm, non calc, v micrmic, mnr micrcarb, slty in pt, smt tex
Acc: tr mass calc

BASAL SALINA FM. AT 9210' MD (-7307 VSS)
S: 3658 W: 3318 4939 HD

SANDSTONE: lt gy, 100% v f gr, w srt, v arg mtx, non calc, fri, drty, dk gr incl, v p vis por
Acc: tr mass calc

CLAYSTONE: sl brn'sh gy, gy, sbblky-blky, mod frm,

- TECH PERUANA GEOIL WELL Z2B-24-079-D-LOG (LOG-25) COMPANY PETRO



non calc, micrmic, occ micrcarb, occ w/ calc veins incl, slty
Acc: tr mass calc

SAND: hyal, wh, mnr mlky, trnsp, qtz, 20% f, 30% m, 30% c, 20% v c gr, sbang, fr srt, fract, some dk & tr smky grs.
FLUOR: 30% sl bri yel'sh wh nat fluor, mod strg mod fst strm mlky wh cut, yel'sh wh res ring

SAND: hyal, wh, mnr mlky, trnsl, qtz, 40% f, 30% m, 20% c, 10% v c gr, sbang, fr srt, hackly, some dk & tr smky grs.
FLUOR: 10% sl bri yel'sh wh nat fluor, mod slow mod weak strm mlky wh cut, yel'sh wh res ring

SANDSTONE: lt gy, gysh wh, 80% v f, 20% f gr, w srt, arg mtx, calc cmt, mod hd, sl drty, w/ dk gr incl, v p vis por
FLUOR: 15% sl bri yel'sh wh nat fluor, mod slow weak strm milky wh cut, sl yel'sh wh res ring.

SAND: hyal, wh, mnr mlky, trnsl, qtz, 20% f, 20% m, 40% c, 20% v c - congl gr, sbang, p srt, hackly, some dk , smky & gn grs.
FLUOR: 20% sl bri yel'sh wh nat fluor, mod slow weak strm mlky wh cut, yel'sh wh res ring

SANDSTONE: lt gy, gysh wh, 80% v f, 20% f gr, w srt, arg mtx, calc cmt, mod hd, sl drty, w/ dk gr incl, v p vis por.
FLUOR: 25% sl bri yel'sh wh nat fluor, slow weak strm mlky wh cut, sl yel'sh wh res ring.

NOTE: At 9474' GCM 11.6 - 9.8 ppg MW up to 11.9 ppg and OCM brn'sh gn vis oil in mud with strg odor, good fluor at the fluoroscope.2% oil concentration in mud circulating in the hole

SAND: hyal, wh, mnr mlky, trnsl, qtz, 50%m, 30% c, 20% v c - congl gr, sbang, p srt, hackly, some dk , smky & gy grs.
FLUOR: 30% sl bri yel'sh wh nat fluor, same as above

SAND: hyal, wh, mnr mlky, trnsl, qtz, 40% m, 30% c, 20% v c, 10% congl gr, sbang - ang, p srt, hackly, some dk , smky & gy grs.
FLUOR: 50% sl bri yel'sh wh nat fluor, mod fast mod strong strm mlky wh cut, sl yel'sh wh res ring

NOTE: Mud sample taken while drilling at 9617' showed live oil brn'sh gn in mud w/ good fluor at the fluoroscope.

SAND: hyal, wh, trnsp, qtz, 10% m, 40% c, 30% v c, 20% grnl gr, sbrd, p srt, v fract, some dk mnr smky, lt gn & tr lt gy
FLUOR: 40% sl bri sl yel'sh wh nat fluor, mod fst mod strg strm mky wh cut, yel'sh wh res ring

CLAYSTONE: md gy, brn'sh gy, occ dk gy, sbblky, mod frm, non calc, v micrmic, occ micrcarb, rough surf, mod slty
Acc: tr mass calc, mass pyr & coal.

SAND: hyal, wh, trnsp, occ mlky, qtz, 20% f, 40% m, 30% c, 10% vc gr, sbang, p srt, v fract, some dk mnr smky gr.

SAND: hyal, wh, trnsp, qtz, 10% m, 40% c, 30% v c, 20% grnl gr, sbrd, p srt, pred v fract, occ dk & smky grs
Acc: tr mass calc, shell frag

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