GEOLOGICAL WELL REPORT

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ENCLOSURES

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Composite Seismic Calibration

GEOLOGICAL REPORT

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1. GENERALITIES

1.1 General summary

The Santa Cruz 1 block is located in the northern part of the Austral basin (figure 1). The prospect lies in the easthern edge of the block, only few kilometers eastwards from the Laguna del Oro, La Paz, Campo Boleadoras, Campo Indio oil and gas fields.

Objetives

The main objective of the El Martillo x-1 well was to investigate the Springhill (Argo Sq and Hidra Sequences), principal producing reservoir in the area, the well was located whithin an embayment controlled by faults.
As secondary objectives, the following intervals may be interesting : basal tertiary sandstone, Anita Fm.sandstones, Piedra Clavada Fm. Sandstone and top Tobilera tuff (if fractured or altered).

1.2 MAIN RESULTS

The main data and results obtained from the El Martillo x-1/l well can be summarized as follows:

Fluids

- The Argo and Hidra sequences are water bearing; from MDT pretests and fluids sampling (water samples at 2498.1 mSS), and log interpretation.
- A water sample was recovered by segregation in the Argo Sands 2498.1 mSS (41200 ppm eq NaCl) .
- A water gradient of 1.02 gr./cc, was determinated in the Hidra sequences by MDT pressure measurements
- All reservoirs are water bearing.

Structural results

Marker	Prognosis(mSS)	Results (mSS)	Difference (m)
Top Tertiary	-350	-259.0	90.1 upper
Top Main Alke	-705	-751.5	46.5 lower
Top Cretaceous	-1030	-1034.6	4.6 lower
Top Mata Amarilla	-1362	-1304.0	58 upper
Top Piedra Clavada	-1642	-1578.6	63.4 upper
Top Kachaike	-1923	-1854.6	68.4 upper
Top Rio Mayer	-2087	-1970.5	116.5 upper
Top Springhill	-2530	-2491.3	38.7 upper
Top Tobifera	-2660	-2620.5	39.5 upper

Lithostratigraphy

The Springhill Formation is 128.6 m thick and can be divided as follows:

- The Argo Sands 14.1 m thick, are composed of medium to coarse sandstone, well sorted, quartz, glauconite, with argillaceous matrix .Downward the sandstone becomes fine to very fine quartz, abundant glauconitic, argillaceous matrix ,siliceous cement, consolidated, poor porosity. At the base of the upper sandstone a coal level was recognized.
- The Hidra sequence is 114.5 m thick is represented by quartzose sandstone medium to coarse, poorly sorted, argillaceous – tuffaceous matrix. Interbeds of siltstone, massive, pyrite, coaly debris. The basal interval is represented by sandstone fine to medium, downward it becomes coarse. Intercalation of shale and siltstone, massive, blocky, pyrite, coal debris. Coal level. Toward base tuffaceous sandstone, fine to very fine, poorly sorted.

Petrophysics

	Argo Sds	Hidra Sq
Total Thickness (m)	25	104.2
Net Sand (m)	10.9	28.4
Net / Gross (%)	44	27
Gas Net Pay (m)	---	---
Oil Net Pay (m)	---	---
Porosity (%)	12.8	13.5
Water Saturation(%)	92	95

1.3 CONCLUSION AND ACHIEVEMENT OF THE OBJECTIVES

- The basal Tertiary sandstone, Anita Fm sandstones and Piedra Clavada Fm basal sandstone wedge, although of good reservoir quality, had no trapped hydrocarbons.

- The encountered reservoirs belonging to Argo and Hidra sequences, had dead oil Shows. Both reservoirs were found water bearing.

- The well was plugged and abandoned.

1.2 WELL GENERAL DATA

Location

Country	: ARGENTINA		ONSHORE
License	: SANTA CRUZ-OESTE1	Ground level above MSL (m)	: 342.0
Field	: SANTA CRUZ1-OESTE		

Partners

Operator	: TOTAL AUSTRAL	Working interest (%)	: 33.3
Partner	: ASTRA C.A.P.S.A		33.3
Partner	: Y.P.F.- REPSOL		33.3

Classification

Classification	: EXPLORATION
Well type	: VERTICAL
Objectives	: ARGO & HIDRA SANDSTONE
Well results	: DRY WELL
Status	: PLUG & ABANDON

Timing

Spudding date	: 19/Nov/99		
TD reached on	: 28/Dec/99	Drilling duration (days)	: 40
Abandonment date	: 03/Jan/00	Operation duration (days)	: 46
Suspended from	: 28/Nov/99 at (m) : 1750.0		
To	: 03/Dec/99		

Cost

Estimated cost	: US2.496.149

Wellsite geologist(s)

Name	Company
ANTONIO GUIDI	GEOSERVICES S.A.
GUSTAVO CAMPITELLI	TOTAL AUSTRAL
A. CHIAPERO	GWS

Validated on : 16-August-01 by: A.GUIDI - D.PEREZ

.../...

1.2 WELL GENERAL DATA

Depth Origin

Log depth origin	: RT	RT elevation above MSL (m)	: 348.45
Drilling depth origin	: RT	Flow line elevation above MSL (m)	: 348.45

Total depth

TMD driller (m)	: 2990.0	TMD logger (m)	: 2992.5
TVD driller (m)	: 2988.8	TVD logger (m)	: 2991.3
Formation at TD	: TOBIFERA	Age	: JURASSIC

Side Track

Number	: 1	KDF (m)	: 1535.0

Drilling phases

Diameter (in)	From (m)	To (m)	Mud type
17 1/2	0.0	503.0	Ca CHLORIDE
12 1/4	494.0	1780.0	POLYMERIC-KCL
8 1/2	1776.0	2990.0	POLYMERIC-KCL

Cased hole

Diameter (in)	Type	Driller depth		Logger depth
		Hanger (m)	Shoe (m)	Shoe (m)
13 3/8	Surface casing		494.0	
9 5/8	Intermediate casing		1776.0	

Rig

Rig name	: PRIDE 305	Rig type	: LAND RIG

Contractors

Drilling	: PRIDE INTERNATIONAL	Deviation	: ANADRILL
Mud logging	: GEOSERVICES S.A.	Coring	: CHRISTENSEN
LWD	: NO CONTRACTOR	Logging	: SCHLUMBERGER
Wel seismic	: NO CONTRACTOR	Testing	: NO CONTRACTOR

Comments

On November 28th during POOH at 550 m, block to block occured. Damagee on crown block; get down the mast and send crown block to Comodoro Rivadavia to repair.

1.3 WELL LOCATION

Status

Coordinates status	: CONFIRMED	Altimetry status	: CONFIRMED

References

Geographical coordinates		Rectangular coordinates	
Geodetic datum	: CAMPO INCHAUSPE	Type of projection	: UTM zone 19 South
Spheroid	: International (Hayford 1909)		
Origin of longitudes	: GREENWICH	Central meridian	: 69° WEST

Well head

Geographical coordinates				Rectangular coordinates	
Latitude	: 50°36'51.425" S	Seismic line	: Q94E-12	Easting (m)	: 392306.63
Longitude	: 70°31'19.684" W	Shot point	: 1025	Northing (m)	: 4391846.85

Level : TD

MD Logger RT (m)	: 2992.5	VD LoggerRT (m)	: 2991.3
MD Driller RT (m)	: 2990.0	VD Driller RT (m)	: 2988.8
Latitude	: 50°36'51.117 "S	Easting (m)	: 392281.93
Longitude	: 70°31'20.930"W	Northing (m)	: 4391856.84
Departure (m)	: 26.3	Seismic line	: Q95E-12
Mean Azimuth (°)	: 290.0	Shot point	: 1025
Angle (°)	: 1.0		
Azimuth (°)	: 312.5		

Level : TOP ARGO SQ

MD Logger RT (m)	: 2840.9	VD LoggerRT (m)	: 2839.8
Latitude	: 50°36'51.214"S	Easting (m)	: 392283.22
Longitude	: 70°31'20.868"W	Northing (m)	: 4391852.88
Departure (m)	: 24.2		
Mean Azimuth (°)	: 284.4		
Angle (°)	: 1.3		
Azimuth (°)	: 337.7		

Validated on : 16-August-01 by: A.GUIDI - D.PEREZ

.../...

1.3 WELL LOCATION

Level : TOP HIDRA SQ

MD LoggerRT (m)	: 2855.5	VD LoggerRT (m)	: 2854.3
Latitude	: 50°38'51.204"S	Easting (m)	: 392283.11
Longitude	: 70°31'20.873"W	Northing (m)	: 4391653.17
Departure (m)	: 24.4	Seismic line	: C94E-12
Mean Azimuth (°)	: 285.0	Shot point	: 1025
Angle (°)	: 1.2		
Azimuth (°)	: 341.3		

Reports

Positioning report edited on	: 23/Nov/99	by	: MARCELO BOTTI
Site survey report edited on	: 23/Nov/99	by	: MARCELO BOTTI

Table 1a

Target: Latitude : Longitude : Easting (m) : 0.0 Northing (m) : 0.0 ONSHORE Country : ARGENTINA License : SANTA CRUZ I-OESTE Field : SANTA CRUZ I-OESTE Platform : Slot :	RT (m a. MSL) : 348.5 GL (m a. MSL) : 342.1 TMD Drl. (m) : 1750.0 TVD Drl. (m) : 1750.0 TMD Log. (m) : 1741.0 TVD Log. (m) : 1741.0 Formation at TD : MATA AMARILLA Age at TD : CRETACEOUS	VERTICAL WELL No side track
EMA X-1	Spudding date : 19/Nov/99 TD reached on : 27/Nov/00 Abandonment date : Drilling (days) : 9 Operation (days) : 12	

Operator : TOTAL AUSTRAL (33.3%) Partners : ASTRA C.A.P.S.A. (33.3%) YPF (33.3%)

Objectives : ARGIO & HEDRA SANDSTONE Classification : EXPLORATION	Results : DRY WELL Status : PLUGGED & ABANDONED

Casings

Diameter (in)	Shoe (m MD driller)
13 3/8	494.0

Wireline Logging

Job Oper. Deas.	Logs	Phase
1 1 1	AIT BHC LDL GR	12 1/4
1 1 2	SHDT GR	12 1/4

Drill Stem Testing

Nbr.	Interval (m MD Logger)	Testing Period	Choke (in)	Results

NO DST PERFORMED

Wireline Form. Testing

Gas (first occurrence)

Strong natural flow.
(m MD driller)

Table 1b

Target: TOP ARGO SQ Latitude: 50°36'51.214"S Longitude: 70°31'20.888"W Easting (m): 392283.2 Northing (m): 4041853.9 ONSHORE Country: ARGENTINA License: SANTA CRUZ-OESTE 1 Field: SANTA CRUZ1-OESTE Platform: Slot:	RT (m a. MSL): 348.5 GL (m a. MSL): 342.0 TMD Drl. (m): 2990.0 TVD Drl. (m): 2988.8 TMD Log. (m): 2992.5 TVD Log. (m): 2991.3 Formation at TD: TOBIFERA Age at TD: JURASSIC	VERTICAL WELL Side track KOP (m): 1555.0
SCA.EMA.X-1/I	Spudding date: 19/Nov/99 TD reached on: 28/Dec/99 Abandonment date: 03/Jan/00 Drilling (days): 40 Operation (days): 46	

Operator: TOTAL AUSTRAL (33.3%) Partners: ASTRA C.A.P.S.A (33.3%) Y.P.F - REPSOL (33.3%)

Objectives: ARGO & HIDRA SANDSTONE Classification: EXPLORATION	Results: DRY WELL Status: PLUG & ABANDON

Casings

Diameter (in)	Shoe (m MD driller)
13 3/8	404.0
9 5/8	1770.0

Wireline Form. Testing

Job

1 2 2 Pf. 1669 : 18

Gas (first occurrence)

Strong natural flux.
(m MD driller)

Wireline Logging

Job Oper. Desc.	Logs	Phase
1 1 1	AIT BHC LDL GR	12 1/4"
1 1 2	SHDT GR	12 1/4"
1 2 1	AIT LDL CNL GR	8"1/2
1 2 2	MDT GR	8"1/2
1 2 3	DSI NGT GPIT	8"1/2
1 2 4	CST GR	8"1/2

Sidewall Coring

Job Oper. Desc.	Phase	Recov.
1 2 4	8"1/2	14/17

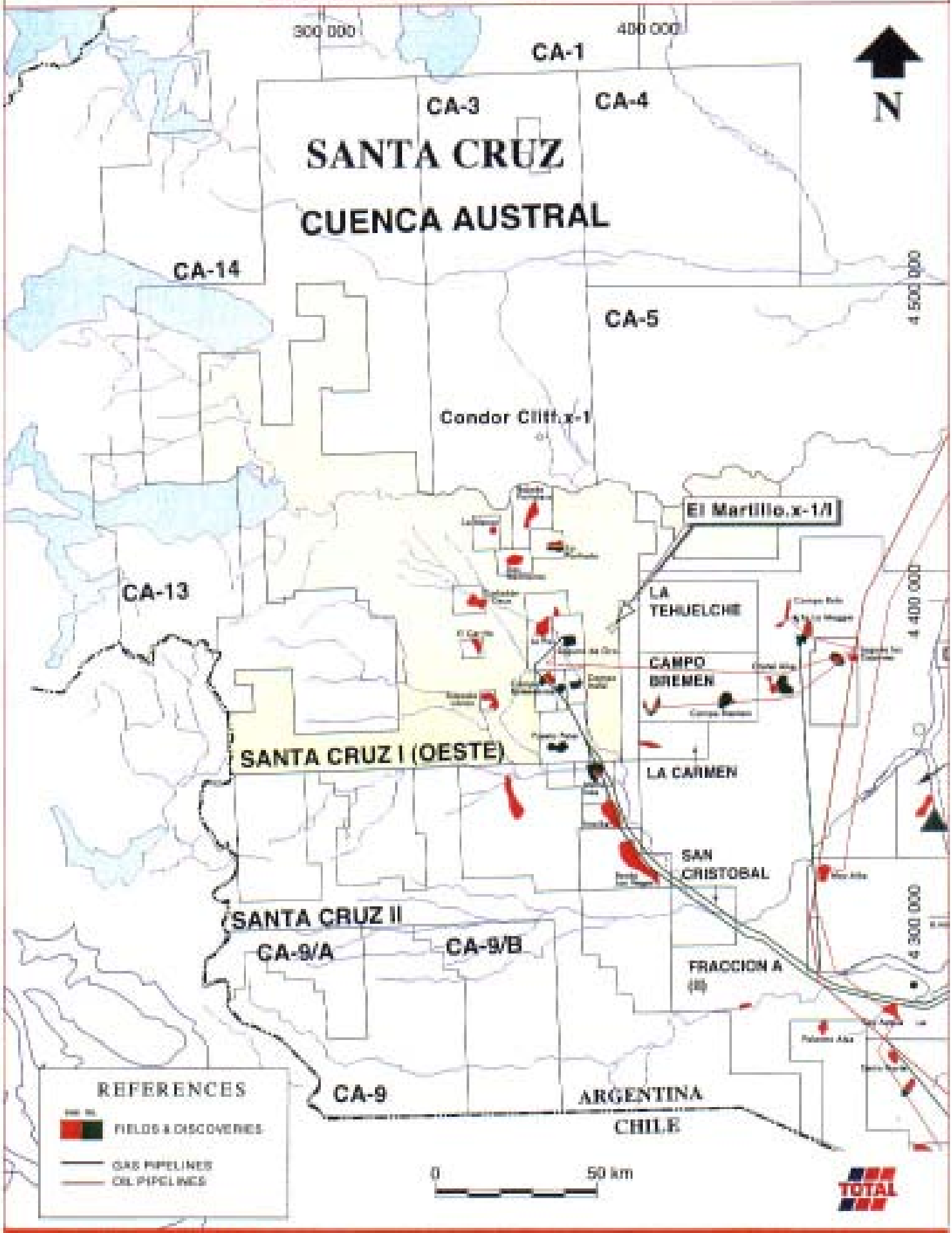
Drill Stem Testing

Nbr.	Interval (m MD Logger)	Testing Period	Choke (in)	Results

NO DST PERFORMED

Fig. 1

SANTA CRUZ I AREA
El Martillo.x-1/I LOCATION MAP



1.4 WELL DATA DISPATCHING LIST

DOCUMENT OR SAMPLE	ADDRESSEE	DATE	QUANTITY
REFERENCE SET EMa.x-1	Santa Cruz-Lab NQN	03/Jan/00	Box#1 20- 1540
PARTNER SET EMa.x-1	Santa Cruz-Lab NQN	03/Jan/00	Box#2 20- 1540
REFERENCE SET EMa.x-1	Santa Cruz-Lab NQN	03/Jan/00	Box#3 1550 -1753
PARTNER SET EMa.x-1/I	Santa Cruz-Lab NQN	03/Jan/00	Box#4 1550-1753
REFERENCE SET EMa.x-1/I	Santa Cruz-Lab NQN	03/Jan/00	Box#5 1545 - 2690
PARTNER SET EMa.x-1/I	Santa Cruz-Lab NQN	03/Jan/00	Box#6 1545 - 2690
REFERENCE SET EMa.x-1/I	Santa Cruz-Lab NQN	03/Jan/00	Box#7 2695 - 2990
PARTNER SET EMa.x-1/I	Santa Cruz-Lab NQN	03/Jan/00	Box#8 2695 - 2990
RIG SET plastic bags & box	Santa Cruz-Lab NQN	03/Jan/00	Box#10 20 - 1753
RIG SET plastic bags & box	Santa Cruz-Lab NQN	03/Jan/00	Box#11 1545- 2780
RIG SET plastic bags & box	Santa Cruz-Lab NQN	03/Jan/00	Box#12 2780 -2990
AFTA	Santa Cruz-Lab NQN	03/Jan/00	Box#13 9 sample

Comments

Aditional sampling were taken for AFTA (Apatite Fission Track Analysis). These samples were taken at the following depth.

Well El Martillo.x-1

1) 350 m
2) 700 m
3) 1100 m
4) 1170 m
5) 1410 m

Well El Martillo.x-1/I

6) 2015 m
7) 2290 m
8) 2840 m
9) 2952 m

Validated on: 16-August 01 by: A.GUIDI - D.PEREZ

2. DRILLING

2.1 Drilling summary

SPUD 19 – November -1999

1) **17 ½' PHASE :** Make up BHA and drilled from surface to 115.0 m, circulated and change 8' drill collar, continued drilled from 115.0 to 245.0 m, repaired pump #2 and drilled to 503.0m, circulate hole clean and slug heavy pill, POOH to surface , run in hole to bottom, circulated hole clean, dropped totco and performed flow check, pump slug and POOH to surface.
2) Rig up Weatheford tools and casing elements, performed prejob meeting, RIH 13 3/8' casing to bottom, casing shoe at 494.0 m. Make up B.J. cement head and lines, circulated, performed prejob meeting, pumped water spacer, tested lines with 3000 psi, mixed and pumped slurry, rig down cement head and line. SHOE @ 494 m
3) 12 ¼' PHASE : Make up 13 3/8' BOP stack and kill lines, tested BOP, kill line, choke lines & Manifold

   Maked up used bit and 12 ¼' BHA, RIH to 458.0 m, tagged cement, circulated, closed BOP and performed casing pressure test to 1500 psi, drilled out cement, top plug, piece, continued drilling cement and float collar to 480.0m. Circulated and displaced hole KCL-PHPL mud, continued drilling cement and shoe, cleaned rat hole to 503.0 m, circulated hole clean. Rig up B.J. tools, test lines with 1000 psi, performed F.I.T. to 1.5 gr/cc equivalent mud weight, then continued drilling from 506.0 m to 512.0 m, circulated bottom up and slug pill.

   POOH to surface, make up 12 ¼' PDC bit, RIH to bottom, circulated bottom up, drilled from 512.0 to 676.0 m, circulated hole clean, continued drilling from 676.0 to 725.0 m, circulated hole clean, drilled from 725.0 to 880.0 m, circulated hole clean, continued drilling from 880.0 to 986.0 m, circulated hole clean and repaired draw work drive chain, drilled from 986.0 to 1123.0 m, circulated to survey, performed survey with negative results, failure survey unit, drilled from 1123.0 to 1152.0 m, circulate and pumped high viscosity pill, performed survey, drift 0°, continued drilled from 1152.0 to 1617.0 m, circulated hole clean, drilled to 1750.0, circulated hole clean, performed flow check and slug heavy pill, then performed short trip to shoe, circulate to clean bit.
4) Wiper trip to Shoe, RIH, to 1401 m, tight spot, circulate & ream down to 1422 m, circulate hole, continuous RIH, circulate bottom up, perform Flow check, pump slug heavy pill, POOH.

5) R/U Schlumberger and logging. Run 1/1/1 AIT-BHL-LDL-GR; Run 1/1/2 SDHT-GR, R/D tools. Make BHA and RIH to bottom to conditioning well, circulate & ream, two bottom's up, pump slug, POOH.

6) On November 28th during POOH 550 m, block to block ocurred. Pride management inspect & evaluated damages on crown block & traveling block, continue POOH to shoe. Prepare to get down the mast.

7) Get down the mast remove and send to Comodoro Rivadavia to repair. On December 02 nd, crown block on location, install and check crown o´matic system.

8) RIH BHA with new bit 12 ¼", circulate & ream tight spots at 1116 m, 1236 m, 1382 m and 1518 m. Circulate bottom´s up, perform Flow check and pump slug. Attemp break out kelly, observed torque, M/U kelly, attempt to circulate negative result, well packed off, suck pipe at 1734 m. Work on pipe jarring up 100 tn, down 35 tn.

9) R/U Schlumberger, perform FPI (indicated at 1683 m 90 % free, perform Back off, uncrew drill string at 1562 m, attempt drill string connecting again. Schlumberger prepare Severing Colliding Tool (SCT), RIH & cut drill string at 1673 m, POOH.

10) RIH to 1642 m circulate & ream to 1672 m, condition hole, pump slug, drop totco, POOH. M/U diverter tool+2 7/8" TBG & RIH to 1670 m, attempt circulate negative result, diverter tool plugged with cutting, L/D and RIH 4 ½ DP, cement plug POOH & WOC. RIH, tag cement at 1316 m, wash down from 1316 m to 1422 m, circulate bottom up. Tag firmely at 1501 m & drill out cement to 1517 m, circulate and condition hole, POOH.

11) M/U Kick off Assembly, RIH DHM & MWD to 1535 m, drill Sidetrack from 1535 mt o 1585 m, Survey at 1567 m INCL: 3.31° AZ: 286°. Drill side track sliding & rotating mode from 1654 m to 1729 m. Survey at 1664 INC: 7.21°, AZ: 268.69°, Survey at 1692 m INC: 4.94°, AZ: 269°. Circulate & POOH, change bit.

12) RIH new bit, DHM+MWD, reaming from 1686 mt o 1729 m. Drill Side track sliding & rotating from 1729 m to 1780 m, last survey at 1765 m INC: 0.99°, AZ: 254.14°. Circulate hole clean, flow check, POOH, prepare to run casing 9 5/8"
RIH 9 5/8" CSG, Shoe at 1776 m cmt job, WOC. Test BOP.

13) **8 ½" Phase:** Make BHA & Bit RIH, drill Float Collar, cmt and shoe, drill to 1785 m, circulate, POOH , to 1774 m; Perform F.I.T. to 1.8 s.g. EMW. Drill ahead to 2150 m Survey at 2150 m 5.5°, controlled ROP. Drill to 2243 m Totco 2.0°, drill to 2505 m Totco 2.75°, drill ahead to 2846 m Totco 1.75°, circulate bottom´ s up, pump slug & Flow check, POOH, change bit.

14) RIH to 2810 m, wash down to 2846 m, drill to 2990 m TD, circulate hole clean POOH 7 stands, works on the firt three stands, 40 tn max overpull. POOH to Shoe, RIH, circulate bottom´s up, POOH, for logging.

15) R/U Schlumberger, Run 1/2/1 AIT-SP-CAL-CNL-LDL-GR., Run 1/2/2 MDT Pretest, Run 1/2/3 DSI-NGT, Run 1/2/4 SWC. R/D Schlumberger.

16) RIH 2 7/8" Cmt Stinger, set abandon plug 1 & 2 & WOC , cut 13 3/8" & 9"5/8 CSG, Set 3 th abandon plug. End of the well , release rig.

2.2 RIG TIME ANALYSIS

DRILLING		
Code	hh:mm	%
A		
F	275:10	24.9
C	54:30	4.9
B	90:45	8.2
P		
FN	605:15	54.8
CN	29:15	2.6
BN		
PN		
TOTAL	1054:55	95.6

GEOLOGY (G)		
Code	hh:mm	%
G1		
G2		
G2A		
G2B		
G2C		
G3		
G4	6:45	0.6
G5		
G6	42:20	3.8
G7		
G8		
G9		
TOTAL	49:05	4.4

GEOLOGY (GN)		
Code	hh:mm	%
GN1		
GN1A		
GN1B		
GN1C		
GN1D		
GN1E		
GN1F		
GN2		
GN3		
GN4		
GN5		
GN6A		
GN6B		
GN6C		
GN7		
GN8		
GN9A		
GN9B		
GN9C		
TOTAL	0:00	0.0

TESTING		
W		
WN		
TOTAL	0:00	0.0

TOTAL (all OPS)	
Days	46
hh:mm	1104:00

TOTAL GEOLOGY (G+GN)	
hh:mm	49:05
%	4.4

List of operation codes

GEOLOGY (G) : Productive operations

G1 : Coring, connections
G2 : Tripping
G2A : Tripping in open hole
G2B : Tripping in casing
G2C : Tripping: handling core barrel, core recovery
G3 : Hole opening / Well cond. after coring
G4 : Geological circulation
G5 : Formation testing: RFT... (excl. DST's)
G6 : Electrical logging (geology/drl. eval.)
G7 : Others measurements for geol. eval.
G8 : Others productive ops for geol. eval.

TESTING

W : Productive operations
WN : Non productive operations

DRILLING

A : Moving
F : Drilling, productive operations
C : Casings, cementing, productive operations
B : Recovery, abandonment, productive operations
P : W.O., completion, production
FN : Drilling, non productive operations
CN : Casings, cementing, non productive operations
BN : Recovery, abandonment, non productive operations
PN : Drilling, non productive operations

GEOLOGY (GN) : Non productive operations

GN1 : Downtime due to hole stability/tool sticking or not able to reach bottom but excluding GN2
GN1A : Well conditionning while logging (unscheduled wiper trips, reaming...)
GN1B : Mud conditionning while logging (unscheduled circulation...)
GN1C : Fishing while logging
GN1D : Well conditionning while coring (unscheduled wiper trips, reaming...)
GN1E : Mud conditionning while coring (unscheduled circulation...)
GN1F : Fishing while coring
GN2 : Downtime W/Kick control or curing losses
GN3 : Downtime due to rig coring/wiring failure
GN4 :
GN5 :
GN6A : Downtime due to failure or Equipment provided by Coring Company
GN6B : Downtime due to Electrical logging Company
GN6C : Downtime due to LWD tool failure
GN7 : Downtime due to rig eqpt. failure
GN8 : W.O.W.
GN9A : Downtime due to operator
GN9B : Downtime due to drilling contractor
GN9C : Downtime due to other service company

Validated on: 16-August-01 by: A.GUIDI - D.PEREZ

2.2 RIG TIME ANALYSIS - DAILY DATA INPUT

DAY	DEPTH	DRILLING									TESTING		GEOLOGY (G)												GEOLOGY (GN)																		
	(MD m)	A	F	C	B	P	PN	CM	BA	PN	W	WN	G1	G2	G3A	G3B	G3C	G3	G4	G5	G6	G7	G8	G9	GN1	-1A	-1B	-1C	-1D	-1E	-1F	GN2	GN3	GN4	GN5	-4A	-4B	-4C	GN7	GN8	-9A	-9B	-9C
1	262.0		17:00				7:00																																				
2	469.0		15:30				15:30																																				
3	593.0		4:00	1:45				8:15																																			
4	593.0						24:00																																				
5	593.0						24:00																																				
6	880.0		12:00				12:00																																				
7	1364.0		16:45				21:15																																				
8	1750.0		15:30				8:30																																				
9	1750.0		9:25				9:45													8:50																							
10	1750.0		4:00				20:00																																				
11	1750.0						24:00																																				
12	1750.0						24:00																																				
13	1750.0						24:00																																				
14	1750.0						24:00																																				
15	1750.0						24:00																																				
16	1750.0						24:00																																				
17	1750.0						24:00																																				
18	1750.0						24:00																																				
19	1750.0						24:00																																				
20	1750.0						24:00																																				
21	1750.0						24:00																																				
22	1750.0						24:00																																				
23	1750.0						24:00																																				
24	1750.0						24:00																																				
25	1817.0						24:00																																				
26	1835.0						24:00																																				
27	1892.0		16:30				7:30																																				
28	1954.0		22:15				1:45																																				
29	1735.0		11:15				22:45																																				
30	1735.0		10:30				24:00																																				
31	1750.0		16:45				7:15																																				

Validated on : 18-August-01 by: A.GUIDI - D.PEREZ

2.2 RIG TIME ANALYSIS - DAILY DATA INPUT

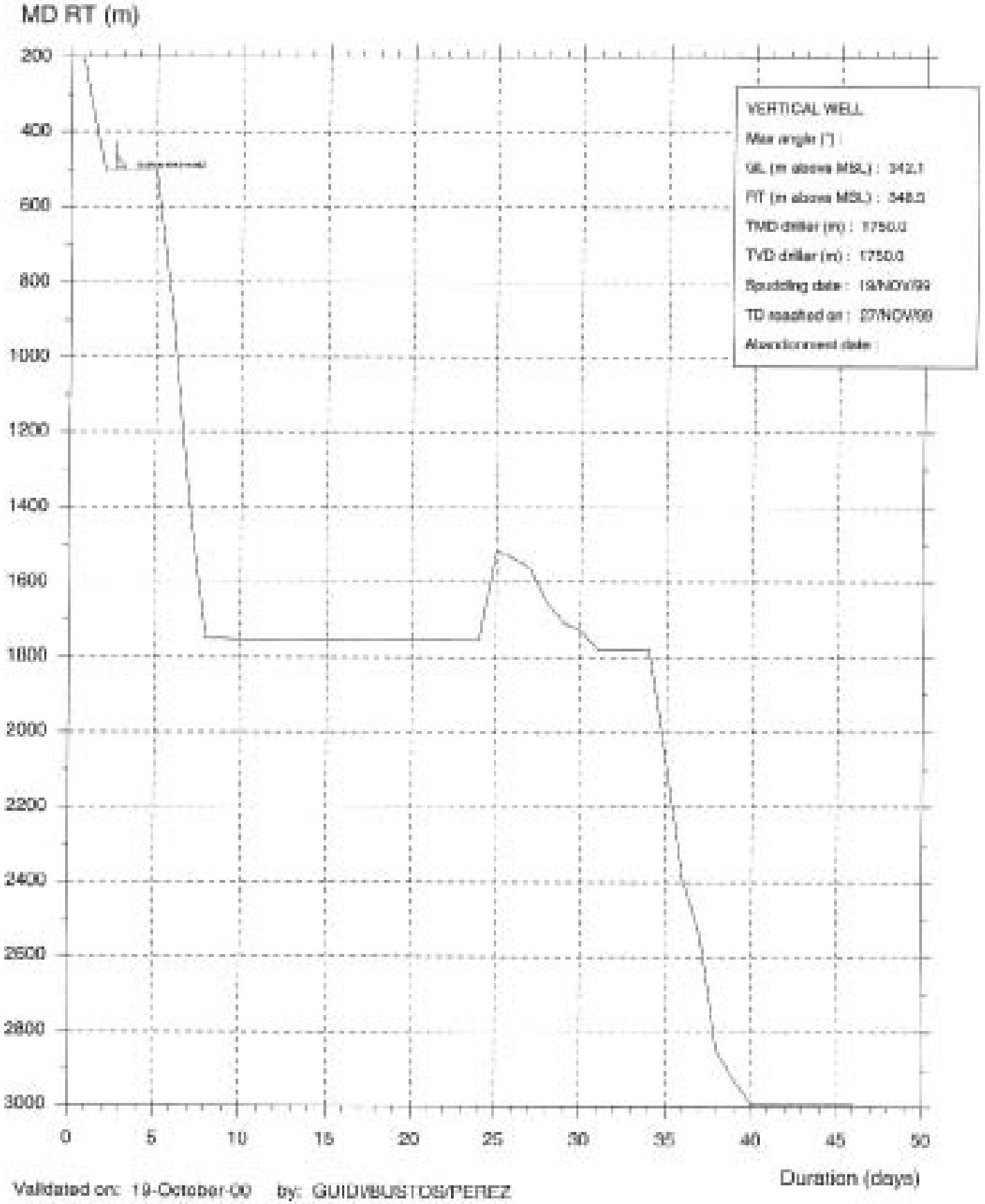
DAY	DEPTH	DRILLING									TESTING		GEOLOGY (G)												GEOLOGY (GN)																				
	(DR #)	A	P	C	S	P	PN	CN	BN	PN	IT	WN	G1	G2	G2A	G2B	G2C	G3	G4	G5	G6	G7	G8	G9	GN1	-1A	-1B	-1C	-1D	-1E	-1F	GN2	GN3	GN4	GN5	-5A	-5B	-5C	GN7	GN8	-8A	-8B	-8C
32	1780.0						7:45	16:15																																					
33	1780.0			20:45				3:15																																					
34	1780.0			21:15			2:45																																						
35	2060.0		21:45	1:45				2:30																																					
36	2094.0		22:30				1:30																																						
37	2539.0		13:30				10:30																																						
38	2545.0		17:15				6:15												2:30																										
39	2925.0		12:15				11:45																																						
40	2990.0		24:00																																										
41	2990.0						14:30														2:30																								
42	2990.0																				21:30																								
43	2990.0		1:30		19:45														4:15																										
44	2990.0				24:00																																								
45	2990.0				24:00																																								
46	2990.0				24:00																																								

Validated on: 16-August-01 by: A.GUIDI - D.PEREZ

Fig. 2a

TOTAL AUSTRAL	EL MARTILLO X-1	EMA X-1

PROGRESSION CHART



Validated on: 19-October-00 by: GUIDI/BUSTOS/PEREZ

2.3 DEVIATION DATA

Wellhead rectangular coordinates

Easting (m) : 392306.6
Northing (m) : 4391846.9

Projection : UTM zone 19 South

Log depth origin : RT
Log depth origin above MSL (m) : 348.5

Total measured depth logger (m) : 2992.5
Total vertical depth logger (m) : 2991.3

Driller depth origin : RT
Driller depth origin above MSL (m) : 348.5

Method of MINIMUM RADIUS OF CURVATURE

Survey Number	Type of Survey	Measured Depth (m)	Vertical Depth (m)	Angle (°)	Azimuth (°)	Delta X (m)	Delta Y (m)	Vertical Section (m)
1	NS	1501.7	1501.7	0.32	39.71	2.7 E	3.2 N	4.2
2	NS	1509.1	1509.1	0.51	39.58	2.7 E	3.3 N	4.2
3	NS	1518.7	1518.7	0.4	17.84	2.8 E	3.3 N	4.3
4	NS	1522.6	1522.6	0.45	3.19	2.8 E	3.4 N	4.3
5	NS	1528.1	1528.1	0.59	337.67	2.7 E	3.4 N	4.4
6	NS	1538.6	1538.6	1.16	299.56	2.6 E	3.5 N	4.4
7	NS	1542.6	1542.6	1.48	295.52	2.6 E	3.6 N	4.4
8	NS	1547.6	1547.6	1.79	296.69	2.4 E	3.6 N	4.4
9	NS	1557.6	1557.6	2.53	289.61	2.1 E	3.8 N	4.3
10	NS	1567.6	1567.6	3.31	286.41	1.6 E	3.9 N	4.2
11	NS	1577.6	1577.6	4.38	286.64	0.9 E	4.1 N	4.2
12	NS	1586.4	1586.4	4.75	285.03	0.3 E	4.3 N	4.3
13	NS	1595.6	1595.5	5.58	282.19	0.5 W	4.5 N	4.5
14	NS	1605.6	1605.5	6.46	278.41	1.6 W	4.7 N	4.9
15	NS	1664.6	1664.0	7.21	268.89	8.5 W	5.1 N	9.9
16	NS	1673.6	1673.0	6.72	268.29	9.6 W	5.0 N	10.9
17	NS	1683.6	1682.9	5.69	267.62	10.7 W	5.0 N	11.8
18	NS	1692.6	1691.9	4.94	269.16	11.6 W	5.0 N	12.6
19	NS	1702.6	1701.8	4.45	268.26	12.4 W	5.0 N	13.3
20	NS	1712.6	1711.8	3.98	268.06	13.1 W	4.9 N	14.0

Validated on : 16-August-01 by: A.GUIDI D.PEREZ

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2.3 DEVIATION DATA

Survey Number	Type of Survey	Measured Depth (m)	Vertical Depth (m)	Angle (°)	Azimuth (°)	Delta X (m)	Delta Y (m)	Vertical Section (m)
21	NS	1721.7	1720.9	3.76	269.79	13.7 W	4.9 N	14.6
22	NS	1731.7	1730.9	3.12	274.83	14.3 W	5.0 N	15.2
23	NS	1741.7	1740.9	2.23	283.36	14.8 W	5.0 N	15.6
24	NS	1751.7	1750.8	1.64	282.95	15.1 W	5.1 N	15.9
25	NS	1760.7	1759.8	1.09	275.49	15.3 W	5.1 N	16.2
26	NS	1780.0	1779.2	0.77	259.23	15.5 W	5.1 N	16.5
27	NS	1790.2	1789.4	0.91	260.02	15.8 W	5.1 N	16.6
28	NS	1800.1	1799.3	0.77	256.7	15.9 W	5.1 N	16.7
29	NS	1810.1	1809.2	0.64	266.31	16.0 W	5.1 N	16.8
30	NS	1820.4	1819.5	0.64	278.28	16.2 W	5.1 N	16.9
31	NS	1820.6	1819.7	0.64	279.47	16.2 W	5.1 N	16.9
32	NS	1831.1	1830.2	0.55	282.53	16.3 W	5.1 N	17.0
33	NS	1831.2	1830.4	0.55	282.51	16.3 W	5.1 N	17.0
34	NS	1840.5	1839.7	0.48	294.04	16.3 W	5.1 N	17.1
35	NS	1850.3	1849.4	0.41	299.96	16.4 W	5.2 N	17.2
36	NS	1861.0	1860.1	0.49	309.3	16.5 W	5.2 N	17.3
37	NS	1880.0	1879.1	0.47	320.85	16.6 W	5.3 N	17.4
38	NS	1890.5	1889.6	0.71	320.12	16.7 W	5.4 N	17.5
39	NS	1900.3	1899.4	0.91	330.84	16.7 W	5.5 N	17.6
40	NS	1910.8	1909.9	1.01	345.65	16.8 W	5.7 N	17.7
41	NS	1920.8	1920.0	0.9	345.82	16.8 W	5.8 N	17.8
42	NS	1940.8	1939.9	0.87	352.41	16.9 W	6.1 N	18.0
43	NS	1950.7	1949.8	0.86	350.19	16.9 W	6.3 N	18.0
44	NS	2000.3	1999.4	0.29	345.12	17.0 W	6.8 N	18.3
45	NS	2051.0	2050.1	0.89	351.82	17.1 W	7.3 N	18.6
46	NS	2100.1	2099.2	1.17	340.33	17.3 W	8.1 N	19.1
47	NS	2121.0	2120.0	1.14	344.0	17.5 W	8.5 N	19.4
48	NS	2140.5	2139.6	1.16	352.64	17.6 W	8.9 N	19.7
49	NS	2150.5	2149.6	1.15	351.19	17.6 W	9.1 N	19.8
50	NS	2170.8	2169.9	1.08	356.89	17.6 W	9.5 N	20.0

Validated on : 16-August-01 by: A.GUIDI - D.PEREZ

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2.3 DEVIATION DATA

Survey Number	Type of Survey	Measured Depth (m)	Vertical Depth (m)	Angle (°)	Azimuth (°)	Delta X (m)	Delta Y (m)	Vertical Section (m)
51	NS	2200.8	2199.9	1.56	355.4	17.7 W	10.2 N	20.4
52	NS	2231.6	2230.7	1.81	351.04	17.8 W	11.1 N	20.9
53	NS	2260.7	2259.8	0.65	10.93	17.8 W	11.7 N	21.3
54	NS	2291.3	2290.4	0.45	120.64	17.7 W	11.8 N	21.3
55	NS	2320.9	2319.9	0.92	150.78	17.5 W	11.6 N	20.9
56	NS	2361.0	2360.0	1.22	156.67	17.1 W	10.9 N	20.5
57	NS	2390.7	2389.7	0.92	137.66	16.8 W	10.4 N	19.8
58	NS	2441.0	2440.0	1.06	177.18	16.5 W	9.5 N	19.2
59	NS	2500.9	2499.9	2.43	194.01	16.6 W	7.9 N	18.6
60	NS	2530.6	2529.7	1.77	214.76	17.2 W	6.9 N	18.6
61	NS	2540.6	2539.6	1.51	225.24	17.4 W	6.7 N	18.6
62	NS	2550.8	2549.8	1.51	225.43	17.6 W	6.5 N	18.6
63	NS	2560.9	2559.9	1.53	225.87	17.8 W	6.3 N	18.9
64	NS	2571.1	2570.0	1.54	226.32	18.0 W	6.1 N	19.0
65	NS	2581.2	2580.2	1.55	226.45	18.2 W	5.9 N	19.1
66	NS	2590.9	2589.9	1.88	229.61	18.4 W	5.7 N	19.3
67	NS	2630.1	2629.1	1.76	288.05	19.5 W	5.5 N	20.2
68	NS	2640.3	2639.2	1.77	288.16	19.8 W	5.6 N	20.5
69	NS	2660.6	2659.5	2.33	308.9	20.4 W	5.9 N	21.2
70	NS	2691.1	2690.0	2.15	306.82	21.3 W	6.7 N	22.3
71	NS	2720.8	2719.7	1.2	294.34	22.1 W	7.1 N	23.2
72	NS	2751.0	2749.9	1.16	202.01	22.5 W	7.0 N	23.5
73	NS	2770.9	2769.8	2.41	181.43	22.6 W	6.4 N	23.4
74	NS	2780.8	2779.7	1.87	189.79	22.6 W	6.0 N	23.4
75	NS	2791.0	2779.9	1.86	190.21	22.6 W	6.0 N	23.4
76	NS	2800.5	2799.4	1.02	238.55	22.8 W	5.8 N	23.5
77	NS	2810.7	2809.6	0.96	285.23	22.9 W	5.6 N	23.6
78	NS	2810.9	2809.7	0.94	286.0	23.0 W	5.6 N	23.6
79	NS	2830.4	2829.2	1.52	318.74	23.3 W	5.8 N	24.0
80	NS	2841.0	2839.9	1.34	337.94	23.4 W	6.0 N	24.2

Validated on : 16-August-01 by: A.GUIDI - D.PEREZ

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2.3 DEVIATION DATA

Survey Number	Type of Survey	Measured Depth (m)	Vertical Depth (m)	Angle (°)	Azimuth (°)	Delta X (m)	Delta Y (m)	Vertical Section (m)
81	NS	2850.2	2849.0	1.28	339.45	23.5 W	6.2 N	24.3
82	NS	2870.6	2869.5	0.96	346.47	23.6 W	6.6 N	24.5
83	NS	2880.1	2878.9	1.05	343.38	23.7 W	6.8 N	24.6
84	NS	2900.6	2899.5	1.03	348.03	23.7 W	7.1 N	24.8
85	NS	2921.2	2920.0	1.54	341.01	23.9 W	7.6 N	25.0
86	NS	2950.2	2949.0	1.37	341.22	24.1 W	8.3 N	25.5
87	NS	2960.7	2959.6	1.34	322.13	24.2 W	8.5 N	25.7
88	NS	2970.9	2969.7	1.34	321.93	24.4 W	8.7 N	25.9
89	NS	2980.9	2979.8	1.29	312.86	24.5 W	8.8 N	26.1
90	NS	2981.1	2979.9	1.28	313.82	24.5 W	8.8 N	26.1
91	NS	2990.9	2989.7	0.96	312.48	24.7 W	9.0 N	26.3

Magnetic References

Azimuths are not corrected for Declination
Azimuths are not corrected for Convergence

TOTAL AUSTRAL	EL MARTILLO.X-1/I	SCA.EMA.X-1/I

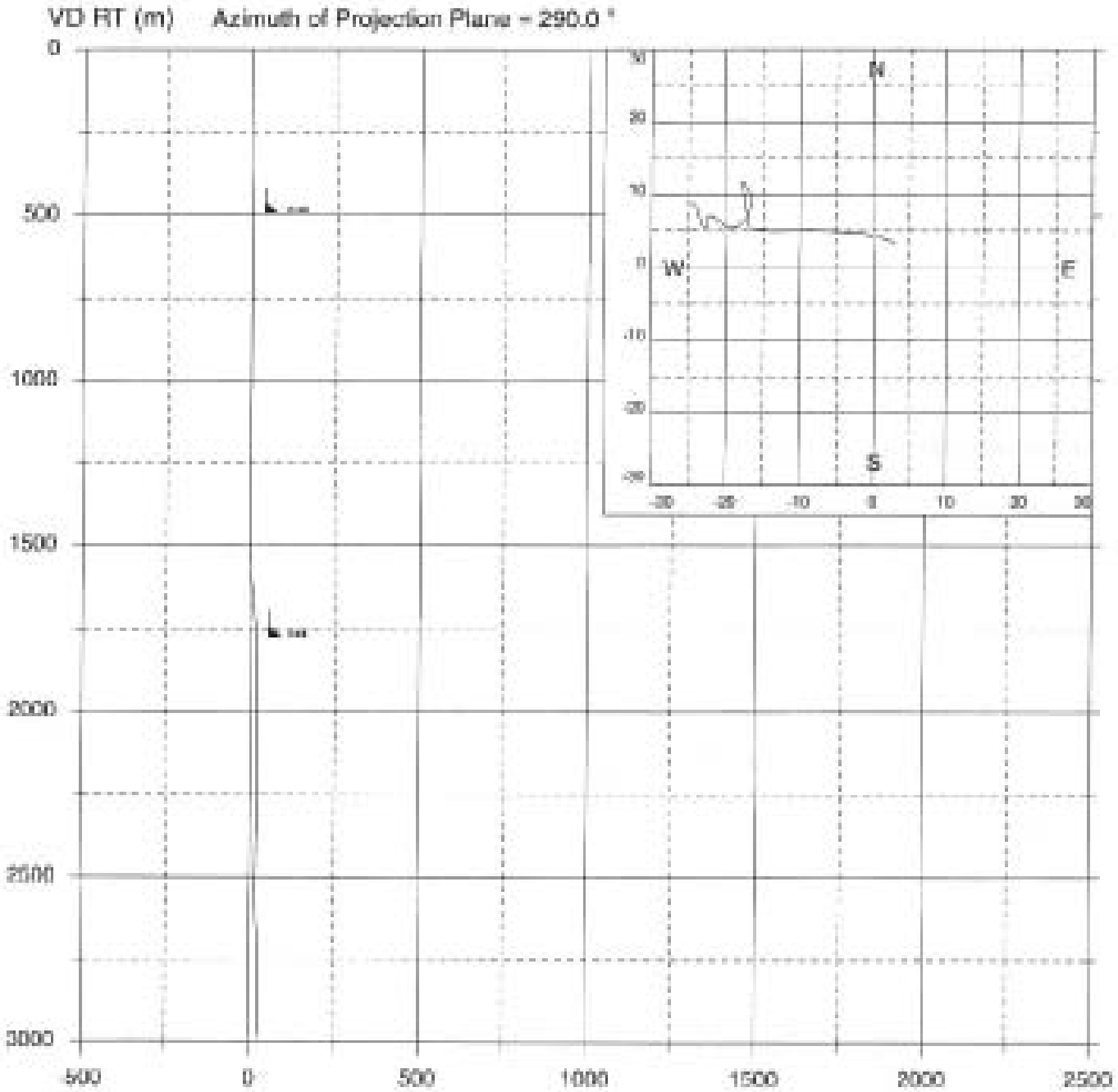
WELL PROFILE

Last survey MD RT (m) : 2990.9
Last survey VD RT (m) : 2969.7

Departure at last survey depth (m) : 26.3
Azimuth at last survey depth (°) : 312.5

Wellhead rectangular coordinates
Easting (m) : 392306.6
Northing (m) : 4391846.9

Casing	Shoe MD RT (m)	VD (m)
13 3/8	494.0	494.0
9 5/8	1776.0	1775.1



Validated on: 23-August-01 by: A.GUIDI - D.PEREZ

3. MUD LOGGING

3.1 MUD LOGGING GENERAL DATA

MD driller from (m) : 0.0 to (m) : 2990.0 *Date from: 19/Nov/99 to: 03/Jan/00*

Mud logging company : GEOSERVICES S.A. Currency : US2100

	Type	Days in operation	Daily cost US2100	Total cost US2100
Mud logging unit :	ALS LEVEL-5	45.	2100	94500
Gas analysis system :	GASLOGGER	6.	1680	10080
Fluorescence analysis system :		6.	1050	6300

	Man days	Daily cost US2100	Total cost US2100
TDC :			
Mud logger :	44	220	9680
Sample catcher :			

Mud logging section cost (US2100) : 120560

Validated on: 16-August-01 by: A.GUIDI - D.PEREZ

3.2 CUTTINGS COLLECTION

Sample type	Number of sets	Quantity per set	Sampling interval (m)	From (MD driller m)	To (MD driller m)
WASHED & DRIED RIG SET PLASTIC BAGS	1	50 cc	10.0	0.0	1750.0
WASHED & DRIED RIG SET PLASTIC BOX	1	5 cc	10.0	0.0	1750.0
NON WASHED - NON DRIED PARTNER SET	1	500 cc	10.0	0.0	1750.0
SLIGHTLY WASHED-NON DRIED REF SET	1	500 cc	10.0	0.0	1750.0
WASHED & DRIED RIG SET PLASTIC BAGS	1	50 cc	10.0	1540.0	1970.0
WASHED & DRIED RIG SET PLASTIC BOX	1	5 cc	10.0	1540.0	1970.0
NON WASHED - NON DRIED PARTNER SE	1	500 cc	10.0	1540.0	1970.0
SLIGHTLY WASHED-NON DRIED REF SET	1	500 cc	10.0	1540.0	1970.0
WASHED & DRIED RIG SET PLASTIC BAGS	1	50 cc	5.0	1970.0	2834.0
WASHED & DRIED RIG SET PLASTIC BOX	1	5 cc	5.0	1970.0	2834.0
NON WASHED - NON DRIED PARTNER SE	1	500 cc	5.0	1970.0	2834.0
SLIGHTLY WASHED-NON DRIED REF SET	1	500 cc	5.0	1970.0	2834.0
WASHED & DRIED RIG SET PLASTIC BAGS	1	50 cc	2.0	2834.0	2964.0
WASHED & DRIED RIG SET PLASTIC BOX	1	5 cc	2.0	2834.0	2964.0
NON WASHED - NON DRIED PARTNER SE	1	500 cc	2.0	2834.0	2964.0
SLIGHTLY WASHED-NON DRIED REF SET	1	500 cc	2.0	2834.0	2964.0
WASHED & DRIED RIG SET PLASTIC BAGS	1	50 cc	5.0	2965.0	2990.0
WASHED & DRIED RIG SET PLASTIC BOX	1	5 cc	5.0	2965.0	2990.0
NON WASHED - NON DRIED PARTNER SE	1	500 cc	5.0	2965.0	2990.0
SLIGHTLY WASHED NON DRIED REF SET	1	500 cc	5.0	2965.0	2990.0

Comments

Aditional sampling was made for AFTA (Apatite Fission Track Analysis). These samples were taken at the following depth:

Well El Martillo x-1

Sample N° 1 350 m

Sample N° 2 700 m

Sample N° 3 1100 m

Sample N° 4 1170 m

Sample N° 5 1410 m

Well El Martillo x-1/I

Sample N° 6 2015 m

Sample N°7 2290 m

Sample N°8 2640 m

Validated on : 16-August-01 by: A.GUIDI - D.PEREZ

3.2 CUTTINGS COLLECTION

Comments

Sample N°9 2952 m

3.3 Hydrocarbon shows

Gas Shows:

Tertiary

- From: 0 m to 440 m, no significant background gas was recorded, 2000 ppm to 3000 ppm .
- From: 440 m to 830 m., background gas is around 3000 ppm to 8000 ppm, it was only methane reading
- From: 830 m to 1100 m, background gas is around 8000 ppm to 10000, with peack of C1: 8000 ppm, ethane appeared in this section with values around 300 ppm to 400 ppm, probably due to Coal.
- From: 1100m. to 1380 m, background gas is around 10000 ppm, maximum peack C1: 8000 ppm, C2: 800 ppm, C3: 100 ppm, iC4: 300 ppm, nC4: traces. Discontinous amount of C3 and C4 were registered.

Top Cretaceous

- From: 1383 m to 1393 m, background gas is around 9000 ppm to 10000 ppm, C1 to nC4 were recorded. Maximum peack at 1375 m; C1: 8000 ppm, C2: 750 ppm, C3: 100 ppm, iC4: 30 ppm and nC4 trace.

Anita & Altavista Formation

- From: 1393 m to 1643 m background gas is around 10000 ppm; maximum values were recorded at 1580 m, C1: 8500 ppm, C2: 800 ppm, C3: 100 ppm, iC4 & nC4 traces.

Mata Amarilla Formation

- From: 1643 m to 1990 m, background gas is around 6000 ppm to 8000 ppm, C1: 7000 ppm.C2: 400 ppm, C3: 80 ppm., iC4 & nC4 traces.

Piedra Clavada Formation

- From 1990 mt to 2180 m, background gas is around 6000 ppm to 9200 ppm, decrease downward, C1: 8200 ppm, C2: 340 ppm, C3: 120 ppm, iC4: 20 ppm, nC4: 25 ppm, appeared iC5 & nC5 traces.

Kachaike Formation

- From: 2180 m to 2350 m, background gas is 2000 ppm to 5500 ppm, C1: 3900 ppm., C2: 300ppm., C3: 220ppm, iC4: 30 ppm, nC4: 50 ppm, iC5 & nC5 traces. Possibly due Fast ROP low gas reading

Rio Mayer Superior Formation

- From 2350 m to 2770 m, gas showed ranged from 5000 ppm to 22000 ppm, downward increase Heavy gas, Maximum peack C1: 7000 ppm, C2: 1600 ppm, C3: 1300 ppm, iC4: 300 ppm, nC4: 800 ppm, iC5: 180 ppm, nC5: 240 ppm.

Rio Mayer Inferior Formation

- From 2770 m to 2840 m, background remains between 15000 ppm to 22000 ppm , with peack of C1: 6200 ppm, C2: 1500 ppm, C3: 630 ppm, iC4: 480 ppm, nC5: 580 ppm, iC5: 220 ppm,nC5: 270 ppm.

Springhill Formation

- Argo Sq average values readding is C1: 8450 ppm, C2: 1730 ppm, C3: 950 ppm, iC4: 350 ppm, nC4: 560 ppm, iC5: 190 ppm, nC5: 220 ppm.
- Hydra Sq : C1: 7200 ppm, C2: 560 ppm, C3: 270 ppm, iC4: 80 ppm, nC4: 130 ppm, iC5: 50 ppm, nC5: 40 ppm.

Tobifera Formation

- From 2970 m to TD background remains at around 2200 ppm, only C1 to C3 were recording

Oil Shows

Altavista Formation

From 1410 m. to 1425 m.: No Direct Fluorescence, very slow diffusse light yellowish green Cut Fluorescence.

Piedra Clavada Formation

From: 2010 m. to 2055 m. No Direct Fluorescence, slow diffusse whitish yellow, Cut Fluorescence, due to carbonaceous matters.

From: 2105 m. to 2110 m No Direct Fluorescence, slow whitish yellow Cut Fluorescence, due to carbonaceous matters.

From: 2120 m to 2175 m No Direct Fluorescence, slow diffusse whitish yellow Cut Fluorescence, Due coal & coaly shale.

Springhill Formation

Ago Sq: from: 2844 m to 2846 m, Traces of dark brown oil stain; No Direct Fluorescence, very slow Streaming whitish yellow Cut Fluorescence.

Hidra Sq.: from 2878 m to 2902 m, Traces brownish black oil stain (dead Oil), No Direct Fluorescence, very Slow greenish yellow Cut Fluorescence.

For more informations regarding shows, see Enclosures 1& 2 .

4. MWD - LWD

4. LWD

Logging While drilling was not performed, but in the side track run DHM + MWD, (M10 tool).

5. CORING

5. CORING

No core was cut in this well

5.2 SIDEWALL CORING

Job number : 1 Operation number : 2 Descent number : 4

Service company : SCHLUMBERGER Date : 31/Dec/99

Tool : CST-C Hole diameter (in) : 8"1/2

PLUGS

Shot : 17 Misfired : Lost : 3 Geologist : G.CAMPITELLI

Recovered : 14 Empty : Paid : 13

Nb	MDRT log (m)	Lgth (cm)	CaCo3 % 1"	CaCo3 % 3"	Por. Eval.	Sat-page	Oil Stain	Fluorescence Direct Dist.	Fluorescence Direct Int.	Fluorescence Cut Int.	Lithological description
2	2934.0	2.0			POOR	0	0	0	0	0	SS:WH, TO VLT GY,F-VF,SP M, QZ, ABDT ARG-TUF MT
3	2927.0	2.5			POOR	0	0	0	0	0	SS:V LT GY,F,SP M-CRS,ANG-SUBANG,QZ,ARGIL-TUFF MT
5	2921.0					0		0			LOST
8	2913.5	2.5			POOR	0	0	0	0	1	SS: A/A, M, SP F, SLW WHITISH YELL CUT FLUO
9	2904.5	2.0			POOR	0	0	0	0	1	SS: A/A, M, SP F, SLW WHITISH YELL CUT FLUO
11	2902.0					0		0			LOST
12	2902.0	2.0			POOR	0	0	0	0	1	SS: A/A, M, VP F, SLW WHITISH YELL CUT FLUO
14	2897.0	3.0			POOR	0	0	0	0	1	SS:V LT GY,M-F,QZ,ARG-TUF MTX,DOMS,COAL DEBRIS
15	2892.0	3.2			POOR	0	0	0	0	0	SS: A/A
18	2887.0	3.0			POOR	0	0	0	0	2	SS:DTINGH GY,VF,QZ,ARGIL MTX,PY,CONCOL
20	2885.5	2.0			POOR	0	0	0	0	2	SS:A/A, STREAKG-CRFF,FST WHISH YEL CUT FLUO
21	2872.5	1.5			NIL	0	0	0	0	0	SLTST: M DK GY,MASS,GLAUC,CALC,HD
24	2850.5	3.0			NIL	0	0	0	0	0	SLTST: M DK GY,MASS,GLAUC,COAL,CALC,HD
26	2825.5	2.0			NIL	0	0	0	0	0	SLTY-CLST: DK GRNS GY,MAS,MICROPY,COAL,SLI CALC,PR
29a	2821.0					0		0			LOST

Validated on: 16-August-01 by: A.GUIDI - D. PEREZ

6. WIRELINE LOGGING

6.1 LIST OF RECORDED LOGS

Logging company : SCHLUMBERGER

Job Nb	Hole diam. (in)	Max angle (°)	Oper Nb	Mud type	Mud density (g/cc)	MD driller (m)	Rmc (ohm.m)	Rm (ohm.m)	Rmf (ohm.m)	at Temp (°C)	Data Nb	MD logger (m)	Temp (°C)	Time at BOC (hh:mm)	Log name	Recording From (m)	Recording To (m)	Run Date	Remarks
1	12 1/4"	2.5	1	POLYMERIC-KCL	1.03	1750.0	0.434	0.152	0.162	14.	1	1741.0	85.	09:45	AIT BHC LDL GR	1741.0 1741.0 1741.0 1741.0	464.0 464.0 464.0 464.0	23/11/99	
1	12 1/4"	2.5	1	POLYMERIC-KCL	1.03	1750.0	0.434	0.152	0.162	14.	2	1741.0	85.	12:05	SHDT GR	1741.0 1741.0	464.0 464.0	23/11/99	
1	8"1/2	7.2	2	KCL	1.16	2960.0	0.346	0.146	0.105	23.	1	2962.0	136.	19:10	AIT LDL CNL GR	2962.0 2962.0 2962.0 2962.0	1775.0 1775.0 1775.0 1775.0	26/11/99	
1	8"1/2	7.2	2	KCL	1.16	2960.0	0.346	0.146	0.105	23.	2	2962.0	136.	27:40	MDT GR	2900.2 2900.2	2842.0 2842.0	26/11/99	5 828 PRETESTS, SAMPLE NT SEGREGATED.
1	8"1/2	7.2	2	KCL	1.16	2960.0	0.346	0.146	0.105	23.	3	2962.0	136.	40:40	DSI NGT GPIT	2962.0 2962.0 2962.0	1775.0 1775.0 464.0	26/11/99	
1	8"1/2	7.2	2	KCL	1.16	2960.0	0.346	0.146	0.105	23.	4	2962.0	136.	50:10	CST GR	2955.5 2955.5	2934.0 2934.0	26/11/99	17 SIDEWALL CORES 12 RECOVERY

Validated on : 16-August-01 by: A.GUIDI - D.PEREZ

.../...

6.1 LIST OF RECORDED LOGS

Comments

Run 1/2/1 at moment to connecte A/T tools some bubble mud come from the well and damaged A/T contact, was repair and checkak on surface. RIH, at shoe A/T failure, POOH, respair in the rig.
Run 1/2/2 MDT, was taken 29 Pretests. One sample segregated at 2546.5 m
Run 1/2/4 CST, sidewall cores, request 17, payed 12.

7. WIRELINE FORMATION TESTING

7.1 PRESSURE DATA

Job : 1 | *Operation : 2* | *Descent : 2*

Service company	: SCHLUMBERGER	Log depth origin (RT) above MSL (m)	: 348.5
Tool	: MDT	Flow line above MSL (m)	: 346.5
Pressure gauge	: DGG		
Packer type	: CONVENTIONAL Hole diameter (in)	: 8"1/2	Date : 30/Dec/98
Probe type	: LARGE DIAMETERMud weight (g/cc)	: 1.16	Geologist : A.GUIDI-G.CAMPITELLI

No	Reservoir	Depth MD RT (m)	Depth VD SS (m)	Hydrostatic pressure Before (kg/cm²)	Hydrostatic pressure EMD (g/cc)	Hydrostatic pressure After (kg/cm²)	Formation pressure ISIP (kg/cm²)	Formation pressure EMD (g/cc)	Formation pressure IK Head (m)	Mobility (mD/cp)	Temp (°C)	Type of pressure	Chamb. cc	Remarks
1	ARGO SQ	2942.0	-2492.4	338.31	1.28	338.68					131.0	NORMAL	20.0	TIGHT
2	ARGO SQ	2942.5	-2492.9	338.74	1.19	338.79					131.0	NORMAL	20.0	TIGHT
3	ARGO SQ	2943.0	-2493.4	338.93	1.19	338.97					131.0	NORMAL	20.0	TIGHT
4	ARGO SQ	2944.5	-2494.9	339.09	1.19	339.63	270.09	0.95	285.9	0.5	131.0	NORMAL	20.0	SUPERCHARGED
5	ARGO SQ	2946.5	-2496.9	339.07	1.19	339.09	287.32	0.94	176.3	4.1	131.0	NORMAL	20.0	STABILIZED
6	ARGO SQ	2948.5	-2498.9	339.40	1.18	339.90	287.47	0.94	175.8	8.	131.0	NORMAL	20.0	STABILIZED
7	ARGO SQ	2953.5	-2503.9	339.70	1.17	339.91					131.0	NORMAL	20.0	TIGHT
8	ARGO SQ	2953.7	-2504.1	339.28	1.17	339.44					131.0	NORMAL	20.0	TIGHT
9	HIDRA SQ	2954.0	-2504.4	339.28	1.17	339.98					131.0	NORMAL	20.0	TIGHT
10	HIDRA SQ	2964.0	-2514.4	339.93	1.17	339.48					131.0	NORMAL	20.0	TIGHT
11	HIDRA SQ	2965.5	-2515.9	339.99	1.17	339.68					131.0	NORMAL	20.0	TIGHT
12	HIDRA SQ	2992.5	-2542.0	339.25	1.17	345.77					131.0	VOLUMETRIC	10.0	TIGHT
13	HIDRA SQ	2995.5	-2545.0	339.52	1.17	339.43	327.74	1.17	831.3	0.2	131.0	VOLUMETRIC	10.0	SUPERCHARGED
14	HIDRA SQ	2998.5	-2548.0	339.06	1.17	339.40	287.69	0.99	327.0	1.	131.0	VOLUMETRIC	10.0	SUPERCHARGED
15	HIDRA SQ	3002.5	-2552.0	340.39	1.17	339.90	272.43	0.94	171.8	12.7	131.0	VOLUMETRIC	10.0	STABILIZED
16	HIDRA SQ	3004.5	-2554.0	340.03	1.17	340.26	272.72	0.94	172.4	35.4	131.0	VOLUMETRIC	10.0	STABILIZED
17	HIDRA SQ	3005.5	-2555.0	339.29	1.17	339.27	294.60	0.98	302.1	0.4	131.0	VOLUMETRIC	10.0	SUPERCHARGED
18	HIDRA SQ	3009.5	-2559.0	341.62	1.18	340.98					131.0	VOLUMETRIC	10.0	TIGHT
19	HIDRA SQ	3013.5	-2563.0	341.84	1.17	341.22	277.58	0.92	211.8	2.7	131.0	VOLUMETRIC	10.0	STABILIZED
20	HIDRA SQ	3015.5	-2565.0	341.91	1.17	341.50	288.79	1.00	422.0	0.02	131.0	VOLUMETRIC	10.0	SUPERCHARGED
21	HIDRA SQ	3021.0	-2571.4	342.60	1.17	342.10	270.14	0.90	190.0	5.9	131.0	VOLUMETRIC	10.0	STABILIZED
22	HIDRA SQ	3026.5	-2576.9	343.14	1.17	342.75	283.90	0.97	262.1	0.6	131.0	VOLUMETRIC	10.0	SUPERCHARGED
23	HIDRA SQ	3030.0	-2580.4	340.55	1.17	340.24	270.81	0.96	217.7	1.1	131.0	VOLUMETRIC	10.0	
24	HIDRA SQ	3034.0	-2584.4	340.95	1.17	340.71	276.28	0.94	176.6	18.4	133.0	VOLUMETRIC	10.0	STABILIZED
25	HIDRA SQ	3037.5	-2587.9	344.41	1.17	344.41					133.0	VOLUMETRIC	10.0	TIGHT
26	HIDRA SQ	3038.4	-2588.8	344.45	1.17	344.29					133.0	VOLUMETRIC	10.0	TIGHT
27	HIDRA SQ	3040.5	-2590.9	340.67	1.16	339.98	294.31	0.96	348.2		133.0	VOLUMETRIC		SUPERCHARGED

Validated on : 16-August-01 by: A.GUIDI - D.PEREZ

.../...

7.1 PRESSURE DATA

No	Reservoir	Depth		Hydrostatic pressure			Formation pressure			Mobility	Temp	Type of	Chamb.	Remarks
		MD RT (ft)	VD SS (ft)	Before (kg/cm²)	EMD (g/cc)	After (kg/cm²)	ISIP (kg/cm²)	EMD (g/cc)	W. Head (ft)	(mD/cp)	(°C)	passed	on	
28	HIDRA SQ	2937.0	-2537.4	341.02	1.17	340.81	273.01	0.94	172.7	180.5	130.0	VOLUMETRIC		STARS DSO
29	HIDRA SQ	2930.2	-2530.6	342.58	1.18	340.47	272.35	0.94	172.9	16.7	130.0	VOLUMETRIC		STARS DSO
30	APGO SQ	2946.5	-2466.9	320.92	1.17	320.03	267.30	0.94	176.4	39.3	130.0	VOLUMETRIC	10.0	SAMPLING

Well: EL MARTILLO.X-1/
DATE 30/12/1999

Witness: DUCCI-CAMPITELLI
Service Company: Schlumberger - F.Mazzo

MDT - PRETEST LIST

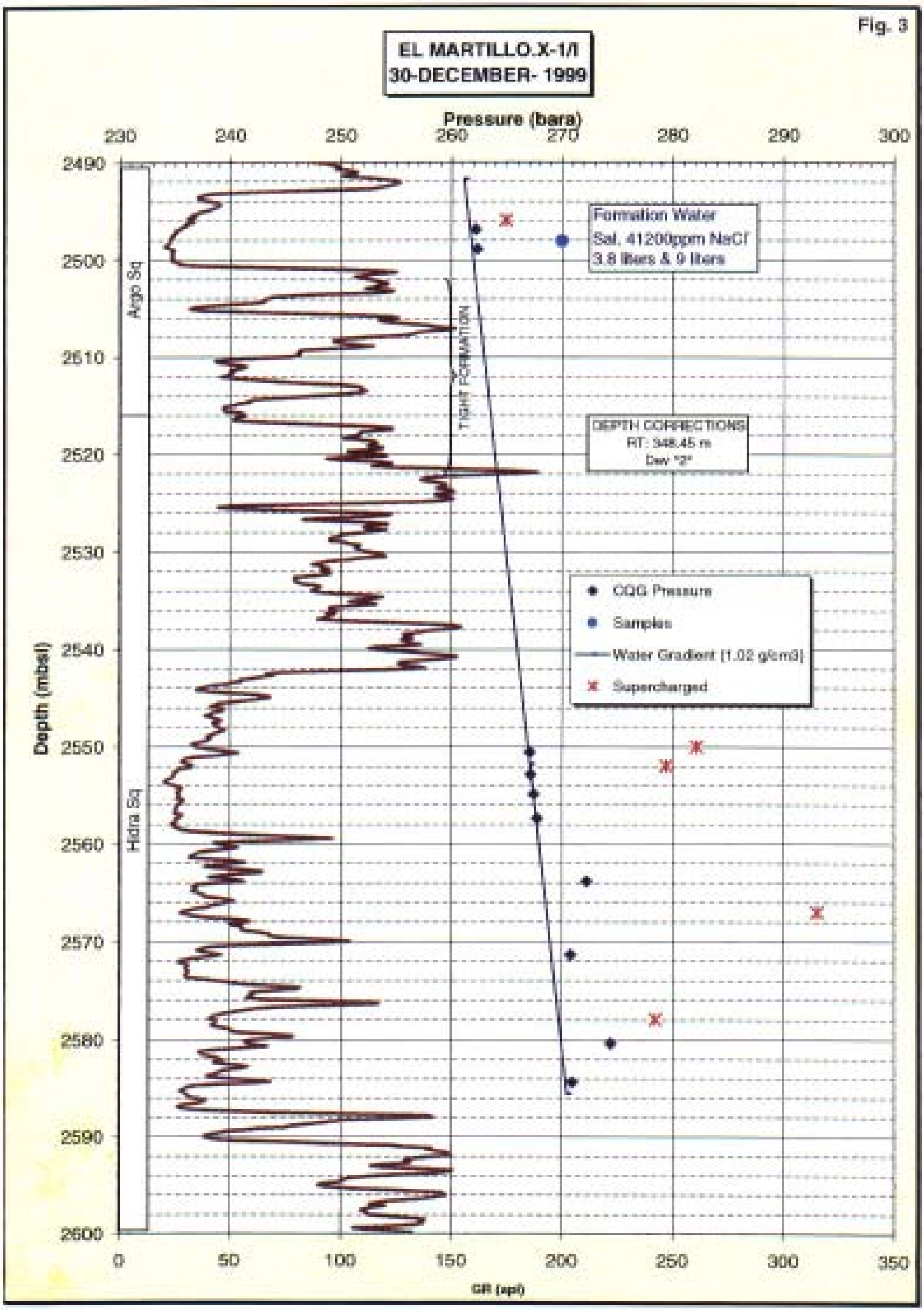
Rotary Table: 348.45 MSL
Correction for TVD: (mMD-mTVD)rt at reservoir depth
Deviation: 2 ° at reservoir depth

Number of Pretest: 29
Number of Pump outs : none
Number of samples: 1 segregated

N°	Depth	Depth	Time	DDS Pressure		Stabilization		DDS Pres	DDS Pres	PUMP OUT				Comments
#	mMD	mSS	hh:mm	(psia)	bars	min	mobility (mD/cp)	Initial psi	Final psi	Vol. Lts	BHFP psia	Res. Ohm.m	Optical Fluid Analysis	
1	2442.5	2482.4	4:30					4826.1	4817.1					TIGHT (DRY TEST)
2	2442.5	2482.9	4:35					4810.2	4796.5					TIGHT (DRY TEST)
3	2443.0	2483.4	4:45					4792.3	4774.4					TIGHT (DRY TEST)
4	2444.5	2484.9	4:53	3841.48*		12.5	0.5	4780.3	4759.8					SUPERCHARGED
5	2445.5	2486.9	5:10	3803.30	262.17	10	4.1	4782.9	4751.8					STABILIZED
6	2448.5	2488.9	5:30	3804.17	262.30	12	8	4786.3	4749.2					STABILIZED
7	2463.5	2503.9	5:47					4780.8	4786					TIGHT (DRY TEST)
8	2463.7	2504.1	5:53					4786.1	4786.9					TIGHT (DRY TEST)
9	2469.0	2509.4	6:02					4788.4	4784.3					TIGHT (DRY TEST)
10	2464.0	2514.4	6:10					4778.1	4771.4					TIGHT (DRY TEST)
11	2465.5	2515.9	6:20					4778.8	4774.8					TIGHT (DRY TEST)
12	2482.5	2542.9	6:42					4825.2	4816					TIGHT (DRY TEST)
13	2485.5	2545.9	6:52	4893.84*		11	2.3	4829.1	4827.8					15 cc PROBE- TEMP 130.1°C SUPERCHARGED
14	2488.5	2548.9	7:13	4891.78*		5	1	4835.4	4826.6					SUPERCHARGED
15	2502.5	2562.9	7:28	3874.84	267.19	6	12.7	4841.5	4834.4					STABILIZED-TEMP 131°C
16	2504.5	2564.9	7:46	3879.05	267.47	3	21.4	4844.9	4839.2					LOST SEAL, RETRACT & REPEAT TEST
17	2505.5	2565.9	8:05	4890.73*		11	0.4	4825.9	4826.6					SUPERCHARGED
18	2509.5	2569.9	8:30					4858.9	4850.2					TIGHT (DRY TEST)
19	2513.5	2573.9	8:41	3948.04	272.22	7	2.7	4857.8	4853.3					STABILIZED
20	2515.5	2575.9	9:00	4846.81*		8	0.02	4863.1	4857.3					SUPERCHARGED
21	2521.0	2571.4	9:27	3967.49	270.82	7	1.9	4873.4	4866.9					STABILIZED
22	2526.5	2576.9	9:43	4837.96*		5	0.6	4880.6	4875					SUPERCHARGED
23	2530.0	2580.4	10:00	3979.62	274.41	4	1.1	4886.4	4882					STABILIZED
24	2534.0	2584.4	10:15	3928.56	270.95	8	13.6	4892.1	4886.7					STABILIZED-133°C
25	2537.5	2587.9	10:33					4898.7	4895.4					TIGHT (DRY TEST)
26	2538.4	2588.8	10:42					4899.2	4896.8					TIGHT (DRY TEST)
27	2550.5	2590.9	11:19	4362.40		10		4845.5	4835.8					RETRACT & REPEAT TEST, TIGHT
28	2557.0	2597.4	11:58	3883.15	267.75	5	120.8	4853.4	4847.4					STABILIZED
29	2560.0	2590.9	12:34	3873.69	267.10	12	15.1	4872.3	4845.6					STABILIZED
1	2446.5	2486.9	1:06	3803.36	262.18	5	33.3	4749.6	4746.2					SEGREGATED WATER SAMPLE
2				3798.00										Chamber 1Gal =3.8L Oil Fluid No Gas.BHFP= 3798.9 psia
														Chamber 2.75 G =9 l Oil Fluid 0.45 cuft Gas B-HFP=3799.5psia

Table 2

Fig. 3


EL MARTILLO.X-1/I
30-DECEMBER- 1999
Pressure (bara)
230
240
250
260
270
280
290
300
Depth (mbsl)
2490
2500
2510
2520
2530
2540
2550
2560
2570
2580
2590
2600
Argo Sq
Hdra Sq
TIGHT FORMATION
Formation Water
Sal. 41200ppm NaCl
3.8 liters & 9 liters
DEPTH CORRECTIONS
RT: 348.45 m
Dev °2°
CQG Pressure
Samples
Water Gradient (1.02 g/cm3)
Supercharged
0
50
100
150
200
250
300
350
GR (api)

AUSTRAL

MDT SAMPLE ANALYSIS

DATE: 30-Dec-99
TIME:

WELL NAME
EL MARTILLO.X-1/1

SAMPLES

	# 1 1 GAL CHAMB	# 2 2 3/4 GAL CHAMB.	# 3
DEPTH MTS:	2846.5	2846.5	
CHAMBER CAPACITY:			
GAS VOLUME ft3:		0.45	
LIQUID VOLUME liters:	3.8	9	
PHYSICAL ASPECT:	TURBIO	TURBIO	
WEIGHT:	1025	1025	
K+	6000	6000	
Ph:	8	8	
CHLORIDES Mg / Lt:	25000	25000	
CALCIUM Mg / Lt:	500	500	
RETORT OIL or HDF %:			
RETORT WATER %:	100	100	
RETORT SOLIDS %:			
OIL WATER RATIO:			
CENTRIFUGE OIL %:			
CENTRIFUGE WATER %:	100	100	
CENTRIFUGE SEDIMENTS %:	VESTIGIOS	VESTIGIOS	
CENTRIFUGE EMULSION %:			
ELECTRICAL STABILITY:			
CHROMATOGRAPHY:			
LIQUID COMPOSITION:	WATER	WATER	
GAS COMPOSITION:			

Notes: HDF = Base Oil

TOTAL FLUIDS SUPERVISOR:
RIG MUD ENGINEER: M.BONANSEA

FLUID SAMPLE REPORT (RFT - MDT)

WELL : El Martillo X-1/I

AREA : Santa Cruz 1- Oeste

Date: December 30 -1999

Run	TYPE	DEPTH	Chamber & Balloon	Recuperated Volume	Sample Pressure on surface	CHROMATOGRAPHY							SATURATED	SATURATED	CHAMBER FLUID		LIQUID CHROMATOGRAPHY		DENSITY	BSW / Relert %				Salinity ClNa	FLUID Interpretation
		m	gal	mdl	psi	C1	C2	C3	iC4	nC4	iC5	nC5	%		VOL	TYPE	% Formation Oil	% Base Oil	kg/l	FLOW	Em Oil	W	Sed	ppm	
1.1.1	MDT	2846.5	1.00	9.1	1000	7080	789	234	61	106	76	103	16.39	12.14	1.79	w	_	_	1.02	_	_	100	_	41200	WATER
1.1.1	MDT	2846.8	1.79	8.0	1109	57181	7293	1418	341	179	96	94	14.15	30.29	8.1	w	_	_	1.02	_	_	100	_	41200	WATER
			1.79	RESISTIVITY: 0.132 ohm/m a 23°C					PH:8	K: 4000 ppm															
			1.00	RESISTIVITY: 0.145 ohm/m a 19°C					PH:8	K: 4000 ppm															
			BMF	RESISTIVITY: 0.105 ohm/m a 19°C					K: 10000 ppm																

Table 3b

8. PORE PRESSURE EVALUATION

8. PORE PRESSURE EVALUATION

Evaluation not performed.

9. SEISMIC DATA

9.1 SEISMIC PROGNOSIS versus WELL RESULTS

Seismic marker	Actual		Prognosed			Diff.	Remarks
	Section TWT(ms)	VD SS (m)	Section TWT(ms)	VD SS (m)	Accuracy (m)	(m)	
TOP CRETACEOUS	1640.	-1034.6	1640.	-1030.0		+4.6	OK
TOP P/CLAVADA	2071.	-1578.6	2083.	-1642.0		-63.4	SHOULD BE PICKED ABOVE
TOP SPRINGHILL	2662.	-2491.3	2674.	-2530.0		-38.7	SHOULD BE PICKED ABOVE
TOP TOBIFERA	2713.	-2620.5	2754.	-2660.0		-39.5	SHOULD BE PICKED ABOVE

Seismic datum plane above MSL (m) : 348.5 Log depth origin : RT Log depth origin above MSL (m) : 348.5

Comments

Seismic Calibration

The El Martillo.x-1 is located in the S4E12 line, reprocessed in 1999 by VERITAS, at SP 1025.

No check-shots were acquired for this well. Nevertheless, the synthetic produced with SYNTOOL software, allowed a rather good calibration (Enclosure 3). This calibration used a 35 hz riker with a normal polarity (convention: impedance increase as slack peak).

The discrepances between prognosis and actual are due to small differences in the velocity model and to the chance of the picking for the key horizons after the calibration.

Validated on: 16-August-01 by: A.GUIDI - D.PEREZ

AUSTRAL BASIN - SANTA CRUZ 1 (OESTE) Block
El Martillo.x-1 WELL / SEISMIC LINE 94-E-12

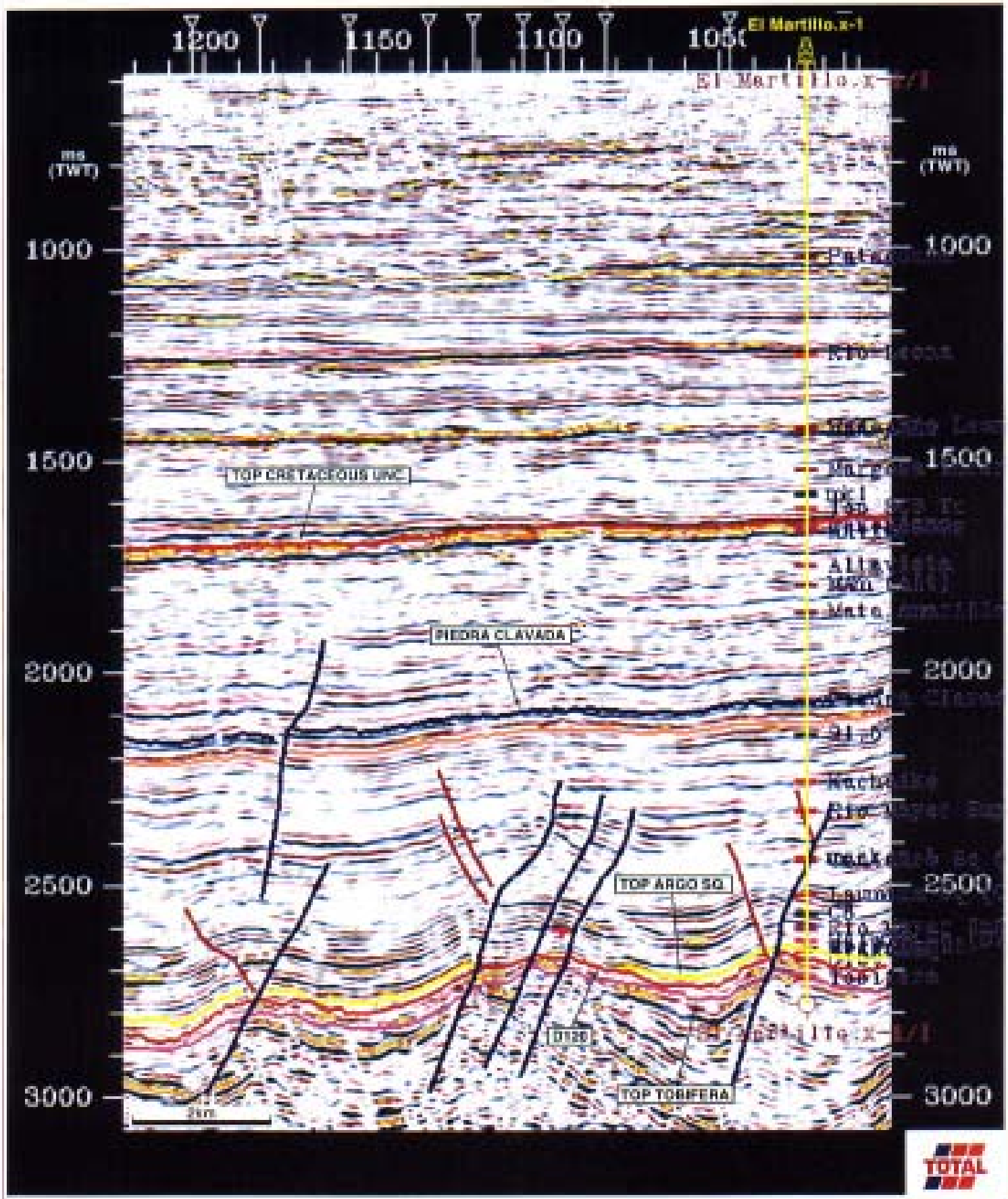
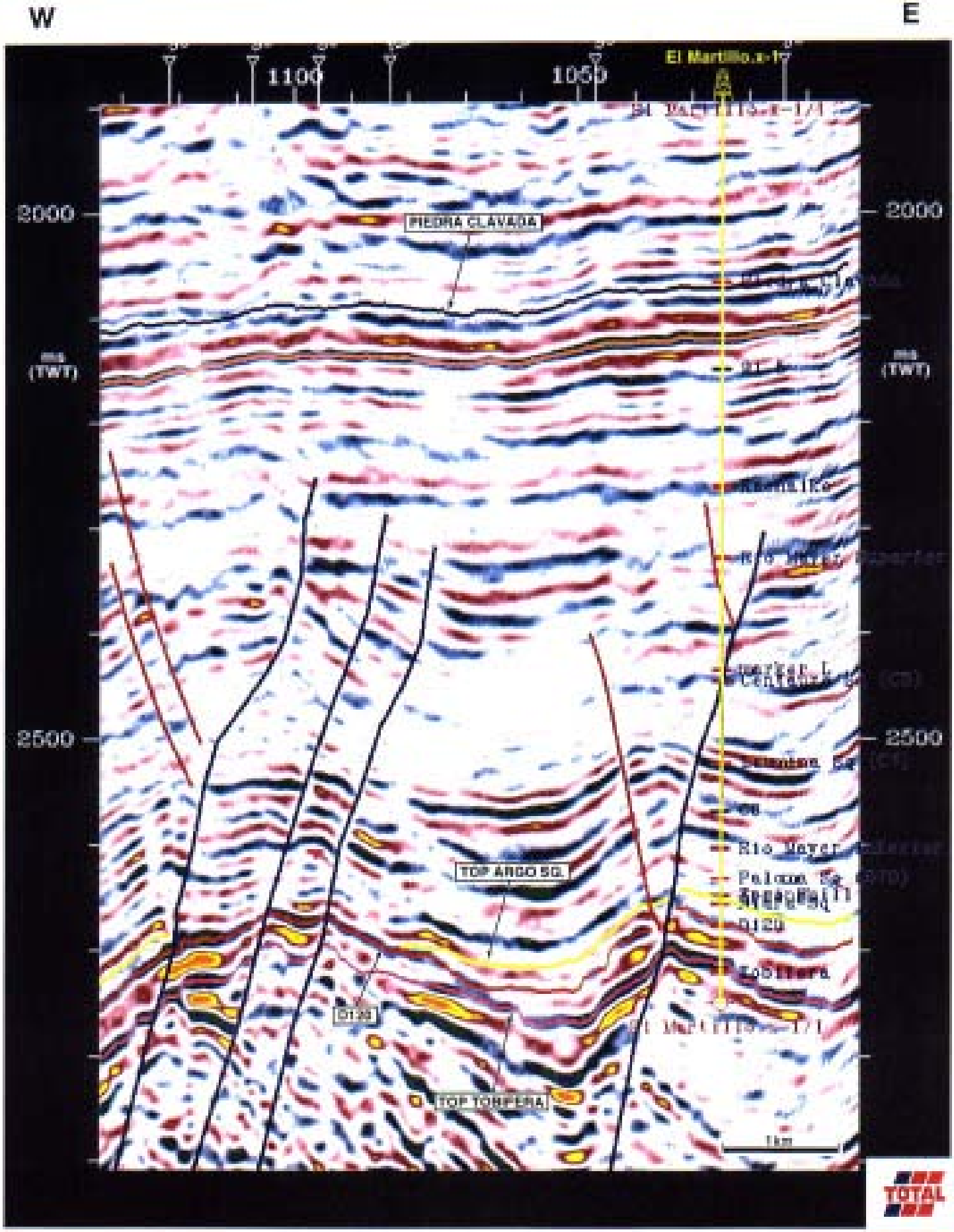


Fig. 4b

AUSTRAL BASIN - SANTA CRUZ I (OESTE) Block
El Martillo.x-1 WELL / SEISMIC LINE 94-E-12 (Zoom)



9.2 VERTICAL SEISMIC PROFILE

Comments

No VSP was performed in this well.

10. STRATIGRAPHICAL & STRUCTURAL RESULTS

10.1 MARKER CHART

Age	Formation	Vertical thickness (m)	Marker name	MD RT log (m)	VD RT log (m)	VD SS (m)	Correlation wells LORO-4 VD SS (m)	Correlation wells CCNX-1 VD SS (m)	Remarks
MIDDRIO-LATE OLIGOCENE	PATAGONIA	272.0	TOP PATAGONIA	607.5	607.5	-259.0	-294.9	-315.6	
OL GOCENE	RIO LEONA	220.5	TOP RIO LEONA	679.5	679.5	-531.0	-584.1	-612.7	
EOCENE	MAN AIKE	111.0	TOP MAN AIKE	1130.0	1130.0	-751.5	-842.7	-870.5	
EOCENE	MARGOSA INFERIOR	123.8	TOP MARGOSA INF	1211.0	1211.0	-862.5	-913.5	-995.1	
EOCENE	BENOYANNO	48.2	BENOYANNO	1334.5	1334.5	-986.4	-1061.5	-1174.5	
CRETACEOUS		35.4	CRETACEOUS	1383.0	1383.0	-1034.6	-1156.1	-1249.6	
MAASTRICH-CAMPANIAN	ANITA	130.5	TOP ANITA	1408.4	1408.4	-1059.5	-1194.4	-1285.3	
CAMPANIAN-SANTONIAN	ALTAVISTA	113.6	TOP ALTAVISTA	1538.7	1538.7	-1190.2	-1303.2	-1396.4	
SANTONIAN-LATE TURONIAN	MATA AMARILLA	274.5	TOP MATA AMARILLA	1653.0	1652.5	-1304.0	-1511.8	-1609.5	
TURONIAN-CENOMANIAN	PIEDRA CLAVADA	276.1	TOP PIEDRA CLAVADA	1927.9	1927.0	-1578.6	-1790.5	-1845.3	
LATE ALBIAN	KACHAIKE	115.6	TOP KACHAIKE	2204.0	2203.1	-1854.6	-2037.1	-2096.6	
ALBIAN-APTIAN	RIO MAYER SUPERIOR	186.0	TOP RIO MAYER SUP	2319.9	2319.9	-1970.5	-2262.4	-2341.7	
ALBIAN-APTIAN	RIO MAYER SUP	124.2	TOP CENTAURO CS	2505.9	2504.9	-2156.4	-2436.4	-2497.0	
ALBIAN-APTIAN	RIO MAYER SUP	71.9	TOP LAUNIRA CF	2630.2	2629.1	-2280.7	-2548.7	-2539.1	
ALBIAN-APTIAN	RIO MAYER SUPER	54.8	CR	2702.1	2701.0	-2352.5	-2617.0	-2552.4	
NEOCOMIAN	RIO MAYER INFERIOR	48.6	TOP RIO MAYER INF	2756.9	2755.8	-2407.3	-2679.5	-2606.7	
NEOCOMIAN	RIO MAYER INFERIOR	31.9	TOP PALOMA SQ DTO	2805.5	2804.4	-2455.9	-2728.0	-2645.7	
NEOCOMIAN	ARGO SQ	4.4	TOP ARGO SQ	2836.5	2835.4	-2486.9	-2755.0	-2666.1	
NEOCOMIAN	SPRINGHILL FM	24.9	TOP SPRINGHILL	2840.9	2839.8	-2491.3	0.0	0.0	
NEOCOMIAN	SPRINGHILL	23.8	TOP HIDRA SQ	2865.9	2864.7	-2516.3	-2785.0	-2691.9	
NEOCOMIAN	SPRINGHILL	80.4	TOP D 129	2889.7	2888.5	-2540.1	-2815.3	-2699.6	
JURASSIC	TOBIFERA	19.9	TOP TOBIFERA	2970.1	2968.9	-2620.5	-2862.9	-2720.9	
JURASSIC	TOBIFERA		TD	2990.0	2988.8	-2640.4	0.0	0.0	

Correlation wells LORO-4 : LAGUNA DE ORO 4 CCNX-1 : CAÑADON CAMUSU NORTE X-1

Log depth origin : RT
RT / MSL : 348.5 m

Validated on: 16-August-01 by: A.GUIDI - D.PEREZ

10.2 Lithology

- **Patagonia Formation (607.5 - 879.5 mMD)**

This Formation is represented by greenish gray **siltstone** and **claystone**, dark greenish gray (blocky and massive), with pyrite, micaceous, tuffaceous, with lithics inclusions, in part sandy, firm to soft. Interbeds of dark greenish gray **sandstone** intercalated towards the top and base of this formation. These are very fine to medium grained, subangular-subrounded, poor to well sorted, abundant argillaceous-tuffaceous matrix, quartz, mica and lithics, pyrite, friable, in part loose, in part grading to **siltstone**. Also, thin intercalations of grayish orange **limestone** can be identified, specially towards the base. They are partly, micritic, locally sparitic, blocky moderately hard. Shell fragments

- **Rio Leona Formation (879.5 - 1100 mMD)**

This Formation is composed mainly by greenish gray **siltstones.** These are subblocky, irregular fracture, micaceous, tuffaceous with pyrite, locally glauconite, green-dark lithics, in part sandy, firm to soft, grading to **claystone**. Upward to top, beds of dark greenish gray, **sandstone**, medium to fine, poorly sorted, subrounded, quartz, abundant lithics, tuffaceous matrix, friable, poor porosity. To the base brownish black **coal** levels have been identified at 1000/10 m and 1070/90 m, blocky, earthy, brittle, hard. Pale green to white **tuff** levels, are frequent and are blocky to subplaty, firm to soft .

- **Man Aike Formation+Margosa Inferior+Senoniano (1100 - 1408.4 mMD)**

This unit has two intervals. In the Upper 1100 m to 1220 m dark greenish gray sandstone, fine to medium in part coarse to conglomeratic, fairly sorted, subrounded, fair to poorly sorted, abundant argillaceous matrix, locally tuffaceous matrix, quartz lithics, in part calcareous cement, consolidate, poor porosity. Conglomerate sandstone, levels at 1110 –1125 m, greenish gray, fairly sorted, subrounded to rounded, quartz, lithics volcanic, argillaceous matrix, siliceous cement, friable, poor porosity.With some silty-claystone beds, blocky to sublocky, irregular
fracture, with carbonaceous matters inclusions, in part sandy, soft to firm.

The Lower unit (1220 m to 1393 m) is formed , mainly by medium grey to dark greenish gray **siltstone**, blocky, firm to soft, sandy, with quartz & glauconite inclusions, an downward increase glauconite contents. Thin beds of dark greenish gray argillaceous sandstone, very fine to fine, well sorted, quartz, i/part with glauconite, abundant argillaceous matrix, friable to loose, fair porosity. Thin layers of tuff, pale yellowish brown, massive hard.

- **Anita Formation (1408.4 –1538.7m MD)**

This formation can be divided in two intervals.The upper section (1393-1440m) is formed mainly by light gray **sandstone**, medium to fine, well sorted, subrounded, quartz lithic, abundant tuffaceous matrix, friable, poor porosity. Thin beds of **tuff**, pale green,massive, blocky, in part crystalline, firm.
The lower interval from (1440 -1501 m) is represented by olive gray **silty-claystone**, massive, sublocky, plastic, soft, grading to **claystone.**

- **Altavista Formation (1538.7 –1653 mMD)**

It is represented basically by olive gray **silty-claystone**, massive, subblocky, irregular fracture,glauconite inclusions, plastic, soft, grading to **claystone.** Thin intercalations of medium dark gray **siltstone**, massive, sublocky, plastic, soft grading to claystone.Also pale green **tuff**, massive, blocky, irregular fracture, crystalline, firm.
The lower part is composed mainly olive gray **siltstone**. And **claystone**, massive, blocky, firm, with coaly inclusions. Thin beds of dark greenish gray glauconitic sandstone, very fine to fine, well sorted, subrounded, quartz, glauconite, argillaceous matrix, calcareous cement, moderatelly consolidate, poor porosity, Shell debris.

- **Mata Amarilla (1653 - 1927.9 mMD)**

This formation is represented basically by olive gray, **silty-claystone**, massive, blocky to sublocky, soft, plastic, grading to claystone.coaly film, shell debris. The upward part, level of **glauconitic sandstone**, dark greenish, fine to very fine, well sorted, subrounded, quartz, glauconite, abundant argillaceous matrix, calcareous cement, moderate consolidated, poor porosity, grading to siltstone. Thin layers of **limestone**, light brownish gray, massive, compact, vitreous, moderatelly hard.

Toward the base, **sandstone**, medium gray to light gray, very fine to fine, well sorted, subangular, quartz, green lithics , tuffaceous matrix, calcareous cement, friable, poor porosity,are frecuent in the base.

- **Piedra Clavada (1927.9 - 2204 mMD)**

This unit can be separated in three intervals. The Upper section (1993-2070m), is represented by light gray and olive gray **sandstone**,very fine to fine, minor, medium, well sorted subrounded, quartz, green lithics, tuffaceous matrix, calcareous cement, carbonaceous matters coal debris, friable, fair to poor porosity.At 2040-2065m beds of **sandstone**, medium to coarse, in part conglomeratic, poorly sorted, subangular, quartz, lithics, scarse tuffaceous matrix, calcareous cement, friable to loose, fair porosity. Downward intercalations of shale, dark gray, massive, blocky, subplaty, coaly film, firm..

The Middle section 2070 to 2135 m is composed of light gray to olive gray sandstone, fine to very fine, downward gradation to medium to coarse, subrounded, quartz, greenish lithics, abundant tuffaceous matrix, friable, poor porosity.

The lower section 2132 to 2204 m consist of light olive gray, sandstone, medium to coarse, fairly sorted, subangular to subrounded, quartz, lithics, tuffaceous matrix, friable, fair porosity. Thin layers of dark gray to brownish gray **shale**, massive, blocky, irregular fracture, locally coaly debris, with interbeds of **siltstone**, massive, glauconite dots, calcareous reaction, firm.. Towards the base can be observed light, brownish gray **limestone**, massive, compact, with mudstone aspect, shell debris, hard.

- **Kachaike (2204 – 2319.9 m MD)**

This Formation is mainly composed of dark gray to brownish gray, **shale**, massive, irregular fracture, locally coaly debris. Interbeds with medium dark siltstone, massive, blocky, occacionally glauconite dots, moderate calcareous reaction, in part very sandy, microcoal inclusions, non calcareous, firm. Toward the base layers of brownish gray **limestone**, compact, firm, with shell debris. Occacionally tuff white, massive, vitreous, firm.

- **Rio Mayer Sup. (2319.9m – 2756.9 m MD)**

It is composed for three different lithological units:

Upper interval is composed of medium dark gray, **shale**, massive, blocky, irregular fracture, with low calcareous contents, coaly film, fossils, soft-firm. Thin levels of white to medium gray **tuff**,

blocky, subplaty, massive, firm to soft, with quartz inclusions. Thin levels of light brownish gray to brownish gray **limestone**, blocky, micritic, hard

The Middle interval is represented by light gray calcareous shale, blocky to subplaty, irregular fracture, massive, strong calcareous reaction, firm, in part grading to siltstone.Thin levels of tuff, are present at the base.

The lower interval, is represented by **shale**, medium gray, massive, soft, with little calcareous contents, coaly film. Thin beds of brownish gray of **limestone**, massive, compact, in part crystalline, soft to firm..

- **Rio Mayer Inf. (2756.9 – 2840.9 m MD)**

This Formation is represented by medium dark gray in part brownish gray and black **siltstone**, blocky, irregular fracture, micropyrite disseminated, with glauconite, traces of white tuff, veins of calcite, locally fine to medium quartz grains inclusions, firm to hard, in part grading to very fine sandstone. In minor part intercalation of brownish black in parts moderate brown **shale**, blocky, subplanar fracture, slightly calcareous reaction, micropyrite, with fossils,(inoceramus debris) soft-firm.Thin levels of calcite. From 2836 to 2840m, medium dark gray, **glauconitic siltstone**, blocky to subblocky, irregular fracture, firm to hard, abundant glauconite, quartz inclusions, medium to fine grains. The last 2 meters are represented by very light gray **sandstone**, fine to coarse, fairly sorted, subangular to subrounded, quartz, scarce glauconite, thin argillaceous matrix, friable, mainly loose, fair porosity.

- **Springhill (2840.9 – 2970.1m MD)**

Argo Sequence (2836.5 – 2840.9 m)

The sequence .is composed of thick sandstone, very light gray, hyaline, medium to coarse, subangular to subrounded, quartz, glauconite, scarse argillaceous matrix, friable to loose, fair porosity. Downward becomes fine to very fine, dark greenish gray, quartz, abundant glauconite, argillaceous matrix, , siliceous cement, consolidated, poor porosity.

At base of upper sandstone : **coal** level, black, conchoidal fracture, micropyrite, hard.

Hidra Sequence (2840.9 - 2970.1 m)

The top intervall (2840.9 -2889m), is composed of very light grey sandstones medium to coarse, fairly sorted, subangular to subrounded, quartz, hyaline, scarse argillaceous –tuffaceous matrix,

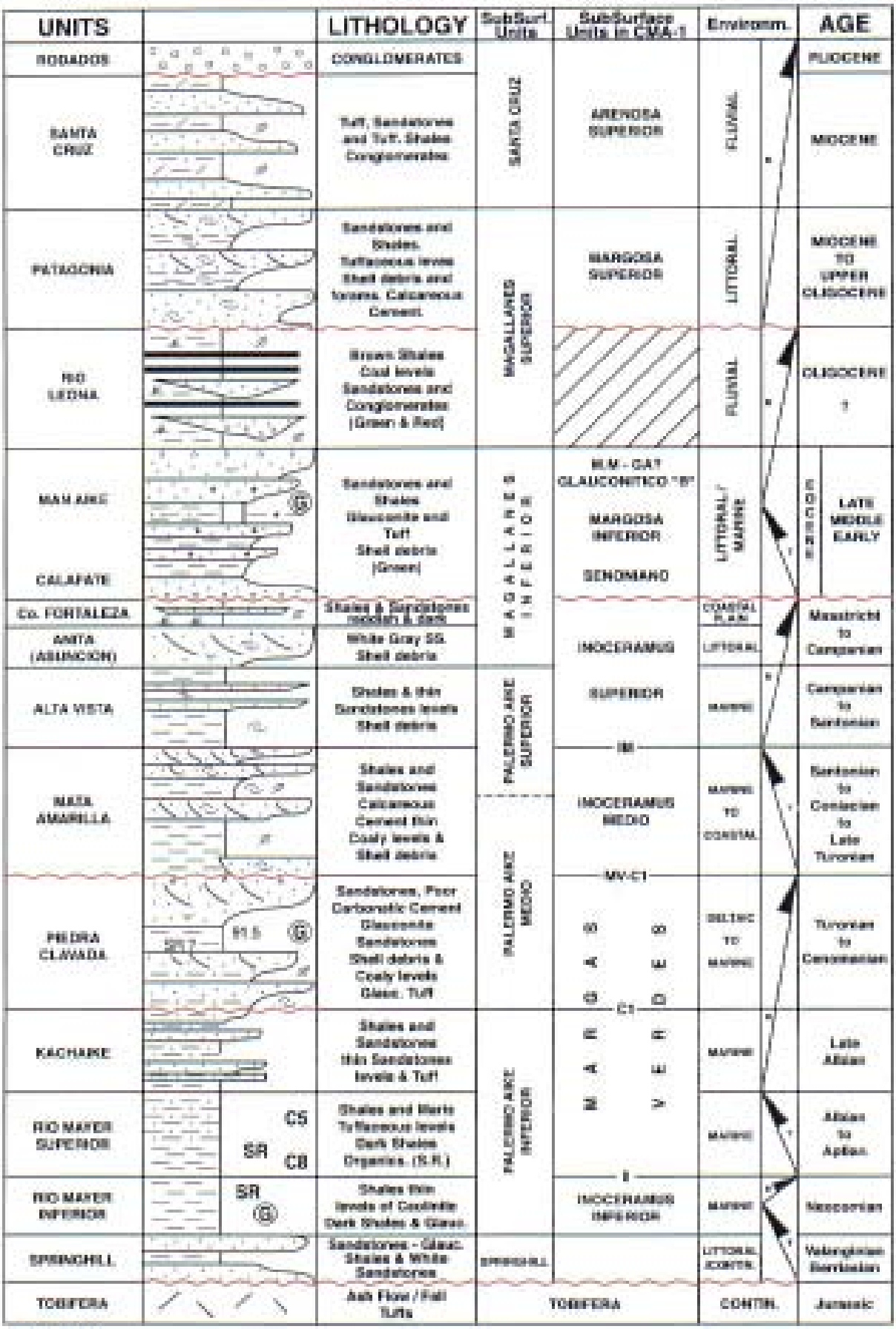
friable to loose, fair porosity. Interbeds of **siltstone**, medium dark gray to brownish black, massive, blocky, medium dark gray to brownish black, massive, blocky, quartz, glauconite inclusions, pyrite, coaly debris, moderate calcareous reaction.
Thin layers of sandstone, very light gray, fine to very fine, in part medium, well sorted, subrounded, quartz, glauconite, argillaceous-tuffaceous matrix, moderate consolidate, poor porosity.

D 120 –Tobifera (2889.7 – 2970.1 m)
The basal interval (2890 - 2969 m), is represented), by very light sandstone, fine to medium downward sequence medium to coarse, fair sorted, angular to subangular, quartz, hyaline, pyrite, scarce tuffaceous matrix, washed out, loose to friable, fair porosity. **Coal** level at 2902/04, black, blocky to sublocky, conchoidal fracture, micropyrite, moderatelly hard.
Intercalations of **siltstone**, medium dark gray, massive, blocky, glauconite dots, coal debris, pyrite, moderate calcareous reaction, Shale, medium gray, massive, subplanar, firm.
Toward base tuffaceous sandstone, medium light gray, fine to very fine, poorly sorted, quartz, tuff matrix, micropyrite, consolidate, poor porosity.

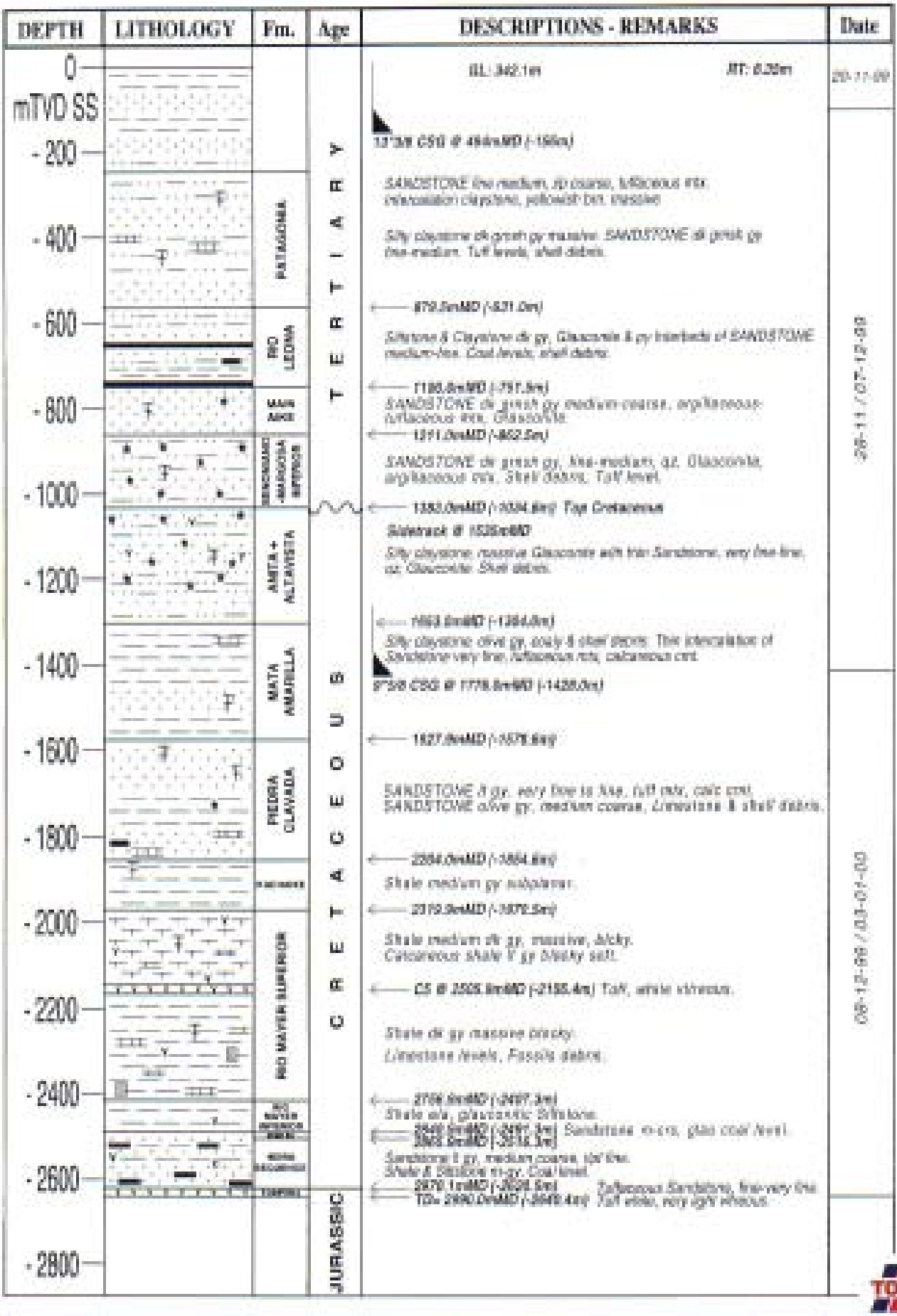
- **Tobifera (2970.1 – 2990m MD)**

This Formation is composed of intercalations of medium light gray **tuffaceous sandstone**, fine to very fine, poor sorted, subrounded, quartz hyaline, minor lithics, micropyrite, abundant tuffaceous matrix, friable, fair porosity .**Tuffaceous shale**, brownish gray, massive, suplanar, with coal,pyrite, firm. Downward **tuff** white to very light gray, massive, earthy, sandy, vitreous aspect, hard.

SANTA CRUZ I
STRATIGRAPHIC COLUMN



SANTA CRUZ I AREA
LITHOLOGICAL COLUMN / El Martillo.x-1/I WELL



« TOTAL AUSTRAL » « El Martillo.x-1/I » « SCA.EMar.x-1/I »

3. CUTTING DESCRIPTION

DEPTH Interval (m)	Litho (%)	LITHOLOGY DESCRIPTION	CALC (%)	OBSERVATION
0-20	80 20	**SILTY CLAYSTONE**: dark yellowish orange (10YR 6/6) in part very pale orange (10YR 8/2), blocky, soft to firm, in part tuffaceous, sticky. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2), very fine to medium, subrounded to subangular, poorly sorted, argillaceous - tuffaceous matrix, consolidated, occasionally coarse, Quartzose to part lithic.		
20-30	90 10	**SILTY CLAYSTONE**: dark yellowish orange (10YR 6/6) in part very pale orange (10YR 8/2), blocky, soft to firm, in part tuffaceous, sticky. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2), very fine to medium, subrounded to subangular, poorly sorted, argillaceous - tuffaceous matrix, consolidated, occasionally coarse, Quartzose to part lithic.		
30-40	80 20	**SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2), very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, minor tuffaceous matrix, consolidated, occasionally coarse, Quartzose to part lithic. **SILTY CLAYSTONE**: dark yellowish orange (10YR 6/6) in part very pale orange (10YR 8/2) blocky, soft to firm, in part tuffaceous, sticky.		
40-50	60 20 20	**CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2), very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, minor tuffaceous matrix, consolidated, occasionally coarse, Quartzose to part lithic. **SILTY CLAYSTONE**: dark yellowish orange (10YR 6/6) in part very pale orange (10YR 8/2) blocky, soft to firm, in part tuffaceous, sticky.		
50-70	100	**CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky.		
70-90	80 20	**SANDSTONE** : dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, minor tuffaceous matrix, consolidated, occasionally coarse, Quartzose to part lithic. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky.		
90-100	60 30 10	**SANDSTONE**: dark greenish grey (5GY 4/1), fine to medium occasionally very fine, subangular to subrounded, well sorted, quartz-lithic, slightly argillaceous matrix, consolidated. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky. **SANDSTONE** : dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2), very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, minor tuffaceous matrix, consolidated, occasionally coarse, Quartzose to part lithic.		**Traces of Limestone**
100-110	60 20 20	**SANDSTONE** : dark greenish grey (5GY 4/1) fine to medium occasionally very fine, subangular to subrounded, well sorted, quartz-lithic, slightly argillaceous matrix, consolidated. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, minor tuffaceous matrix, consolidated, occasionally coarse, Quartzose to part lithic.		**Traces of Limestone**
110-120	90 10 TR	**SANDSTONE**: dark greenish grey (5GY 4/1), fine to medium occasionally very fine, subangular to subrounded, well sorted, quartz-lithic, slightly argillaceous matrix, consolidated. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, minor tuffaceous matrix, consolidated, occasionally coarse, Quartzose to part lithic. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky.		**Traces of Limestone**

120-130	80 10 10	**SANDSTONE**: dark greenish grey (5GY 4/1), fine to medium occasionally coarse, subangular to subrounded, well sorted, quartz-lithic, slightly argillaceous matrix, consolidated. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2), very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, minor calcareous matrix, consolidated, occasionally coarse, Quartzose in part lithic. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky.		**Shell debris**
130-140	60 20 20	**CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky. **SANDSTONE**: dark greenish grey (5GY4/1) medium to coarse, subangular to subrounded, well sorted, quartz-lithic, slightly argillaceous matrix, consolidated. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic.		**Shell debris**
140-150	80 20 TR	**CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic. **SANDSTONE**: dark greenish grey (5GY 4/1), medium to coarse, subangular to subrounded, well sorted, quartz lithic, slightly argillaceous matrix, consolidated.		
150-160	50 40 10	**SANDSTONE**: dark greenish grey (5GY 4/1) to dark grey (N3) medium to fine, subangular to subrounded, well sorted, quartz-lithic, slightly argillaceous matrix, consolidated. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2), very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic.		
160-170	90 10 TR	**CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky. **SANDSTONE** : dark greenish grey (5GY 4/1) to dark grey (N3) medium to fine, subangular to subrounded, well sorted, quartz-lithic, slightly argillaceous matrix, consolidated. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic.		
170-180	100	**SANDSTONE** : dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic.		**COAL fragm.**
180-190	80 20	**SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky.		
190-200	60 40	**CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, sticky. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic.		
200-220	100	**SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic.		
220-230	60 40	**SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic.		
230-240	100 TR	**SANDSTONE** : dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2), very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated. Quartzose in part lithic. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic.		
240-250	60 40	**CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, in part very silty **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2), very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic.		
250-260	80 20	**SILTSTONE**: medium grey (N5), massive, very soft, plastic, Tuff and Quartz inclusions, sandy **CLAYSTONE**: pale yellowish brown (10 YR 6/2) , blocky, soft, plastic, in part very silty.		

260-270	40 10 30	**SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose to part lithic. **SILTSTONE** : medium grey (N5), massive, very soft, plastic, Tuff and Quartz inclusions, sandy. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, in part very silty.		
270-280	60 40 TR	**SANDSTONE** : dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose to part lithic. **SILTSTONE** : medium grey (N5), massive, very soft, plastic, Tuff and Quartz inclusions, sandy. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, in part very silty.		
280-290	80 20 TR	**SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2), very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated. Quartzose in part lithic. **SILTSTONE** : medium grey (N5), massive, very soft, plastic, Tuff and Quartz inclusions, sandy. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, in part very silty.		
290-300	90 10 TR	**SANDSTONE** : dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2), very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic. **SILTSTONE** : medium grey (N5), massive, very soft, plastic, Tuff and Quartz inclusions, sandy. **CLAYSTONE**: pale yellowish brown (10YR 6/2), blocky, soft, plastic, in part very silty.		
300-310	60 30 10	**CLAYSTONE**: grayish green (5G 5/2), to dusky green (5G 3/2), massive, blocky, firm to soft, silty, in part grading to Siltstone. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic. **SILTSTONE**: medium grey (N5), massive, very soft, plastic, Tuff and Quartz inclusions, sandy.		
310-320	70 20 10	**CLAYSTONE**: grayish green (5G 5/2) to dusky green (5G 3/2), massive, blocky, firm to soft, silty, in part grading to Siltstone. **SANDSTONE** : dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2) very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic. **SILTSTONE** : medium grey (N5), massive, very soft, plastic, Tuff and Quartz inclusions, sandy.		
320-330	80 10 10	**CLAYSTONE**: grayish green (5G 5/2) to dusky green (5G 3/2), massive, blocky, firm to soft, silty, in part grading to Siltstone. **SANDSTONE**: dark yellowish brown (10YR 4/2) to pale brown (5YR 5/2), very fine to medium, subrounded to subangular, poorly sorted, abundant argillaceous, in part calcareous cement, consolidated, Quartzose in part lithic. **SILTSTONE** : medium grey (N5), massive, very soft, plastic, Tuff and Quartz inclusions, sandy.		
330-340	80 20	**CLAYSTONE**: grayish green (5G 5/2) to dusky green (5G 3/2), massive, blocky, firm to soft, silty, in part grading to Siltstone. **SILTSTONE**: medium grey (N5), massive, very soft, plastic, Tuff and Quartz inclusions, sandy.		
340-350	90 10	**CLAYSTONE**: grayish green (5G 5/2) to dusky green (5G 3/2), massive, blocky, firm to soft, silty, in part grading to Siltstone. **SILTSTONE** : medium grey (N5), massive, very soft, plastic, Tuff and Quartz inclusions, sandy.		
350-420	100	**CLAYSTONE**: grayish green (5G 5/2) to dark greenish gray (5G 4/1), in part medium gray (N5) and medium light gray (N6), massive, blocky, firm to soft, silty, in part grading to Siltstone.		
420-500	100	**CLAYSTONE**: grayish green (5G 5/2) to dark greenish gray (5G 4/1), in part medium gray (N5) and medium light gray (N6), massive, blocky, firm to soft, silty, in part grading to Siltstone.		**Presence of Calcite and fossils debris**
500-510	60 40	**SANDSTONE**: dark greenish gray (2GY 4/1), fine to medium, subangular, fairly sorted, quartzose, abundant tuff lithics, tuffaceous matrix, moderately consolidated. **CLAYSTONE** : grayish green (5G 5/2) to dark greenish gray (5G 4/1), in part medium gray (N5) and medium light gray (N6), massive, blocky, firm to soft, silty, in part grading to Siltstone.		**Sample contaminated with cement**
510-520	80 20	**SANDSTONE**: dark greenish gray (2GY 4/1), fine to medium, subangular, fairly sorted, quartzose, abundant tuff lithics, tuffaceous matrix, moderately consolidated. **CLAYSTONE** : grayish green (5G 5/2) to dark greenish gray (5G 4/1), in part medium gray (N5) and medium light gray (N6), massive, blocky, firm to soft, silty, in part grading to Siltstone.		**Sample contaminated with cement**

520-620	100	**CLAYSTONE** dark greenish gray (5GY 4/1) massive, blocky to subblocky, firm to soft, with lithics inclusions, in part plastic, silty, in part grading to Siltyclaystone		
620-630	70 30	**SILTSTONE:** greenish gray (5G 6/1) blocky to subblocky, firm to soft, massive, abundant lithics inclusions, in part sandy. **CLAYSTONE** dark greenish gray (5GY 4/1), massive,blocky to subblocky, firm to soft, with lithics inclusions, in part plastic, silty, in part grading to Siltyclaystone		
630-640	10 20 10	**SANDSTONE:** medium gray (N5), very fine, subrounded, well sorted, abundant argillaceous matrix, quartz-lithic, in parts with calcareous cement. **SILTSTONE:** greenish gray (5G 6/1), blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy. **CLAYSTONE** dark greenish gray (5GY 4/1), massive, blocky to subblocky ,firm to soft, with lithics inclusions, in part plastic, silty, in part grading to SILTY CLAYSTONE		Abundant shell debris.
640-650	60 20 20	**SHALE:** dark greenish gray (5GY 4/1), platy to subplaty, massive, firm, compact, occasionally medium dark gray (N4) **SANDSTONE** medium gray (N5), very fine, subrounded, well sorted, abundant argillaceous matrix, quartz-lithic, in parts with calcareous cement. **SILTSTONE:** greenish gray (5G 6/1) blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy.		Abundant shell debris.
650-660	40 40 10 10	**SILTSTONE:** greenish gray (5G 6/1) blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy. **LIMESTONE:** grayish orange (10YR 7/4) to pale yellowish brown (10YR 6/2), crystalline, blocky, moderately hard with shell fragments. **SANDSTONE:** medium gray (N5), very fine, subrounded, well sorted, abundant argillaceous matrix, quartz-lithic, in part with calcareous cement. **SHALE:** dark greenish gray (5GY 4/1) platy to subplaty, massive, firm, compact, occasionally medium dark gray (N4).		Presence of forams and Abundant shell debris.
660-670	60 20 10 10	**SILTSTONE:** greenish gray (5G6/1) blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy. **LIMESTONE:** grayish orange (10YR 7/4) to pale yellowish brown (10YR 6/2), crystalline, blocky, moderately hard with shell fragments. **SANDSTONE:** medium gray (N5), very fine, subrounded, well sorted, abundant argillaceous matrix, quartz-lithic, in part with calcareous cement. **SHALE:** dark greenish gray (5GY 4/1), platy to subplaty, massive, firm, compact, occasionally medium dark gray (N4).		Presence of forams and Abundant shell debris.
670-680	40 40 10 10	**SILTSTONE:** greenish gray (5G 6/1) blocky to subblocky, firm to soft, massive, abundant lithics inclusions, in part sandy. **SANDSTONE** medium gray (N5), very fine, subrounded, well sorted, abundant argillaceous matrix, quartz-lithic, in parts with calcareous cement. **LIMESTONE:** grayish orange (10YR 7/4) to pale yellowish brown (10YR6/2), crystalline, blocky, moderately hard with shell fragments. **SHALE:** dark greenish gray (5GY 4/1) platy to subplaty, massive, firm, compact, occasionally medium dark gray (N4).		Presence of forams and calcareous shell debris.
680-690	80 10 10	**SANDSTONE:** medium gray (N5), very fine, subrounded, well sorted, abundant argillaceous matrix, quartz-lithic, in parts with calcareous cement,grading to Siltstone. **SILTSTONE:** greenish gray (5G 6/1) blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy. **LIMESTONE:** grayish orange (10YR 7/4) to pale yellowish brown (10YR 6/2), crystalline, blocky, moderately hard, with shell fragments.		Presence of forams and calcareous shell debris.
690-700	60 30 10	**SANDSTONE** medium gray (N5), very fine, subrounded, well sorted, abundant argillaceous matrix, quartz-lithic, in parts with calcareous cement grading to siltstone. **SILTSTONE:** greenish gray (5G 6/1), blocky to subblocky, firm to soft, massive, abundant lithics inclusions, in part sandy. **LIMESTONE:** grayish orange (10YR 7/4) to pale yellowish brown (10YR6/2), crystalline, blocky, moderately hard, with shell fragments.		Presence of forams and calcareous shell debris.
700-710	50 40 10	**SILTSTONE:** greenish gray (5G 6/1), blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy. **SANDSTONE** medium gray (N5), very fine, subrounded,well sorted, abundant argillaceous matrix, quartz-lithic, in parts with calcareous cement grading to siltstone. **LIMESTONE:** grayish orange (10YR 7/4) to pale yellowish brown (10YR6/2), crystalline, blocky, moderately hard, with shell fragments.		Presence of forams and calcareous shell debris.
710-720	80 10 10	**SILTSTONE:** greenish gray (5G 6/1), blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy. **SANDSTONE** medium gray (N5), very fine, subrounded, well sorted, abundant argillaceous matrix, quartz-lithic, in parts with calcareous cement grading to siltstone. **LIMESTONE:** grayish orange (10YR 7/4) to pale yellowish brown (10YR6/2), crystalline, blocky, moderately hard, with shell fragments.		Presence of forams and calcareous shell debris.

720-730	90 10 TR	**SILTSTONE:** greenish gray (5G 6/1) blocky to subblocky, firm to soft, massive, abundant lithics inclusions, in part sandy. **SANDSTONE:** medium gray (N5), very fine, subrounded,well sorted, abundant argillaceous matrix, quartz-lithic, in parts with calcareous cement grading to siltstone **LIMESTONE:** grayish orange (10YR 7/4) to pale yellowish brown (10YR6/2), crystalline, blocky, moderately hard, with shell fragments.		Presence of forams and calcareous shell debris.
730-750	100	**SILTSTONE:** greenish gray (5G 6/1) blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy		
750-760	90 10	**SILTSTONE:** greenish gray (5G 6/1) blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy. **TUFF:** white (N8), blocky, soft-firm		
760-770	60 40	**SILTSTONE:** greenish gray (5G 6/1) blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy. **TUFF:** white (N8), blocky, soft-firm		
770-800	100	**SILTSTONE:** greenish gray (5G 6/1) blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy (grading to very fine Sandstone), occasionally with glauconite dots.		
800-850	60 40	**SANDSTONE:** greenish gray (5G 6/1), fine to very fine, subangular, fairly sorted, abundant argillaceous matrix, siliceous cement,,quartz and abundant lithics. **SILTSTONE:** greenish gray (5G 6/1), blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy(grading to very fine Sandstone),occasionally with glauconite dots.		
850-900	100	**SANDSTONE:** greenish gray (5G 6/1), fine to very fine, subangular, fairly sorted, abundant argillaceous matrix, siliceous cement,,quartz and abundant lithics.		
900-910	80 20	**SANDSTONE:** greenish gray (5G 6/1), fine to very fine, subangular, fairly sorted, abundant argillaceous matrix, siliceous cement,,quartz and abundant lithics. **TUFF:** pale green (10G 6/2), blocky, moderately hard, irregular fracture.		
910-920	60 20 20	**SANDSTONE:** greenish gray (5G 6/1), fine to very fine, subangular, fairly sorted, abundant argillaceous matrix, siliceous cement, quartz and abundant lithics. **TUFF:** pale green (10G 6/2), blocky, moderately hard, irregular fracture. **SILTSTONE:** greenish gray (5G 6/1), blocky to subblocky, firm to soft, massive, abundant lithics inclusions, in part sandy (grading to very fine Sandstone), occasionally with glauconite dots.		
920-930	40 30 30	**SILTSTONE:** greenish gray (5G 6/1), blocky to subblocky, firm to soft, massive, abundant lithics inclusions, in part sandy (grading to very fine Sandstone). **TUFF:** pale green (10G 6/2), blocky, moderately hard, irregular fracture. **CLAYSTONE:** pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), blocky to subplaty, irregular fracture, firm.		
930-950	70 20 10	**SILTSTONE:** greenish gray (5G 6/1), blocky to subblocky,firm to soft, massive, abundant lithics inclusions, in part sandy(grading to very fine Sandstone). **CLAYSTONE:** pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), blocky to subplaty, irregular fracture, firm. **TUFF:** pale green (10G 6/2), blocky, moderately hard, irregular fracture.		
950-960	80 20	**SANDSTONE:** greenish gray (5G 6/1), fine to very fine, subangular, fairly sorted, abundant argillaceous matrix, siliceous cement, quartz and abundant lithics. **SILTSTONE:** greenish gray (5G 6/1), blocky to subblocky, firm to soft, massive, abundant lithics inclusions, in part sandy (grading to very fine Sandstone).		
960-970	60 40	**SANDSTONE:** dark greenish gray (5GY 4/1), fine to medium, subangular, poorly sorted, argillaceous matrix, siliceous cement, quartz and abundant lithic,consolidated to friable,poor porosity, in part tuffaceous. **SILTY CLAYSTONE:** greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone.		
970-980	80 20	**SILTY CLAYSTONE:** greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone. **SANDSTONE:** dark greenish gray (5GY 4/1), fine to medium, subangular, poorly sorted, argillaceous matrix, siliceous cement, quartz and abundant lithics, consolidated to friable,poor porosity, in part tuffaceous.		
980-990	90 10	**SILTY CLAYSTONE:** greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone. **SANDSTONE:** dark greenish gray (5GY 4/1), fine to medium, subangular, poorly sorted, argillaceous matrix, siliceous cement, quartz and abundant lithics, consolidated to friable,poor porosity, in part tuffaceous.		
990-1000	100	**SILTY CLAYSTONE:** greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone.		
1000-1010	60 40	**COAL:** brownish black (5YR 2/1), hard, earthy, lip blocky, brittle. **SILTY CLAYSTONE:** greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone.		

1018-1020	80 20	**SILTY CLAYSTONE**: greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone. **TUFF**: pale green (10G 6/2), to white (N9), blocky, moderately hard, irregular fracture.		
1020-1030	50 50	**SILTY CLAYSTONE**: greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone. **TUFF**: pale green (10G 6/2) to white (N9), blocky, moderately hard, irregular fracture.		
1030-1040	90 10	**SILTY CLAYSTONE**: greenish gray (5GY 4/1) blocky, irregular fracture, firm, grading to very fine Sandstone. **TUFF**: pale green (10G 6/2) to white (N9), blocky, moderately hard, irregular fracture.		
1040-1050	70 30	**SILTY CLAYSTONE**: greenish gray (5GY 4/1) blocky, irregular fracture, firm, grading to very fine Sandstone. **TUFF**: pale green (10G 6/2) to white (N9), blocky, moderately hard, irregular fracture.		
1050-1055	50 30 20 TR	**SILTY CLAYSTONE**: greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone. **TUFF**: pale green (10G 6/2) to white (N9), blocky, moderately hard, irregular fracture. **CLAYSTONE**: brownish gray (5YR 4/1), blocky, compact, massive, in part laminated with coal, firm to hard, with abundant carbonaceous inclusions. **COAL**: brownish black (5YR 2/1), hard, earthy, in part blocky, brittle.		
1055-1060	70 20 10 TR	**SILTY CLAYSTONE**: greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone. **TUFF**: pale green (10G 6/2) to white (N9), blocky, moderately hard, irregular fracture. **CLAYSTONE**: brownish gray (5YR 4/1), blocky, compact, massive, in part laminated with coal, firm to hard, with abundant carbonaceous inclusions. **COAL**: brownish black (5YR 2/1), hard, earthy, in part blocky, brittle.		
1060-1065	40 20 40 TR	**SILTY CLAYSTONE**: greenish gray (5GY 4/1) blocky, irregular fracture, firm, grading to very fine Sandstone. **TUFF**: pale green (10G 6/2) to white (N9), blocky, moderately hard, irregular fracture. **CLAYSTONE**: brownish gray (5YR 4/1), blocky, compact, massive, in part laminated with coal, firm to hard, with abundant carbonaceous inclusions. **COAL**: brownish black (5YR 2/1), hard, earthy, in part blocky, brittle.		
1065-1075	80 20 TR	**SILTY CLAYSTONE**: greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone. **CLAYSTONE**: brownish gray (5YR 4/1), blocky, compact, massive, in part laminated with coal, firm to hard, with abundant carbonaceous inclusions. **COAL**: brownish black (5YR 2/1), hard, earthy, in part blocky, brittle.		
1075-1080	50 40 10	**CLAYSTONE**: brownish gray (5YR 4/1), blocky, compact, massive, in part laminated with coal, firm to hard, with abundant carbonaceous inclusions. **SILTY CLAYSTONE**: greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone. **COAL**: brownish black (5YR 2/1), hard, earthy, in part blocky, brittle.		
1080-1085	80 10 10	**CLAYSTONE**: brownish gray (5YR 4/1), blocky, compact, massive, in part laminated with coal, firm to hard, with abundant carbonaceous inclusions. **SILTY CLAYSTONE**: greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone. **COAL**: brownish black (5YR 2/1), hard, earthy, in part blocky, brittle.		
1085-1090	80 20 TR	**CLAYSTONE**: brownish gray (5YR 4/1), blocky, compact, massive, in part laminated with coal, firm to hard, with abundant carbonaceous inclusions. **SILTY CLAYSTONE**: greenish gray (5GY4/1) blocky, irregular fracture, firm, grading to very fine Sandstone. **COAL**: brownish black (5YR 2/1), hard, earthy, in part blocky, brittle.		
1090-1095	60 40 TR	**CLAYSTONE**: brownish gray (5YR 4/1), blocky, compact, massive, in part laminated with coal, firm to hard, with abundant carbonaceous inclusions. **SILTY CLAYSTONE**: greenish gray (5GY 4/1), blocky, irregular fracture, firm, grading to very fine Sandstone. **COAL**: brownish black (5YR 2/1), hard, earthy, in part blocky, brittle.		
1095-1100	80 20	**SANDSTONE**: dark greenish gray (5GY 4/1), very fine to medium, in part coarse loose grains, subrounded, poorly sorted, abundant argillaceous matrix, quartz and green volcanic lithics, in part calcareous cement, mostly friable. Poor porosity. **CLAYSTONE**: brownish gray (5YR 4/1), blocky, compact, massive, in part laminated with coal, firm to hard, with abundant carbonaceous inclusions.		NO OIL SHOW.
1100-1105	90 10	**SANDSTONE**: dark greenish gray (5GY 4/1), very fine to medium, in part coarse loose grains, subrounded, poorly sorted, abundant argillaceous matrix, quartz and green volcanic lithics, in part calcareous cement, mostly friable, in part conglomeratic. Poor porosity. **CLAYSTONE**: brownish gray (5YR 4/1), blocky, compact, massive, in part laminated with coal, firm to hard, with abundant carbonaceous inclusions.		NO OIL SHOW.

1105-1110	100	**SANDSTONE**: dark greenish gray (5GY 4/1), very fine to medium, in part coarse loose grains, subrounded, poorly sorted, abundant argillaceous matrix, quartz and green volcanic lithics, in part calcareous cement, mostly friable, in part conglomeratic. Poor porosity		**NO OIL SHOW.**
1110-1115	80 20	**SANDSTONE**: dark greenish gray (5GY 4/1), very fine to medium, in part coarse loose grains, subrounded, poorly sorted, abundant argillaceous matrix, quartz and green volcanic lithics,in part calcareous cement, mostly friable., in part conglomeratic. Poor porosity **CONGLOMERATE**: greenish gray (5G 6/1), rounded to subrounded, poorly sorted, argillaceous matrix, abundant siliceous cement, Quartz, mostly volcanic lithic.		**NO OIL SHOW.**
1115-1120	60 40	**CONGLOMERATE**: greenish gray (5G 6/1), rounded to subrounded, poorly sorted, argillaceous matrix, abundant siliceous cement, Quartz, mostly volcanic lithic. **SANDSTONE**: dark greenish gray (5GY 4/1), very fine to medium, in part coarse loose grains, subrounded, poorly sorted, abundant argillaceous matrix, quartz and green volcanic lithics, in part calcareous cement, mostly friable, in part conglomeratic.		**NO OIL SHOW.**
1120-1125	50 30 20	**SANDSTONE**: dark greenish gray (5GY 4/1), very fine to fine, in part coarse loose grains, subrounded, poorly sorted, abundant argillaceous matrix, quartz and green volcanic lithics, in part calcareous cement, mostly friable, in part conglomeratic. Poor porosity **CONGLOMERATE**: greenish gray (5G 6/1), rounded to subrounded, poorly sorted, argillaceous matrix, abundant siliceous cement, Quartz, mostly volcanic lithic. **SILTY CLAYSTONE**: dark greenish gray (5G 4/1), blocky to subblocky, firm to soft, compact, massive, in part sandy.		**NO OIL SHOW.**
1125-1130	60 30 10	**SANDSTONE**: dark greenish gray (5GY 4/1), very fine to fine, in part coarse loose grains, subrounded, poorly sorted, abundant argillaceous matrix, quartz and green volcanic lithics, in part calcareous cement, mostly friable, in part conglomeratic. Poor porosity **SILTY CLAYSTONE**: dark greenish gray (5G 4/1), blocky to subblocky, firm to soft, compact, massive, in part sandy **CONGLOMERATE**: greenish gray (5G 6/1), rounded to subrounded, poorly sorted, argillaceous matrix, abundant siliceous cement, Quartz, mostly volcanic lithic.		**NO OIL SHOW.**
1130-1135	40 30 30	**SANDSTONE**: dark greenish gray (5GY 4/1), very fine to fine, in part coarse loose grains, subrounded, poorly sorted, abundant argillaceous matrix, quartz and green volcanic lithics, in part calcareous cement, mostly friable, in part conglomeratic. Poor porosity **SILTY CLAYSTONE**: dark greenish gray (5G 4/1), blocky to subblocky, firm to soft, compact, massive, in part sandy **CONGLOMERATE**: greenish gray (5G 6/1), rounded to subrounded, poorly sorted, argillaceous matrix, abundant siliceous cement, Quartz, mostly volcanic lithic.		**NO OIL SHOW.**
1135-1140	100	**SANDSTONE**: dark greenish gray (5GY 4/1), medium to coarse, in part conglomeratic, subrounded, poorly sorted, abundant argillaceous matrix, quartz and green volcanic lithics,in part calcareous cement, mostly friable. Poor porosity		**NO OIL SHOW.**
1140-1145	90 10	**SILTY CLAYSTONE**: dark greenish gray (5G 4/1), blocky to subblocky, firm to soft, compact, massive, laminated with carbonaceous material, in part sandy **SANDSTONE**: dark greenish gray (5GY 4/1), medium to coarse, in part conglomeratic, subrounded, poorly sorted, abundant argillaceous matrix, quartz and green volcanic lithics, in part calcareous cement, mostly friable. Poor porosity		**NO OIL SHOW**
1145-1150	70 30	**SANDSTONE**: dark greenish gray (5GY 4/1), fine to coarse, occasionally conglomeratic, subrounded, poorly sorted, abundant argillaceous matrix, quartz and green volcanic lithics, in part calcareous cement, mostly friable. Poor porosity **SILTY CLAYSTONE**: dark greenish gray (5G 4/1), blocky to subblocky, firm to soft, compact, massive, laminated with carbonaceous material, in part sandy.		**NO OIL SHOW.**
1150-1155	90 10	**SANDSTONE**: dark greenish gray (5GY 4/1), fine to coarse, occasionally conglomeratic, subrounded, poorly sorted, abundant argillaceous matrix, quartz and green volcanic lithics, in part calcareous cement, mostly friable. Poor porosity **SILTY CLAYSTONE**: dark greenish gray (5G 4/1), blocky to subblocky, firm to soft, compact, massive, laminated with carbonaceous material, in part sandy.		**NO OIL SHOW.**
1155-1160	100 TR	**SANDSTONE**: dark greenish gray (5GY 4/1), fine to coarse, occasionally conglomeratic, subrounded, poorly sorted, abundant argillaceous matrix, quartz and lithics, in part calcareous cement, mostly friable. Poor porosity **SILTY CLAYSTONE**: dark greenish gray (5G 4/1), blocky to subblocky, firm to soft, compact, massive, laminated with carbonaceous material, in part sandy.		**NO OIL SHOW.**

1160-1165	80 20	**SANDSTONE:** dark greenish gray (5GY 4/1), fine to coarse, occasionally conglomeratic, subrounded, poorly sorted, abundant argillaceous matrix, quartz and lithics, in part calcareous cement, mostly friable. Poor porosity **SILTY CLAYSTONE:** dark greenish gray (5G 4/1), blocky to subblocky, firm to soft, compact, massive, laminated with carbonaceous material, in part sandy.		NO OIL SHOW.
1165-1185	100	**SANDSTONE:** dark greenish gray (5GY 4/1), fine to coarse, subrounded, poorly sorted, abundant argillaceous matrix, quartz and lithics in part calcareous and siliceous cement, friable to consolidated. Poor porosity		NO OIL SHOW.
1185-1200	90 10	**SANDSTONE:** dark greenish gray (5GY 4/1), fine to coarse, subrounded, poorly sorted, abundant argillaceous matrix, quartz and lithics, in part calcareous and siliceous cement, friable to consolidated. Poor porosity **SILTY CLAYSTONE:** dark greenish gray (5G 4/1), blocky to subblocky, firm to soft, compact, massive, laminated with carbonaceous material, in part sandy.		NO OIL SHOW.
1200-1205	80 20	**SANDSTONE:** dark greenish gray (5GY 4/1) to light gray (N7), medium to coarse, in part fine to very coarse, subrounded, poorly sorted, abundant argillaceous matrix, quartz and lithics, in part calcareous and siliceous cement, friable to consolidated. Poor porosity **SILTSTONE:** dark yellowish brown (10YR 4/2), blocky, earthy, firm to soft, compact, massive, with carbonaceous material inclusions, in part sandy.		NO OIL SHOW.
1205-1215	60 40	**SILTSTONE:** dark yellowish brown (10YR 4/2) blocky, earthy, firm to soft, compact, massive, with carbonaceous material inclusions, in part sandy. **SANDSTONE:** dark greenish gray (5GY 4/1) to light gray (N7), medium to coarse, in part fine to very coarse, subrounded, poorly sorted, abundant argillaceous matrix, quartz and lithics, in part calcareous and siliceous cement, friable to consolidated. Poor porosity		NO OIL SHOW.
1215-1220	80 20	**SILTSTONE:** dark yellowish brown (10YR 4/2), blocky, earthy, firm to soft, compact, massive, with carbonaceous material inclusions, in part sandy. **SANDSTONE:** dark greenish gray (5GY 4/1) to light gray (N7), medium to coarse, in part fine to very coarse, subrounded, poorly sorted, abundant argillaceous matrix, quartz and lithics, in part calcareous and siliceous cement, friable to consolidated. Poor porosity		NO OIL SHOW.
1220-1230	100	**SILTSTONE:** brownish gray (5YR 4/1) to brownish black (5YR 2/1) and dark yellowish brown (10YR 4/2), blocky, earthy, firm to soft, compact, massive, with carbonaceous material inclusions, in part sandy, grading to silty claystone		
1230-1235	60 40	**SILTSTONE:** brownish gray (5YR 4/1) brownish black (5YR 2/1) and dark yellowish brown (10YR 4/2), blocky, earthy, firm to soft, compact, massive, with carbonaceous material inclusions, in part sandy, grading to silty claystone. **TUFF:** pale yellowish brown (10YR 6/2), blocky to subplaty, moderately hard to hard, massive.		
1235-1360	100 TR	**SILTSTONE:** dusky yellowish brown (10YR 2/2), blocky, earthy, firm to soft, compact, massive, in part sandy, grading to silty claystone. **TUFF:** pale yellowish brown (10YR 6/2), blocky to subplaty, moderately hard to hard, massive.		
1360-1370	100	**SILTSTONE:** dusky yellowish brown (10YR 2/2), blocky, earthy, firm to soft, compact, massive, in part sandy, grading to silty claystone brownish gray. Occasionally with glauconite clots.		
1270-1285	100	**SILTY CLAYSTONE:** medium gray (N5) to dark greenish gray (5GY 4/1), blocky to subblocky, compact, massive, soft to firm, occasionally hard, glauconite inclusion.		
1285-1350	100	**SILTY CLAYSTONE:** dark greenish gray (5GY 4/1), blocky to subblocky, compact, massive, soft to firm, occasionally hard, abundant glauconite inclusions.		
1350-1355	70 30	**SILTY CLAYSTONE:** dark greenish gray (5GY 4/1), blocky to subblocky, compact, massive, soft to firm, occasionally hard, abundant glauconite inclusions. **ARGILLACEOUS SANDSTONE:** dark greenish gray (5GY 4/1), fine to very fine, fairly sorted, subangular, abundant argillaceous matrix, slightly calcareous cement, quartz and glauconite, poor porosity, in part grading to Silty Claystone		NO OIL SHOW.
1355-1360	100 TR	**ARGILLACEOUS SANDSTONE:** dark greenish gray (5GY 4/1), fine to very fine, fairly sorted, subangular, abundant argillaceous matrix, slightly calcareous cement, quartz and glauconite, poor porosity, in part grading to Silty Claystone **SILTY CLAYSTONE:** dark greenish gray (5GY 4/1), blocky to subblocky, compact, massive, soft to firm, occasionally hard, abundant glauconite inclusions.		NO OIL SHOW.
1360-1385	100	**SILTY CLAYSTONE:** dark greenish gray (5GY 4/1), blocky to subblocky, compact, massive, soft to firm, occasionally hard, abundant glauconite inclusions. Grading to very fine argillaceous sandstone		

1385-1390	40 40 20	**SILTY CLAYSTONE:** brownish gray (5YR 4/1) to light olive gray (5Y 6/1), blocky to subblocky, compact, massive, soft to firm, occasionally hard, occasionally glauconite inclusions. **SANDSTONE:** light gray (N7), medium to fine, poor sorted, subangular, Quartz, abundant white tuffaceous matrix, friable. Poor porosity **TUFF:** pale green (10G 6/2), blocky, firm, irregular fracture.		**NO OIL SHOW.**
1390-1400	50 30 20	**SANDSTONE:** light gray (N7), medium to fine, poor sorted, subangular, Quartz, abundant white tuffaceous matrix, friable. Poor porosity **TUFF:** pale green (10G 6/2), blocky, firm, irregular fracture. **SILTY CLAYSTONE:** brownish gray (5YR 4/1) to light olive gray (5Y 6/1), blocky to subblocky, compact, massive, soft to firm, occasionally hard, occasionally glauconite inclusions.		**NO OIL SHOW**
1400-1405	100	**SANDSTONE:** light gray (N7), medium to fine, poor sorted, subangular, quartz, abundant white tuffaceous matrix, friable. Poor porosity		**NO OIL SHOW.**
1405-1410	100	**SANDSTONE:** light gray (N7), medium to fine, poor sorted, subangular, quartz, very abundant white tuffaceous matrix, friable. Poor porosity		**NO OIL SHOW.**
1410-1415	60 20 20	**SANDSTONE:** light gray (N7), medium to fine, poor sorted, subangular, quartz, very abundant white tuffaceous matrix, friable. Poor porosity. **SILTY CLAYSTONE:** brownish gray (5YR 4/1) to light olive gray (5Y 6/1), blocky to subblocky, compact, massive, soft to firm, occasionally hard, occasionally glauconite inclusions. **TUFF:** pale green (10G 6/2), blocky, firm, irregular fracture		**NO OIL SHOW.**
1415-1420	100	**SANDSTONE:** light gray (N7), fine to very fine, poor sorted, subangular, quartz, very abundant white tuffaceous matrix, friable. Poor porosity		**No Direct Fluorescence. Very Slow light yellowish green cut fluorescence**
1420-1425	100	**SANDSTONE:** light gray (N7), medium to coarse, poor sorted, subangular, quartz, abundant white tuffaceous matrix, friable. Poor porosity		**No Direct Fluorescence. Very Slow light yellowish green cut fluorescence**
1425-1430	70 20 10	**SANDSTONE:** light gray (N7), medium to coarse, poor sorted, subangular, quartz, abundant white tuffaceous matrix, friable. Poor porosity **TUFF:** pale green (10G 6/2), blocky, firm, irregular fracture. **SILTY CLAYSTONE:** dark greenish gray (5GY 4/1), blocky to subblocky, compact, massive, soft to firm, occasionally hard, occasionally glauconite inclusions.		**NO OIL SHOW.**
1430-1435	60 20 20	**SANDSTONE:** light gray (N7), medium to coarse, poor sorted, subangular, quartz, abundant white tuffaceous matrix, friable. Poor porosity **TUFF:** pale green (10G 6/2), blocky, firm, irregular fracture. **SILTY CLAYSTONE:** dark greenish gray (5GY 4/1), blocky to subblocky, compact, massive, soft to firm, occasionally hard, occasionally glauconite inclusions.		**NO OIL SHOW.**
1435-1440	80 20	**SANDSTONE:** light gray (N7) medium to very fine, poor sorted, subangular, quartz, abundant white tuffaceous matrix, friable. Poor porosity **TUFF:** pale green (10G 6/2), blocky, firm, irregular fracture		**NO OIL SHOW.**
1440-1445	90 10	**SANDSTONE:** light gray (N7) medium to fine, poor sorted, subangular, quartz, abundant white tuffaceous matrix, friable. Poor porosity **TUFF:** pale green (10G 6/2), blocky, firm, irregular fracture.		**NO OIL SHOW.**
1445-1510	100	**SILTY CLAYSTONE:** olive gray (5Y 4/1), compact, massive, blocky to subblocky, irregular fracture, firm to soft, in part plastic, grading to Claystone		
1510-1640	100	**SILTY CLAYSTONE:** olive gray (5Y 4/1), compact, massive, blocky to subblocky, irregular fracture, firm to soft, in part plastic, grading to Claystone		
1640-1650	70 30	**SILTY CLAYSTONE:** olive gray (5Y 4/1), compact, massive, blocky to subblocky, irregular fracture, firm to soft, in part plastic, grading to Claystone With glauconite dots inclusions. **GLAUCONITIC SANDSTONE:** dark greenish gray (5GY 4/1), fine to very fine, subrounded to rounded, well sorted, Quartz and abundant Glauconite, abundant argillaceous matrix, consolidated. Grading to glauconitic siltstone		**NO OIL SHOW.**
1650-1660	60 30	**SILTY CLAYSTONE:** olive gray (5Y 4/1), compact, massive, blocky to subblocky, irregular fracture, firm to soft, in part plastic, grading to Claystone With glauconite dots inclusions. **GLAUCONITIC SANDSTONE:** dark greenish gray (5GY 4/1), fine to very fine, subrounded to rounded, well sorted, Quartz and abundant Glauconite, abundant argillaceous matrix and calcareous cement, consolidated. Grading to glauconitic siltstone		**NO OIL SHOW.**
1660-1670	90 10	**SILTSTONE:** greenish gray (5G 6/1), irregular fracture, blocky, very soft, in part very sandy, abundant glauconite inclusions, strong calcareous reaction, grading to calcareous siltstone. **GLAUCONITIC SANDSTONE:** dark greenish gray (5GY 4/1), fine to very fine, subrounded to rounded, well sorted, Quartz and abundant Glauconite, abundant argillaceous matrix and calcareous cement, consolidated. Grading to Glauconitic Siltstone		**NO OIL SHOW.**
1670-1690	100	**SILTSTONE:** greenish gray (5G 6/1), irregular fracture, blocky, very soft in part very sandy, abundant glauconite inclusions, in part with calcareous reaction, grading to very fine sandstone		

1690-1700	80 20	**SILTY CLAYSTONE:** olive gray (5Y 4/1), compact, massive, blocky to subblocky, irregular fracture, firm to soft, in part plastic, grading to Claystone. With glauconite dots inclusions. **SILTSTONE:** greenish gray (5G 6/1), irregular fracture, blocky, very soft in part very sandy, abundant Glauconite inclusions, in part with calcareous reaction, grading to very fine Sandstone.		
1700-1710	90 10	**SILTY CLAYSTONE:** olive gray (5Y 4/1), compact, massive, blocky to subblocky, irregular fracture, firm to soft, in part plastic, grading to Claystone. With glauconite dots inclusions. **SILTSTONE:** greenish gray (5G 6/1), irregular fracture, blocky, very soft, in part very sandy, abundant glauconite inclusions, in part with calcareous reaction, grading to very fine Sandstone.		
1710-1720	80 10 10	**SILTY CLAYSTONE:** olive gray (5Y 4/1), compact, massive, blocky to subblocky, irregular fracture, firm to soft, in part plastic, grading to Claystone. With glauconite dots inclusions. **SILTSTONE:** greenish gray (5G 6/1), irregular fracture, blocky, very soft in part very sandy, abundant glauconite inclusions, in part with calcareous reaction, grading to very fine sandstone. **LIMESTONE:** white (N9), crystalyne, blocky hard, irregular fracture.		
1720-1760	100	**SILTY CLAYSTONE:** olive gray (5Y 4/1), compact, massive, blocky to subblocky, irregular fracture, firm to soft, in part plastic, grading to Claystone.		
1770-1780	100	**SILTY CLAYSTONE:** olive gray (5Y 4/1), compact, massive, blocky to subblocky, irregular fracture, firm to soft, in part plastic, grading to Claystone, marly aspect.		
1780-1790	70 20 10	**SILTY CLAYSTONE:** olive gray (5Y 4/1), compact, massive, blocky to subblocky, irregular fracture, firm to soft, in part plastic, grading to Claystone. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz,occasionally greenish lithics, siliceous matrix,calcareous cement, consolidated to friable, in part silty, poor porosity. **CEMENT**		**START 8" ¼ PHASE**
1790-1800	80 20	**SILTY CLAYSTONE:** olive gray (5Y4/1), compact, massive, blocky to subblocky, irregular fracture, firm to soft, in part plastic, grading to Claystone. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, siliceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity.		**NO OIL SHOW.**
1800-1810	90 10	**SILTY CLAYSTONE:** medium dark gray (N4), compact, massive, subblocky, irregular fracture, firm to soft, in part plastic, grading to Claystone. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, siliceous matrix calcareous cement, consolidated to friable, in part silty, poor porosity.		**NO OIL SHOW.**
1810-1820	100 Tr	**SILTY CLAYSTONE:** medium dark gray (N4), compact, massive, subblocky ,irregular fracture, firm to soft, in part plastic, grading to Claystone. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, siliceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity.		**NO OIL SHOW.** **Traces of shell debris.**
1820-1840	80 20	**SILTY CLAYSTONE:** medium dark gray (N4), compact, massive, subblocky , irregular fracture, firm to soft, in part plastic, grading to Claystone. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, siliceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity.		**NO OIL SHOW.**
1840-1850	90 10	**SILTY CLAYSTONE:** medium dark gray (N4), compact, massive, subblocky , irregular fracture, firm to soft, in part plastic, grading to Claystone. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, siliceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity.		**NO OIL SHOW.**
1850-1860	90 10 Tr	**SILTY CLAYSTONE:** medium dark gray (N4), massive, subblocky ,coaly flks,occasionally micro pyrite, grading to Claystone,firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, siliceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity. **LIMESTONE:** light brownish gray (5YR 6/1), massive, mudstone, fine sandy inclusions, firm.		**NO OIL SHOW.**
1860-1880	90 10	**SILTY CLAYSTONE:** medium dark gray (N4), massive, subblocky ,coaly flks, occasionally micro pyrite, grading to Claystone,firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, isolated coaly flks, siliceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity.		**NO OIL SHOW.** **Traces of Calcite.**
1880-1890	90 10 Tr	**CLAYSTONE:** dark gray (N3),massive,subblocky,in part subplanar fracture,micro coal,in part silty,firm. **SILTY CLAYSTONE:** medium dark gray (N4), massive, subblocky ,coaly flks,occasionally micro pyrite, grading to Claystone,firm. **SANDSTONE.**		**Shell debris.**

1890-1900	100 Tr Tr	**CLAYSTONE:** dark gray (N3),massive,subblocky,in part subplanar fracture,micro coal,in part silty,firm. **SILTY CLAYSTONE:** medium dark gray (N4), massive, subblocky ,coaly film, occasionally micro pyrite, grading to Claystone, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, isolated coaly film, tuffaceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity.		**NO OIL SHOW.** **Shell debris.**
1900-1910	60 30 10	**CLAYSTONE:** dark gray (N3), massive, subblocky, in part subplanar fracture, micro coal, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, isolated coaly film, tuffaceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity. **SILTY CLAYSTONE:** medium dark gray (N4), massive, subblocky, coaly film, occasionally micro pyrite, grading to Claystone, firm.		**NO OIL SHOW.** **Shell debris.**
1910-1920	80 10 10 Tr Tr	**CLAYSTONE:** dark gray (N3), massive, subblocky, in part subplanar fracture, micro coal, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, isolated coaly film, tuffaceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity. **SILTY CLAYSTONE:** medium dark gray (N4), massive, subblocky ,coaly film, occasionally micro pyrite, grading to Claystone, firm. **LIMESTONE:** light brownish gray (5YR 6/1), massive, mudstone, fine sandy inclusions, firm. **TUFF:** very light gray (N8), massive, blocky, vitreous, moderately hard.		**NO OIL SHOW.** **Calcite traces.**
1920-1930	70 20 10 Tr Tr	**CLAYSTONE:** dark gray (N3), massive, subblocky, in part subplanar fracture, micro coal, in part silty, firm. **CLAYSTONE:** brownish gray (5YR 4/1), massive, amorphus, plastic,very soft, isolated very fine sandy inclusions. **SILTY CLAYSTONE:** medium dark gray (N4), massive, subblocky, coaly film, occasionally micro Pyrite, grading to Claystone, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, isolated coaly film, tuffaceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity. **TUFF:** very light gray (N8), massive, blocky, vitreous, moderately hard.		**NO OIL SHOW.**
1930-1940	60 30 10 Tr	**CLAYSTONE:** dark gray (N3), massive, subblocky, in part subplanar fracture, micro coal, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, isolated coaly film, tuffaceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity. **CLAYSTONE:** brownish gray (5YR 4/1), massive, plastic, very soft, isolated very fine sandy inclusions. **TUFF:** very light gray (N8), massive, blocky, vitreous, moderately hard.		**NO OIL SHOW.** **Shell debris traces.**
1940-1950	70 20 10 Tr	**CLAYSTONE:** dark gray (N3), massive, subblocky, in part subplanar fracture, micro coal, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, isolated coaly film, tuffaceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity. **CLAYSTONE:** brownish gray (5YR 4/1), massive, amorphus, plastic, very soft, isolated very fine sandy inclusions. **TUFF:** very light gray (N8), massive, blocky, vitreous, moderately hard.		**NO OIL SHOW.** **Shell debris traces.**
1950-1960	100 Tr Tr	**CLAYSTONE:** dark gray (N3), massive, subblocky, in part subplanar fracture, micro coal, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, isolated coaly film, tuffaceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity. **CLAYSTONE:** brownish gray (5YR 4/1), massive, amorphus, plastic, very soft, isolated very fine sandy inclusions.		**NO OIL SHOWS.**
1960-1970	90 10 Tr	**CLAYSTONE:** dark gray (N3), massive, subblocky, in part subplanar fracture, micro coal, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, isolated coaly film, tuffaceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity. **CLAYSTONE:** brownish gray (5YR 4/1), massive, amorphus, plastic, very soft, isolated very fine sandy inclusions.		**NO OIL SHOWS.** **Shell debris traces.**
1970-1983	100	**CLAYSTONE:** dark gray (N3), massive, subblocky, in part subplanar fracture, micro coal, in part silty, firm.		**Traces of LIMESTONE**

1985-1990	90 10	**CLAYSTONE:** dark gray (N3), massive, subblocky, in part subplanar fracture, micro coal, in part silty,firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, isolated coaly film, tuffaceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity.		NO OIL SHOWS.
1990-1995	70 30	**CLAYSTONE:** dark gray (N3), massive, subblocky, in part subplanar fracture, micro coal, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics,isolated coaly film,abundant tuffaceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity.		NO OIL SHOWS.
1995-2000	60 40	**CLAYSTONE:** dark gray (N3), massive, subblocky, in part subplanar fracture, micro coal, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine, subangular to subrounded, well sorted, Quartz, occasionally greenish lithics, isolated coaly film, abundant tuffaceous matrix, calcareous cement, consolidated to friable, in part silty, poor porosity.		NO OIL SHOWS.
2005-2010	60 40	**CLAYSTONE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7),very fine to fine, subrounded, fair sorted, Quartz, minor greenish lithics, abundant tuffaceous matrix, light calcareous cement, grading to siltstone, consolidated, very poor porosity.		**Very slow, direct fluo whitish yellow cut fluo diffuse Carbonaceous matter.**
2010-2015	50 50	**CLAYSTONE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, i part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7),very fine to fine, subrounded, fair sorted, Quartz, minor greenish lithics, abundant tuffaceous matrix, light calcareous cement, consolidated, very poor porosity.		**Very slow, direct fluo whitish yellow cut fluo diffuse Carbonaceous matter.**
2015-2020	80 20	**CLAYSTONE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine to fine, subrounded, fairly sorted, Quartz, minor greenish lithics, abundant tuffaceous matrix, light calcareous cement, consolidated, very poor porosity.		**Very slow, direct fluo whitish yellow cut fluo diffuse Carbonaceous matter.**
2020-2025	50 50	**CLAYSTONE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine to fine, very coarse to conglomerated grains included, subrounded, fairly sorted, Quartz, minor greenish lithics, abundant tuffaceous matrix, light calcareous cement, consolidated, very poor porosity.		**Very slow, direct fluo whitish yellow cut fluo diffuse Carbonaceous matter.**
2025-2030	90 10	**CLAYSTONE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine to fine, subrounded, fairly sorted, Quartz, minor greenish lithics, abundant tuffaceous matrix, light calcareous cement, consolidated, very poor porosity.		**Very slow, direct fluo whitish yellow cut fluo diffuse Carbonaceous matter.**
2030-2035	70 30	**SANDSTONE:** medium light gray (N6)-(N7), very fine to fine, subrounded, fairly sorted, Quartz, minor greenish lithics, abundant tuffaceous matrix, light calcareous cement, consolidated, very poor porosity **CLAYSTONE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, in part silty, firm.		**Very slow, direct fluo whitish yellow cut fluo diffuse Carbonaceous matter.**
2035-2040	80 20	**CLAYSTONE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, in part silty, firm. **SANDSTONE:** very light gray (N8), medium to coarse-minor very coarse, subangular, poor sorted, Quartz, coarse tuffaceous matrix, calcareous cement, consolidated, very poor porosity.		**Very slow, direct fluo whitish yellow cut fluo diffuse Carbonaceous matter.**
2040-2045	70 30	**SANDSTONE:** very light gray (N8), medium to coarse-minor very coarse, subangular, poor sorted, Quartz, coarse tuffaceous matrix, calcareous cement, consolidated, very poor porosity. **CLAYSTONE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, in part silty, firm.		**Very slow, direct fluo whitish yellow cut fluo diffuse Carbonaceous matter.**
2045-2050	70 20 10	**SANDSTONE:** very light gray (N8), medium to coarse-to conglomerated, subangular, poor sorted, Quartz, coarse tuffaceous matrix, calcareous cement, consolidated, very poor porosity. **SANDSTONE:** medium light gray (N6)-(N7), very fine to fine, subrounded, fairly sorted, Quartz, minor greenish lithics, abundant tuffaceous matrix, light calcareous cement, consolidated, very poor porosity. **CLAYSTONE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, in part silty, firm.		**Very slow, direct fluo whitish yellow cut fluo diffuse Carbonaceous matter.**
2050-2055	70 20 10	**CONGLOMERATIC SANDSTONE:** light olive gray (5YR 6/1), subrounded, poor sorted, Quartz and lithics, coarse tuffaceous matrix, loose. **SANDSTONE:** very light gray (N8), medium to coarse-to conglomerated, subangular, poor sorted, Quartz, coarse tuffaceous matrix, calcareous cement, consolidated, very poor porosity. **CLAYSTONE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, in part silty, firm.		**Very slow, direct fluo whitish yellow cut fluo diffuse Carbonaceous matter.**
2055-2060	100 Tr	**CONGLOMERATIC SANDSTONE:** light olive gray (5YR 6/1), subrounded, poor sorted,Quartz and lithics,coarse tuffaceous matrix,loose. **SANDSTONE**		

2060-2065	80 20	CONGLOMERATIC SANDSTONE: light olive gray (5YR 6/1), subrounded, poor very poor sorted, Quartz and lithics, coarse whitish matrix, loose. SANDSTONE: medium light gray (N6)-(N7),very fine to fine, subrounded,fair sorted,Quartz,minor greenish lithics,abundant raffaceous matrix,light calcareous cement,consolidated,very poor porosity.		NO OIL SHOWS.
2065-2070	50 40 10	SANDSTONE: medium light gray (N6)-(N7), very fine to fine, subrounded, fair sorted, Quartz, minor greenish lithics, abundant raffaceous matrix, light calcareous cement, consolidated, very poor porosity. CLAYSTONE: dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm. CONGLOMERATIC SANDSTONE: light olive gray (5YR 6/1), subrounded, very poor sorted, Quartz and lithics, coarse whitish matrix, loose.		NO OIL SHOWS.
2070-2075	80 20	CLAYSTONE: dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm. SANDSTONE: medium light gray (N6)-(N7), very fine to fine, subrounded, fair sorted, Quartz, minor greenish lithics, abundant raffaceous matrix, light calcareous cement, consolidated, very poor porosity.		NO OIL SHOWS.
2075-2080	90 10	CLAYSTONE: dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm. CONGLOMERATIC SANDSTONE: light olive gray (5YR 6/1), subrounded, poor sorted, Quartz and lithics, coarse whitish matrix, loose.		NO OIL SHOWS.
2080-2090	10 90	SANDSTONE: very light gray (N8), medium to coarse-in part very coarse, subangular, poor sorted, Quartz, isolated coal, coarse raffaceous matrix, calcareous cement, consolidated,very poor porosity. CLAYSTONE: dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm.		NO OIL SHOWS.
2090-2100	90 10	SANDSTONE: medium light gray (N6)-(N7), very fine to fine, subrounded, fair sorted, Quartz, minor greenish lithics, abundant raffaceous matrix, light calcareous cement, consolidated, very poor porosity. CLAYSTONE: dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm grading to SHALE.		NO OIL SHOWS
2100-2110	80 20	SANDSTONE: medium light gray (N6)-(N7), very fine to fine, subrounded, fair sorted, Quartz, minor greenish lithics, abundant raffaceous matrix, light calcareous cement, consolidated, very poor porosity. SHALE: dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm.		**Slow diffuse whithis yellow cut fluo, none direct fluo. Abundant carbonaceuous matter.**
2110-2115	60 40	SILTSTONE: very light gray (N7), irregular fracture, occasionally coaly films, grading to very fine sandstone. SHALE: dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm.		**Slow diffuse whithis yellow cut fluo, none direct fluo. Abundant carbonaceuous matter.**
2115-2120	70 30	SHALE: dark gray (N3)-minor medium light gray (N6), massive, irregular fracture,blocky,isolated coaly film,in part silty,firm. SILTSTONE: very light gray (N7), irregular fracture, occasionally coaly films, grading to very fine sandstone.		**Slow diffuse whithis yellow cut fluo, none direct fluo. Abundant carbonaceuous matter.**
2120-2130	90 10	SANDSTONE: light olive gray(5YR6/1), medium to coarse, subangular-abrounded, very poor sorted, Quartz & lithics, argillaceous matrix, poor to fair porosity, coarse calcareous cement, moderately cemed. SHALE: dark gray (N3)-minor medium light gray (N6), massive, irregular fracture,blocky,isolated coaly film, in part silty,firm.		**Slow diffuse whithis yellow cut fluo, none direct fluo. Abundant carbonaceuous matter.**
2130-2140	100 TR	SANDSTONE: medium light gray (N6)-(N7), very fine to fine, subrounded, fairly sorted, Quartz, minor greenish lithics, abundant raffaceous matrix, light calcareous cement, consolidated, very poor porosity. SHALE: dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm.		**Slow diffuse whithis yellow cut fluo, none direct fluo. Abundant carbonaceuous matter**
2140-2150	80 20	SANDSTONE: medium light gray (N6)-(N7), very fine to fine, subrounded, fair sorted, Quartz, minor greenish lithics, abundant raffaceous matrix, light calcareous cement, consolidated, very poor porosity. SHALE: dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm.		**Slow diffuse whithis yellow cut fluo, none direct fluo. Abundant carbonaceuous matter.**

2150-2155	40 40 20	**SHALE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm. **SILTSTONE:** very light gray (N7), irregular fracture, occasionally coaly films, grading to very fine sandstone. **SANDSTONE:** medium light gray (N6)-(N7), very fine to fine, subrounded, fairly sorted, Quartz, minor greenish lithics, abundant tuffaceous matrix, light calcareous cement, consolidated, very poor porosity.		**Slow diffuse whithis yellow cut fluo, none direct fluo. Abundant carbonaceuous matter.**
2155-2160	50 40 10	**SILTSTONE:** very light gray (N7), irregular fracture, occasionally coaly films, grading to very fine sandstone. **SANDSTONE:** medium light gray (N6)-(N7), very fine to fine, subrounded, fairly sorted, Quartz, minor greenish lithics, abundant tuffaceous matrix, light calcareous cement, consolidated, very poor porosity. **SHALE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm.		**Slow diffuse whithis yellow cut fluo, none direct fluo. Abundant carbonaceuous matter.**
2160-2165	100	**SANDSTONE:** medium light gray (N6)-(N7), very fine to fine, subrounded, fairly sorted, Quartz, minor greenish lithics, abundant tuffaceous matrix, light calcareous cement, consolidated, very poor porosity.		**Slow diffuse whithis yellow cut fluo, none direct fluo. Abundant carbonaceuous matter.**
2165-2170	90 10	**SANDSTONE:** medium light gray (N6)-(N7), very fine to fine, subrounded, fairly sorted, Quartz, minor greenish lithics, abundant tuffaceous matrix, light calcareous cement, consolidated, very poor porosity. **SHALE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm.		**Slow diffuse whithis yellow cut fluo, none direct fluo. Abundant carbonaceuous matter.**
2170-2175	60 40	**SHALE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine to fine, subrounded, fairly sorted, Quartz, minor greenish lithics,abundant tuffaceous matrix, light calcareous cement, consolidated, very poor porosity.		**Slow diffuse whithis yellow cut fluo, none direct fluo. Abundant carbonaceuous matter.**
2175-2180	90 10	**SHALE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm. **SANDSTONE:** medium light gray (N6)-(N7), very fine to fine, subrounded, fair sorted, Quartz, minor greenish lithics, abundant tuffaceous matrix, light calcareous cement, consolidated, very poor porosity.		**NO OIL SHOWS**
2180-2185	100	**SHALE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm.		
2185-2190	90 10	**SHALE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm. **SILTSTONE:** very light gray (N7), irregular fracture, occasionally coaly films, grading to very fine sandstone.		
2190-2195	100	**SHALE:** dark gray (N3)-minor medium light gray (N6), massive, irregular fracture, blocky, isolated coaly film, in part silty, firm.		
2195-2200	100 Tr Tr	**SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal , in part slight calcareous reaction, firm to moderately firm. **SANDSTONE:** very light gray (N8), fine to very fine, subangular, fair sorted, Quartz, greenish lithics, white argillaceous matrix, consolidated to friable, fair to poor porosity. **LIMESTONE:** light brownish gray (5YR 6/1), massive , in part crystalline, compact, hard.		
2200-2205	60 40 Tr	**SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, in part slight calcareous reaction, firm to moderately firm.. **SHALE:** brownish black (5YR 2/1), massive, blocky, isolated micro coal, soft. **SANDSTONE:** very light gray (N8), fine to very fine, subangular, fair sorted, Quartz, greenish lithics, white argillaceous matrix, consolidated to friable, fair to poor porosity.		
2205-2210	80 10 10	**SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, in part slight calcareous reaction, firm to moderately firm. **SHALE:** brownish black (5YR 2/1), massive, blocky, isolated micro coal, soft. **SANDSTONE:** very light gray (N8), fine to very fine, subangular, fair sorted, Quartz, greenish lithics, white argillaceous matrix, grading to siltstone, consolidated to friable, fair to poor porosity.		**NO OIL SHOWS**

2210-2215	80 20 Tr Tr	**SHALE:** dark gray (N3),massive, blocky to subplaty, irregular fracture, micro coal, in part slight calcareous reaction, firm to moderatelly firm. **SANDSTONE:** very light gray (N8),fine to very fine, subangular,fair sorted,Quartz,greenish lithics,white argillaceous matrix,consolidated to friable,fair to poor porosity. **SHALE:** brownish black (5YR2/1),massive,blocky,isolated micro coal,soft. **LIMESTONE:**light brownish gray (5YR6/1),massive ,in part crystalline, conpacthard.		**NO OIL SHOWS**
2215-2220	60 30 10 Tr	**SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, non calcareous, in part very fine sandy inclusions, moderatelly firm. **LIMESTONE:** light brownish gray (5YR 6/1)-white (N9), massive, mudstone, in part crystalline, subblocky, moderatelly firm **SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, in part slight calcareous reaction, firm to moderatelly firm. **SANDSTONE:** very light gray (N8), fine to very fine, subangular, fair sorted, Quartz, greenish lithics, white argillaceous matrix, consolidated to friable, fair to poor porosity		**Shell debris.**
2220-2225	80 20 Tr Tr	**SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, non calcareous, in part very fine sandy inclusions, moderatelly firm. **SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, in part slight calcareous reaction, firm to moderatelly firm. **LIMESTONE:** light brownish gray (5YR 6/1)-white (N9), massive, mudstone, in part crystalline, subblocky, moderatelly firm. **SANDSTONE:** very light gray (N8), fine to very fine, subangular, fair sorted, Quartz, greenish lithics, white argillaceous matrix, consolidated to friable, fair to poor porosity		**Shell debris.**
2225-2230	100 Tr Tr Tr	**SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, non calcareous, in part very fine sandy inclusions, moderatelly firm. **SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, in part slight calcareous reaction, firm to moderatelly firm.. **LIMESTONE:** light brownish gray (5YR 6/1) white (N9), massive, mudstone, in part crystalline, subblocky, moderatelly firm. **SANDSTONE:** very light gray (N8), fine to very fine, subangular, fair sorted, Quartz, greenish lithics, white argillaceous matrix, consolidated to friable, fair to poor porosity		**Shell debris.**
2230-2235	100 Tr	**SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, non calcareous, grading to very fine sandstone, moderatelly firm. **SHALE:** brownish black (5YR 2/1), massive, blocky, isolated micro coal, soft.		
2235-2240	90 10 Tr	**SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, non calcareous, grading to very fine sandstone, moderatelly firm. **SHALE:** brownish black (5YR 2/1), massive, blocky, isolated micro coal, soft. **SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, in part slight calcareous reaction, firm to moderatelly firm.		
2240-2245	90 10	**SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, non calcareous, in part very fine sandy inclusions, moderatelly firm. **SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal,in part slight calcareous reaction, firm to moderatelly firm.		
2245-2250	60 40	**SHALE:** dark gray (N3),massive, blocky to subplaty, irregular fracture, micro coal ,in part slight calcareous reaction,firm to moderatelly firm. **SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, non calcareous, in part very fine sandy inclusions, moderatelly firm.		
2250-2255	70 20 10	**SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, in part slight calcareous reaction, firm to moderatelly firm.. **SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, non calcareous, in part very fine sandy inclusions, moderatelly firm. **SHALE:** brownish black (5YR 2/1), massive, blocky, isolated micro coal, soft.		
2255-2260	90 10 Tr	**SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, in part slight calcareous reaction, firm to moderatelly firm.. **LIMESTONE:** white (N9),massive,mudstone,subblocky, soft. **SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, non calcareous, in part very fine sandy inclusions, moderatelly firm.		**Shell debris.**

2360-2365	100 Tr Tr	**SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, in part slight calcareous reaction, firm to moderately firm. **LIMESTONE:** white (N9), massive, mudstone, subblocky, soft. **SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, non calcareous, in part very fine sandy inclusions, moderately firm.		**Shell debris.**
2265-2270	80 20	**SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, glauconite, silty, in part slight calcareous reaction, moderately firm. **SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, non calcareous, in part very fine sandy inclusions, moderately firm.		
2270-2275	70 20 10	**SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, glauconite, silty, in part slight calcareous reaction, moderately firm. **SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, greenish tinted, non calcareous, in part very fine sandy inclusions, moderately firm. **LIMESTONE:** light brownish gray (5YR 6/1), massive, mudstone, subblocky, soft.		**Shell debris.**
2275-2280	80 10 10	**SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, glauconite, silty, in part slight calcareous reaction, moderately firm. **SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, greenish tinted, non calcareous, in part very fine sandy inclusions, moderately firm. **LIMESTONE:** light brownish gray (5YR 6/1), massive, mudstone, subblocky, soft.		**Shell debris.**
2280-2285	90 10 Tr	**SHALE:** dark gray (N3), massive, blocky to subplaty, irregular fracture, micro coal, glauconite, silty, in part slight calcareous reaction, moderately firm. **SILTSTONE:** medium dark gray (N4), massive, subblocky, irregular fracture, micro coal, greenish tinted, non calcareous, in part very fine sandy inclusions, moderately firm. **LIMESTONE:** light brownish gray (5YR 6/1), massive, mudstone, subblocky, soft.		**Shell debris.**
2285-2290	70 30	**SHALE:** dark gray (N3)-(N4), massive, blocky to subplaty, irregular fracture, micro coal, glauconite, silty, in part slight calcareous reaction, moderately firm. **SHALE:** brownish black (5YR 2/1), massive, blocky, isolated micro coal, slight calcareous reaction, soft.		
2290-2295	50 40 10	**SHALE:** medium dark gray (N4), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm. **SHALE:** brownish gray (5YR 4/1), massive, blocky, occasionally glauconite dots, moderate calcareous reaction, soft, in part firm. **LIMESTONE:** light brownish gray (5YR 6/1)-white (N9), massive, mudstone, subblocky, in part crystalline, moderately firm.		**Shell debris.**
2295-2300	80 20	**SHALE:** medium dark gray (N4), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm. **SHALE:** brownish gray (5YR 4/1), massive, blocky, occasionally glauconite dots, moderate calcareous reaction, soft, in part firm.		
2300-2305	90 10 Tr	**SHALE:** medium dark gray (N4), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm. **SHALE:** brownish gray (5YR 4/1), massive, blocky, occasionally glauconite dots, moderate calcareous reaction, soft, in part firm. **TUFF:** white (N9)-(N8), massive, subplaty, vitreous, firm.		
2305-2310	70 10 10 10	**SHALE:** medium dark gray (N4), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm. **SHALE:** brownish gray (5YR 4/1), massive, blocky, occasionally glauconite dots, moderate calcareous reaction , soft, in part firm. **LIMESTONE:** light brownish gray (5YR 6/1)-white (N9), massive, mudstone, subblocky, in part crystalline, moderately firm. **SILTSTONE:** medium gray (N5), massive, subblocky, irregular fracture, glauconite dots, calcareous reaction, in part grading to very fine sandstone.		**Shell debris.**
2310-2315	90 10	**SHALE:** medium dark gray (N4), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm. **SHALE:** brownish gray (5YR 4/1), massive, blocky, occasionally glauconite dots, moderate calcareous reaction, soft, in part firm.		**Shell debris.**
2315-2320	80 20 Tr	**SHALE:** medium dark gray (N4), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm. **SILTSTONE:** medium gray (N5), massive, subblocky, irregular fracture, glauconite dots, calcareous reaction, in part grading to very fine sandstone. **SHALE:** brownish gray (5YR 4/1), massive, blocky, occasionally glauconite dots, moderate calcareous reaction, soft, in part firm.		**Pyrite traces.**

2320-2325	90 10 Tr< Tr	**SHALE:** medium dark gray (N4), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm. **TUFF:** white (N9)-(N8), massive, subplaty, vitreous, firm. **SILTSTONE:** medium gray (N5), massive, subblocky, irregular fracture, glauconite dots, calcareous reaction, in part grading to very fine sandstone. **SHALE:** brownish gray (5YR 4/1), massive, blocky, occasionally glauconite dots, moderate calcareous reaction, soft, in part firm.		
2325-2330	90 10 Tr< Tr	**SHALE:** medium dark gray (N4), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm. **LIMESTONE:** light brownish gray (5YR 6/1)-white (N9), massive, mudstone, subblocky, in part crystalline, moderately firm. **SHALE:** brownish gray (5YR 4/1), massive, blocky, occasionally glauconite dots, moderate calcareous reaction, soft, in part firm. **TUFF:** white (N9)-(N8), massive, subplaty, vitreous, firm.		**Shell debris.**
2330-2335	60 40 Tr	**SHALE:** brownish gray (5YR 4/1), massive,blocky, occasionally glauconite dots, moderate calcareous reaction, soft, in part firm. **SHALE:** medium dark gray (N4), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm. **TUFF:** white (N9)-(N8), massive, subplaty, vitreous, firm.		
2335-2340	50 50 Tr	**SHALE:** brownish gray (5YR 4/1), massive, blocky, occasionally glauconite dots, moderate calcareous reaction, soft, in part firm. **SHALE:** medium dark gray (N4),massive, subblocky to subplaty, coaly film,glauconite dots,slight calcareous reaction,firm. **TUFF:** white (N9)-(N8), massive, subplaty, vitreous, firm.		
2340-2345	50 40 10 Tr	**SHALE:** brownish gray (5YR 4/1), massive, blocky, occasionally glauconite dots, moderate calcareous reaction, soft, in part firm. **SHALE:** medium dark gray (N4), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm. **LIMESTONE:** light brownish gray (5YR 6/1)-white (N9), massive, mudstone, subblocky, in part crystalline, moderately firm. **SILTSTONE:** medium gray (N5), massive, subblocky, irregular fracture, glauconite dots, calcareous reaction, in part grading to very fine sandstone.		**Shell debris.**
2345-2355	50 50	**SHALE:** brownish gray (5YR 4/1), massive, blocky, occasionally glauconite dots, moderate calcareous reaction, soft, in part firm. **SHALE:** medium dark gray (N4), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm.		
2355-2365	100	**SHALE:** medium dark gray (N4), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm.		
2365-2370	100	**SHALE:** medium dark gray (N4) medium gray (N5), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm.	8	
2370-2375	100	**SHALE:** medium dark gray (N4)-medium gray (N5), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm.		
2375-2380	100	**SHALE:** medium dark gray (N4) medium gray (N5), massive, subblocky to subplaty, coaly film,glauconite dots, slight calcareous reaction, firm.	6	
2380-2385	100	**SHALE:** medium dark gray (N4)-medium gray (N5), massive, subblocky to subplaty, coaly film, glauconite dots, slight calcareous reaction, firm.		
2385-2390	60 40	**CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. **SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact.	20	
2390-2395	80 20	**SHALE:** medium dark gray (N4),massive,blocky,irregular fracture,slight calcareous reaction,compact. **CALCAREOUS SHALE:** medium light gray (N6),subplaty to platy, irregular fracture,strong calcareous reaction,firm.		
2395-2400	80 20	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	6	
2400-2405	80 20	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.		
2405-2410	80 20	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	7.7	
2410-2415	90 10	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.		
2415-2420	90 10	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	2.5	

2420-2425	90 10	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.		
2425-2430	90 10	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	6.1	
2430-2435	80 20	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture,slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.		
2435-2440	80 20	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	6	
2440-2445	90 10	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.		
2445-2450	80 20	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	7.5	
2450-2455	80 20	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.		
2455-2460	90 10	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	3.8	
2460-2465	90 10	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.		
2465-2470	80 20	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	4.1	
2470-2475	100	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact.		
2475-2480	80 20	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	1.9	
2480-2485	60 40	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), blocky to subplaty, irregular fracture, strong calcareous reaction, firm.		
2485-2490	70 30	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	6	Incorrasus debris.
2490-2495	60 40	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.		
2495-2500	60 40	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	5	
2500-2505	70 30	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.		
2505-2510	60 40	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	5.6	
2510-2515	60 40	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.		

2515-2520	70 30	SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	5.3	
2520-2525	50 30 Tr	SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. TUFF: white (N9), subblocky, irregular fracture, hard.	4	
2525-2530	60 30 10	CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. TUFF: white (N9), subblocky, irregular fracture, hard.	7.2	
2530-2535	80 20 Tr	SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. TUFF: white (N9), subblocky, irregular fracture, hard.	2	
2535-2540	50 50	SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	6.2	
2540-2545	60 40	SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.		
2545-2550	50 50	SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	6.5	
2550-2555	70 30	CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction compact.		
2555-2560	90 10	CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact.	9	
2560-2565	50 50	CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, glauconite dots, firm. SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact.		
2565-2570	60 40	SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	4	
2570-2575	80 20	SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.		
2575-2580	60 10	SHALE: medium gray (N5), massive, blocky, irregular fracture, slight calcareous reaction, compact. CALCAREOUS SHALE: medium light gray (N6),s subplaty to platy, irregular fracture, strong calcareous reaction, firm.	2	
2580-2585	50 50	SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	3	
2585-2590	60 30 10	CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. LIMESTONE: white (N9), massive, irregular fracture, firm to soft.	8.4	
2590-2595	70 30	CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact.	5.8	
2595-2600	50 50	CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. LIMESTONE: light gray (N8), massive, irregular fracture, firm to soft.	4.2	
2600-2605	60 40	CALCAREOUS SHALE: medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. SHALE: medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact.	4.4	

2605-2610	50 50 Tr	**CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. **SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **LIMESTONE:** moderate yellowish brown (10YR 4/2), massive, blocky in part crystalline, irregular fracture, argillaceous, hard.	3.5	
2610-2615	50 40 10	**CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. **SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **LIMESTONE:** white (N9), massive, irregular fracture, firm to soft.	3	
2615-2620	80 20	**CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. **SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact.	11	
2620-2625	100	**CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	16.7	
2625-2630	10 30	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	3.3	
2630-2635	60 40 Tr	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. **LIMESTONE:** white (N9), massive, irregular fracture, firm to soft.	5.5	
2635-2640	60 40 Tr	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm. **LIMESTONE:** white (N9), massive, irregular fracture, firm to soft.	4	
2640-2645	70 30	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **CALCAREOUS SHALE:** medium light gray (N6), subplaty to platy, irregular fracture, strong calcareous reaction, firm.	3	
2645-2650	90 10	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **LIMESTONE:** moderate yellowish brown (10YR 4/2), massive, blocky in part crystalline, irregular fracture, argillaceous, hard.	4	
2650-2655	100	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact.	1.4	
2655-2660	90	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact.	2	
2660-2665	90 10	**SHALE:** medium dark gray (N4), massive, blocky, irregular fracture, slight calcareous reaction, compact. **LIMESTONE:** white (N9), massive, irregular fracture, firm to soft.	3.4	
2665-2680	100	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, occasionally slight calcareous reaction, compact, hard.		
2680-2685	80 20 Tr	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** dark greenish gray (5G 4/1), massive, subblocky, glauconite dots, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **TUFF:** pinkish gray (5YR 8/1), subplaty, hard.		
2685-2695	70 30	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** dark greenish gray (5G 4/1), massive, subblocky, glauconite dots, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard.		
2695-2700	80 20	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** dark greenish gray (5G 4/1), massive, subblocky, glauconite dots, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard.		
2700-2705	90 10	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** dark greenish gray (5G 4/1), massive, subblocky, glauconite dots, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard.		
2705-2710	80 10 10	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** dark greenish gray (5G 4/1), massive, subblocky, glauconite dots, occasionally pyrite, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **LIMESTONE:** grayish red (5R 4/2), massive, irregular fracture, firm to soft.		

2710-2715	90 10	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** dark greenish gray (5G 4/1), massive, subblocky, glauconite dots, occasionally pyrite, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard.		
2715-2720	80 10 10	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** dark greenish gray (5G 4/1), massive, subblocky, glauconite dots, occasionally pyrite, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **LIMESTONE:** grayish red (5R 4/2), massive, irregular fracture, firm to soft.		
2720-2725	90 10 Tr Tr	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard. **LIMESTONE:** grayish red (5R 4/2), massive, irregular fracture, firm to soft. **SILTSTONE:** dark greenish gray (5G 4/1), massive, subblocky, glauconite dots, occasionally pyrite, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **TUFF:** pinkish gray (5YR 8/1), subplaty, hard.		
2725-2730	100 Tr	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** dark greenish gray (5G 4/1), massive, subblocky, glauconite dots, occasionally pyrite, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard.		
2730-2735	100	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard.		
2735-2740	90 10	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** dark greenish gray (5G 4/1), massive, subblocky, glauconite dots, occasionally pyrite, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard.		Contaminated sample with fiber (MIX II)
2740-2745	80 20	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** dark greenish gray (5G 4/1), massive, subblocky, abundant glauconite, occasionally pyrite, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard.		Abundant fiber (MIX II)
2745-2750	60 30 10	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard. **LIMESTONE:** light gray (N7)-(N8), massive, in part crystalline, irregular fracture, firm to soft. **SILTSTONE:** dark greenish gray (5G 4/1), massive, subblocky, glauconite dots, occasionally pyrite, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard.		
2750-2755	70 30	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** medium dark gray (N4), massive, subblocky, glauconite dots, argillaceous, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard.		
2755-2760	60 40	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** medium dark gray (N4), massive, subblocky, glauconite dots, argillaceous, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard.		
2760-2765	60 30 10	**SHALE:** medium dark gray (N4)-(N5), massive, blocky minor platy, irregular fracture, coal debris, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** medium dark gray (N4), massive, subblocky, glauconite dots, argillaceous, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **LIMESTONE:** light gray (N7)-(N8), massive, in part crystalline, irregular fracture, firm to soft.		
2765-2770	70 20 10	**SHALE:** medium dark gray (N4)-dark gray (N3), massive, blocky subplaty, irregular fracture, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** medium dark gray (N4), massive, subblocky, glauconite dots, argillaceous, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **LIMESTONE:** brownish gray (5YR 4/1), massive, mudstone, in part crystalline, firm to soft.		
2770-2775	40 40 10	**SHALE:** medium dark gray (N4)-dark gray (N3), massive, blocky subplaty, irregular fracture, occasionally slight calcareous reaction, compact, hard. **LIMESTONE:** brownish gray (5YR 4/1), massive, mudstone, in part crystalline, firm to soft. **SILTSTONE:** medium dark gray (N4), massive, subblocky, glauconite dots, argillaceous, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard.		

2775-2780	40 40 20	**SHALE:** medium dark gray (N4)-dark gray (N3), massive, blocky subplaty, irregular fracture, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** medium dark gray (N4), massive, subblocky, glauconite dots, argillaceous, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **LIMESTONE:** brownish gray (5YR 4/1), massive, mudstone, in part crystalline, firm to soft.		
2780-2785	50 40 10	**SHALE:** medium dark gray (N4)-dark gray (N3), massive, blocky subplaty, irregular fracture, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** medium dark gray (N4), massive, subblocky, glauconite dots, argillaceous, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **LIMESTONE:** brownish gray (5YR 4/1), massive, mudstone, in part crystalline, firm to soft.		
2785-2795	60 40 Tr	**SHALE:** medium dark gray (N4) dark gray (N3), massive, blocky subplaty, irregular fracture, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** medium dark gray (N4), massive, subblocky, glauconite dots, argillaceous, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **LIMESTONE:** brownish gray (5YR 4/1), massive, mudstone, in part crystalline, firm to soft.		
2795-2800	50 50 Tr	**SHALE:** medium dark gray (N4)-dark gray (N3), massive, blocky subplaty, irregular fracture, occasionally slight calcareous reaction, compact, hard. **SILTSTONE:** medium dark gray (N4), massive, subblocky, abundant glauconite dots, argillaceous, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **LIMESTONE:** brownish gray (5YR 4/1), massive, mudstone, in part crystalline, firm to soft.		
2800-2805	50 40 10	**SILTSTONE:** medium dark gray (N4), massive, subblocky, glauconite dots, argillaceous, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **SHALE:** medium dark gray (N4)-dark gray (N3), massive, blocky subplaty, irregular fracture, occasionally slight calcareous reaction, compact, hard. **LIMESTONE:** brownish gray (5YR 4/1), massive, mudstone, in part crystalline, firm to soft.		
2805-2810	60 40 Tr	**SILTSTONE:** medium dark gray (N4), massive, subblocky, glauconite dots, argillaceous, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **SHALE:** medium dark gray (N4)-dark gray (N3), massive, blocky subplaty, irregular fracture, occasionally slight calcareous reaction, compact, hard,in part soft. **LIMESTONE:** brownish gray (5YR 4/1), massive, mudstone, in part crystalline, firm to soft.		
2810-2815	60 40	**SILTSTONE:** medium dark gray (N4), massive, subblocky, glauconite dots, argillaceous, slight calcareous reaction, in part grading to very fine sandstone, moderately hard to hard. **SHALE:** medium dark gray (N4) dark gray (N3), massive, blocky subplaty, irregular fracture, occasionally slight calcareous reaction, compact, hard.		
2815-2825	80 20	**SILTSTONE:** medium dark gray (N4), massive, blocky, Glauconite dots, argillaceous, slight calcareous cement, in part grading to very fine sandstone . **SHALE:** medium dark gray(N4)-dark gray (N3), massive, blocky subplaty, irregular, fracture, occasionally slight calcareous reaction, compact - hard.		
2825-2830	70 30	**SILTSTONE:** medium dark gray (N4), massive, blocky, Glauconite dots, argillaceous, slight calcareous cement, in part grading to very fine sandstone . **SHALE:** medium dark gray(N4)-dark gray (N3), massive, blocky subplaty, irregular, fracture, occasionally slight calcareous reaction, compact - hard.		
2830-2836	80 20 TR	**SILTSTONE:** medium dark gray (N4), massive, blocky, Glauconite dots, argillaceous, slight calcareous cement, in part grading to very fine sandstone . **SHALE:** medium dark gray(N4)-dark gray (N3), massive, blocky-subplaty, irregular, fracture, occasionally slight calcareous reaction, compact - hard. Loose Quartz grains.		
2836-2838	60 20 20	**SILTSTONE:** medium dark gray (N4), massive, blocky, Glauconite dots, argillaceous, slight calcareous cement, in part grading to very fine sandstone . **SHALE:** medium dark gray(N4)-dark gray (N3), massive, blocky-subplaty, irregular, fracture, occasionally slight calcareous reaction, compact - hard. **SANDSTONE:** light gray (N7), fine, subrounded, fair sorted, hyaline Quartz grains argillaceous matrix, friable to loose.		NO OIL SHOWS
2838-2840	40 40 20	**SANDSTONE:** light gray (N7), fine minor very fine, subrounded, fair sorted, hyaline Quartz abundant Glauconite, some argillaceous matrix, friable to loose. **SILTSTONE:** medium dark gray (N4), massive, blocky, Glauconite dots, argillaceous, slight calcareous cement, in part grading to very fine sandstone. **SHALE:** medium dark gray (N4) dark gray (N3), massive, blocky-subplaty, irregular fracture, occasionally slight calcareous reaction, compact, hard.		NO OIL SHOWS

2840-2843	60 20 20	SANDSTONE: light gray (N7), fine grain very fine, subrounded, fair sorted, hyaline Quartz, abundant Glauconite, coarse argillaceous matrix, friable to loose. SANDSTONE: hyaline translucent, medium to coarse, subrounded, Quartz, loose. SILTSTONE: medium dark gray (N4), massive, blocky, Glauconite dots, argillaceous, slight calcareous cement, in part grading to very fine sandstone.		NO OIL SHOWS
2843-2844	40 40 20	SANDSTONE: dark greenish gray (5G 4/1), fine to very fine, fair sorted, subrounded, Quartz & Glauconite, coarse feldspar, argillaceous matrix, coarse calcareous cement, consolidate, very poor porosity. SILTSTONE: medium dark gray (N4), massive, blocky, Glauconite dots, argillaceous, slight calcareous cement, in part grading to very fine sandstone. SANDSTONE: hyaline translucent, medium to coarse, subrounded, Quartz, loose.		Brownish and black dead oil stain. No direct fluorescence. Very slow greenish yellow cut fluorescence.
2844-2846	60 20 20	SILTSTONE: medium dark gray (N4), massive, blocky, Glauconite dots, argillaceous, slight calcareous cement, in part grading to very fine sandstone. SANDSTONE: dark greenish gray (5G 4/1), fine to very fine, fair sorted, subrounded, Quartz & Glauconite, coarse feldspar, argillaceous matrix, coarse calcareous cement, consolidate, very poor porosity. SANDSTONE: hyaline translucent, medium to coarse, subrounded, Quartz, loose.		Brownish and black dead oil stain. No direct fluorescence. Very slow greenish yellow cut fluorescence.
2846-2850	70 10 Tr Tr	SILTSTONE: medium dark gray (N4) brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. SANDSTONE: dark greenish gray (5G 4/1),fine to very fine, fair sorted, subrounded, Quartz,abundant Glauconite, coarse feldspar, argillaceous matrix, coarse calcareous cement, consolidate, very poor porosity. SANDSTONE: hyaline translucent, medium to coarse, subrounded, Quartz , loose. TUFF: pinkish gray (5YR 8/1), subplaty, isolated micro pyrite, hard.		Brownish and black dead oil stain. No direct fluorescence. Very slow greenish yellow cut fluorescence. Contaminated sample due trip in.
2850-2852	80 10 10 Tr Tr	SILTSTONE: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. SANDSTONE: dark greenish gray (5G 4/1), fine to very fine, fair sorted, subrounded, Quartz, abundant Glauconite, coarse feldspar, argillaceous matrix, coarse calcareous cement, consolidate, very poor porosity. COAL: black (N1), blocky to subblocky conchoidal fracture, occasionally micro pyrite, moderately hard. SANDSTONE: hyaline translucent, medium to coarse, subrounded, Quartz, loose. TUFF: pinkish gray (5YR 8/1), subplaty, isolated micro pyrite, hard.		Brownish and black dead oil stain. No direct fluorescence. Very slow greenish yellow cut fluorescence.
2852-2854	80 20 Tr Tr	SILTSTONE: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. SANDSTONE: very light gray (N8), fine to medium, in part coarse, subangular, fair sorted, Quartz hyaline, coarse tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, poor porosity. COAL: black (N1), blocky to subblocky conchoidal fracture, occasionally micro pyrite, moderately hard. TUFF: pinkish gray (5YR 8/1), subplaty, isolated micro pyrite, hard.		NO OIL SHOW.
2854-2856	60 30 10 Tr	SILTSTONE: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. SANDSTONE: very light gray (N8), fine to medium, in part coarse, subangular, fair sorted, Quartz hyaline, coarse tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, poor porosity. TUFF: pinkish gray (5YR 8/1), subplaty, isolated micro pyrite, hard. COAL: black (N1), blocky to subblocky conchoidal fracture, occasionally micro pyrite, moderately hard.		NO OIL SHOW.
2856-2858	60 40 Tr	SILTSTONE: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. SANDSTONE: very light gray (N8), fine to medium, in part coarse, subangular, fair sorted, Quartz hyaline, coarse tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, poor porosity. COAL: black (N1), blocky to subblocky conchoidal fracture, occasionally micro pyrite, moderately hard.		NO OIL SHOW.
2858-2860	90 10 Tr	SILTSTONE: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. SANDSTONE: very light gray (N8), fine to medium, in part coarse, subangular, fair sorted, Quartz hyaline, coarse tuffaceous argillaceous matrix washed out, loose, occasionally consolidated, poor porosity. TUFF: pinkish gray (5YR 8/1), subplaty, isolated micro pyrite, hard. COAL: black (N1), blocky to subblocky conchoidal fracture, occasionally micro pyrite, moderately hard.		NO OIL SHOW.

2860-2862	60 40 Tr Tr	**SILTSTONE**: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. **SANDSTONE**: very light gray (N8), fine to medium, in part coarse, subangular, fair sorted, Quartz hyaline, coarse tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, poor porosity. **TUFF**: pinkish gray (5YR 8/1), subplaty, isolated micro pyrite, hard. **COAL**: black (N1), blocky to subblocky conchoidal fracture, occasionally micro pyrite, moderatelly hard.		**NO OIL SHOW.**
2863-2864	70 30 Tr Tr	**SILTSTONE**: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. **SANDSTONE**: very light gray (N8), fine to medium, in part coarse, subangular, fair sorted, Quartz hyaline, coarse tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, poor porosity. **TUFF**: gray (5YR 8/1), subplaty, isolated micro pyrite, hard. **COAL**: black (N1), blocky to subblocky conchoidal fracture, occasionally micro pyrite, moderatelly hard.		**NO OIL SHOW.**
2864-2866	80 30 Tr Tr	**SILTSTONE**: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. **SANDSTONE**: very light gray (N8), fine to medium, in part coarse, subangular, fair sorted, Quartz hyaline, coarse tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, poor porosity. **TUFF**: pinkish gray (5YR 8/1), subplaty, isolated micro pyrite, hard. **COAL**: black (N1), blocky to subblocky conchoidal fracture, occasionally micro pyrite, moderatelly hard.		**NO OIL SHOW.**
2866-2868	70 30 Tr	**SILTSTONE**: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris,argillaceous, moderate calcareous cement, in part grading to very fine sandstone,hard. **SANDSTONE**: very light gray (N8), medium to coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, coarse tuffaceous-argillaceous matrix washed, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **TUFF**: pinkish gray (5YR 8/1), subplaty, isolated micro pyrite, hard.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.**
2868-2870	50 50 Tr	**SILTSTONE**: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. **SANDSTONE**: very light gray (N8), medium to coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, coarse tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **TUFF**: pinkish gray (5YR 8/1), subplaty, isolated micro pyrite, hard.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.**
2870-2872	60 40 Tr	**SANDSTONE**: very light gray (N8), medium to coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, coarse tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE**: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. **TUFF**: pinkish gray (5YR 8/1), subplaty, isolated micro pyrite, hard.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.**
2872-2874	60 40 Tr	**SANDSTONE**: very light gray (N8), medium to coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, coarse tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE**: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. **TUFF**: pinkish gray (5YR 8/1), subplaty, isolated micro pyrite, hard.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.**
2874-2876	80 20	**SANDSTONE**: very light gray (N8), medium to coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, coarse tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE**: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.**
2876-2878	90 10	**SANDSTONE**: very light gray (N8), medium to coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, coarse tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE**: medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.**

2878-2880	90 10	**SANDSTONE:** very light gray (N8), medium to coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous argillaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE:** medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.** **COAL traces.**
2880-2882	70 30	**SANDSTONE:** very light gray (N8), medium to coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE:** medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.** **COAL traces.**
2882-2884	60 20 20	**SANDSTONE:** very light gray (N8), medium to coarse, angular to subangular, fair sorted, Quartz hyaline,occasionally pyrite, scarce tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE:** medium dark gray (N4)-brownish black (5YR2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. **SANDSTONE:** medium gray (N5), very fine to fine, angular to subangular, fair sorted, Quartz, Glauconite, tuffaceous-argillaceous matrix, friable, poor porosity.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.** **COAL traces.**
2884-2886	60 30 10	**SANDSTONE:** very light gray (N8), medium to coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite,scarce tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE:** medium dark gray (N4)-brownish black (5YR2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. **SANDSTONE:** medium gray (N5), very fine to fine, angular to subangular, fair sorted, Quartz, Glauconite, tuffaceous argillaceous matrix, friable, poor porosity.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.** **COAL traces.**
2886-2888	70 30 Tr	**SANDSTONE:** very light gray (N8), medium to coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE:** medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris,argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. **SANDSTONE:** medium gray (N5), very fine to fine, angular to subangular, fair sorted, Quartz, Glauconite, tuffaceous-argillaceous matrix, friable, poor porosity.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.** **COAL traces.**
2888-2890	60 20 20	**SANDSTONE:** very light gray (N8), medium to coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous-argillaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE:** medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris,argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. **SANDSTONE:** medium gray (N5), very fine to fine, angular to subangular, fair sorted, Quartz, Glauconite, tuffaceous-argillaceous matrix, friable, poor porosity.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.** **COAL & TUFF traces.**
2890-2892	70 20 10	**SANDSTONE:** very light gray (N8), fine to part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE:** medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard. **SANDSTONE:** medium gray (N5), very fine to fine, angular to subangular, fair sorted, Quartz, Glauconite, tuffaceous-argillaceous matrix, friable, poor porosity.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.** **COAL & TUFF traces.**
2892-2894	90 10	**SANDSTONE:** very light gray (N8), fine to part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE:** medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard.		**Brownish and black dead oil stain.** **No direct fluorescence.** **Very slow greenish yellow cut fluorescence.** **COAL traces.**

2894-2896	90 10	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE:** medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard.		Brownish and black dead oil stain. No direct fluorescence. Very slow greenish yellow cut fluorescence. COAL traces.
2896-2898	100 Tr	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, fair to poor porosity, loose, in part friable. **SILTSTONE:** medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard.		Brownish and black dead oil stain. No direct fluorescence. Very slow greenish yellow cut fluorescence. COAL traces.
2898-2900	90 10	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable. **SILTSTONE:** medium dark gray (N4)-brownish black (5YR 2/1), massive, subblocky, Glauconite dots, coal debris, argillaceous, moderate calcareous cement, in part grading to very fine sandstone, hard.		Brownish and black dead oil stain. No direct fluorescence. Very slow greenish yellow cut fluorescence. COAL traces.
2900-2902	90 10	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable. **COAL:** black (N1), blocky to subblocky, conchoidal fracture, occasionally pyrite, moderately hard.		Brownish and black dead oil stain. No direct fluorescence. Very slow greenish yellow cut fluorescence.
2902-2904	100	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		Brownish and black dead oil stain. No direct fluorescence. Very slow greenish yellow cut fluorescence. COAL traces.
2904-2906	100	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		Brownish and black dead oil stain. No direct fluorescence. Very slow greenish yellow cut fluorescence. COAL traces.
2906-2908	100	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW. Traces of COAL.
2908-2910	100	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW. Traces of COAL.
2910-2912	100	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW. Contaminated with LCM.
2912-2914	100	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW. Contaminated with LCM.
2914-2916	100	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW.
2916-2918	100	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW.
2918-2920	100	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW.
2920-2922	100	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW.
2922-2924	100	**SANDSTONE:** very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW.

2924-2926	100 Tr	**SANDSTONE**: very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable. **SHALE**: medium gray (N5) in part light brownish gray (5YR 6/1), massive, subblocky, occasionally Quartz inclusions, soft.		NO OIL SHOW.
2926-2928	90 10	**SANDSTONE**: very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable. **SHALE**: medium gray (N5) in part light brownish gray (5YR 6/1), massive, subblocky, occasionally Quartz inclusions, soft.		NO OIL SHOW.
2928-2930	100	**SANDSTONE**: very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW.
2930-2932	100	**SANDSTONE**: very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, abundant tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW.
2932-2934	100	**SANDSTONE**: very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, abundant tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW.
2934-2936	100	**SANDSTONE**: very light gray (N8), fine in part medium, subangular to subrounded, fair sorted, Quartz hyaline, occasionally pyrite, abundant tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW.
2936-2938	90 10	**SANDSTONE**: very light gray (N8), coarse to medium in part very coarse, subangular, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable. **SHALE**: medium gray (N5) in part light brownish gray (5YR 6/1), massive, subblocky, occasionally Quartz inclusions, soft.		NO OIL SHOW.
2938-2940	90 10	**SANDSTONE**: very light gray (N8), coarse to medium in part very coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable. **SHALE**: medium gray (N5) in part light brownish gray (5YR 6/1), massive, subblocky, occasionally Quartz inclusions, soft.		NO OIL SHOW.
2940-2942	90 10	**SANDSTONE**: very light gray (N8), coarse to medium in part very coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable. **SHALE**: medium gray (N5) in part light brownish gray (5YR 6/1), massive, subblocky, occasionally Quartz inclusions, soft.		NO OIL SHOW.
2942-2944	80 20	**SHALE**: medium gray (N5) in part light brownish gray (5YR 6/1), massive, subblocky, occasionally Quartz inclusions, soft. **SANDSTONE**: very light gray (N8), coarse to medium in part very coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW.
2944-2946	80 20	**SHALE**: medium gray (N5) in part light brownish gray (5YR 6/1), massive, subblocky, occasionally Quartz inclusions, soft. **SANDSTONE**: very light gray (N8), coarse to medium in part very coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW.
2946-2948	90 10	**SANDSTONE**: very light gray (N8), coarse to medium, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable. **SHALE**: medium gray (N5) in part light brownish gray (5YR 6/1), massive, subblocky, occasionally Quartz inclusions, soft.		NO OIL SHOW.
2948-2950	100	**SANDSTONE**: very light gray (N8), coarse to medium in part very coarse, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable.		NO OIL SHOW.
2950-2952	90 10	**SANDSTONE**: very light gray (N8), coarse to medium, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, scarce tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable. **SHALE**: medium gray (N5) in part light brownish gray (5YR 6/1), massive, subblocky, occasionally Quartz inclusions, soft.		NO OIL SHOW.

2952-2954	90 30 10	**SANDSTONE**: very light gray (N8), coarse to medium, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, coarse tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable. **TUFFACEOUS SANDSTONE**: medium light gray (N6), in part brownish gray (5YR 4/1), fine to very fine, angular, fair sorted, tuffaceous matrix washed out, friable. **SHALE**: medium gray (N5) in part light brownish gray (5YR 6/1), massive, subblocky, occasionally Quartz inclusions, soft.		**NO OIL SHOW.**
2954-2956	80 20	**SANDSTONE**: very light gray (N8), coarse to medium, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, coarse tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable. **TUFFACEOUS SANDSTONE**: medium light gray (N6), in part brownish gray (5YR 4/1), fine to very fine, angular, fair sorted, tuffaceous matrix washed out, friable.		**NO OIL SHOW.**
2956-2958	60 40	**SANDSTONE**: very light gray (N8), coarse to medium, angular to subangular, fair sorted, Quartz hyaline, occasionally pyrite, coarse tuffaceous matrix washed out, loose, occasionally consolidated, poor porosity, loose, in part friable. **TUFFACEOUS SANDSTONE**: medium light gray (N6), in part brownish gray (5YR 4/1), fine to very fine, angular, fair sorted, tuffaceous matrix washed out, friable.		**NO OIL SHOW.**
2958-2960	50 40 10	**TUFFACEOUS SANDSTONE**: medium light gray (N6), in part brownish gray (5YR 4/1), fine to very fine, angular, fair sorted, tuffaceous matrix washed out, friable to moderate consolidate. **TUFFACEOUS SHALE**: brownish gray (5YR 4/1), in part brownish black (5YR 2/1), massive, subblocky, irregular fracture, in part plastic, soft. **TUFF**: White (N9) to very light gray (N8), massive, blocky to subblocky, washed out, earthy, in part sandy, vitreous, soft.		
2960-2962	60 40 Tr	**TUFFACEOUS SANDSTONE**: medium light gray (N6), in part brownish gray (5YR 4/1), fine to very fine, angular, fair sorted, tuffaceous matrix washed out, friable to moderate consolidate. **TUFFACEOUS SHALE**: brownish gray (5YR 4/1), in part brownish black (5YR 2/1), massive, subblocky, irregular fracture, in part plastic, soft. **TUFF**: White (N9) to very light gray (N8), massive, blocky to subblocky, washed out, earthy, in part sandy, vitreous, soft.		**COAL traces.**
2962-2964	70 30 Tr	**TUFFACEOUS SANDSTONE**: medium light gray (N6), in part brownish gray (5YR 4/1), fine to very fine, angular, fair sorted, tuffaceous matrix washed out, friable to moderate consolidate. **TUFFACEOUS SHALE**: brownish gray (5YR 4/1), in part brownish black (5YR 2/1), massive, subblocky, irregular fracture, in part plastic, soft. **TUFF**: White (N9) to very light gray (N8), massive, blocky to subblocky, washed out, earthy, in part sandy, vitreous, soft.		**COAL traces.**
2964-2970	60 30 10	**TUFFACEOUS SHALE**: brownish gray (5YR 4/1), in part brownish black (5YR 2/1), massive, subblocky, Coal & Pyrite inclusions, irregular fracture, in part plastic, soft. **TUFFACEOUS SANDSTONE**: medium light gray (N6), in part brownish gray (5YR 4/1), fine to very fine, angular, fair sorted, tuffaceous matrix washed out, friable to moderate consolidate. **TUFF**: White (N9) to very light gray (N8), massive, blocky to subblocky, washed out, earthy, in part sandy, vitreous, soft.		
2970-2973	60 30 20	**TUFFACEOUS SHALE**: brownish gray (5YR 4/1), in part brownish black (5YR 2/1), massive, subblocky, Coal & Pyrite inclusions, irregular fracture, in part plastic, soft. **TUFFACEOUS SANDSTONE**: medium light gray (N6), in part brownish gray (5YR 4/1), fine to very fine, angular, fair sorted, tuffaceous matrix washed out, friable to moderate consolidate. **TUFF**: White (N9) to very light gray (N8), minor medium bluish gray (5B 5/1), massive, blocky to subblocky, washed out, earthy, in part sandy, vitreous, soft.		
2973-2980	60 20 20	**TUFFACEOUS SHALE**: brownish gray (5YR 4/1), in part brownish black (5YR 2/1), massive, subblocky, Coal & Pyrite inclusions, irregular fracture, in part plastic, soft. **TUFFACEOUS SANDSTONE**: medium light gray (N6), in part brownish gray (5YR 4/1), fine to very fine, angular, fair sorted, tuffaceous matrix washed out, friable to moderate consolidate. **TUFF**: White (N9) to very light gray (N8), minor medium bluish gray (5B 5/1), massive, blocky to subblocky, washed out, earthy, in part sandy, vitreous, soft.		

2980-2985	40 40 20	**TUFFACEOUS SHALE**: brownish gray (5YR 4/1), in part brownish black (5YR 2/1), massive, subblocky, Coal & Pyrite inclusions, irregular fracture, in part plastic, soft. **TUFF**: White (N9) to very light gray (N8), minor medium bluish gray (5B 5/1), massive, blocky to subblocky, washed out, earthy, in part sandy, siltstone, soft. **TUFFACEOUS SANDSTONE**: medium light gray (N6), in part brownish gray (5YR 4/1), fine to very fine, angular, fair sorted, tuffaceous matrix washed out, friable to moderate consolidate.		
2985-2990	40 40 20	**TUFFACEOUS SHALE**: brownish gray (5YR 4/1), in part brownish black (5YR 2/1), massive, subblocky, Coal & Pyrite inclusions, irregular fracture, in part plastic, soft. **TUFF**: White (N9) to very light gray (N8), minor medium bluish gray (5B 5/1), massive, blocky to subblocky, washed out, earthy, in part sandy, siltstone, soft. **TUFFACEOUS SANDSTONE**: medium light gray (N6), in part brownish gray (5YR 4/1), fine to very fine, angular, fair sorted, tuffaceous matrix washed out, friable to moderate consolidate.		**END B*R/2 PHASE.**

11. PETROPHYSICAL ANALYSIS & HYDROCARBON EVALUATION

11.1 LOG INTERPRETATION PARAMETERS

Zone name : ARGO + HIDRA SDS

Top (MD RT m)	: 2840.0	Bot (MD RT m)	: 2970.0	Bit size (in)	: 8.5
Mud type	: WBM	Rmf (ohm.m)	: 0.105	T Rmf (°C)	: 23.9
PHIN clay (%)	: 0.3	RHO clay (g/cc)	: 2.52	DT clay (µs/ft)	:
RT clay (ohm.m)	: 2.	GR max (API)	: 120	GR min (API)	: 20
RHO matrix (g/cc)	: 2.65	RHO Hc (g/cc)	: 1.00	DT matrix (µs/ft)	:
"a"	: 0.9	"m"	: 2.	"n"	: 2.
Cp	:				
Rw (ohm.m)	: 0.13	T Rw (°C)	: 110.		
Sw Formula	: INDONESIAN				

Validated on: 16-August-01 by: A.GUIDI - D.PEREZ

11.2 CUT OFFS FOR NET PAY IDENTIFICATION

Zone name	MD RT (m)		VD SS (m)		CUT OFFS		
	Top	Bot	Top	Bot	PHI (%)	SW (%)	Vcl (%)
ARGO SD	2840.9	2865.9	-2491.3	-2516.3	10.	70.	40.
HIDRA SD	2865.9	2970.1	-2516.3	-2620.5	10.	70.	40.

Comments

Classification of reservoir quality (in percentage):

	VCL	POROSITY
A	less than 20	greater than 20
B	20-30	15-20
C	30-40	10-15
D	40-60	5-10
U	greater than 60	less than 5

Validated on: 16-August 01 by: A.GUIDI - D.PEREZ

11.3 RESERVOIR CHART

Reservoir	Reservoir MD KB (m) Top	Reservoir MD KB (m) Bot	Reservoir VD SS (m) Top	Reservoir VD SS (m) Bot	Layer MD KB (m) Top	Layer MD KB (m) Bot	Layer VD SS (m) Top	Layer VD SS (m) Bot	Fluid type	Gross int (m)	Net res (m)	Net pay (m)	Average Vcl (%)	Average Ph Ser (%)	Average (%)	Flow type	Hc (%)	Remarks
ARGO SQ					2841.7	2842.9	-2492.1	-2493.3	W	1.2	1.2	-	28.	12.1	87	C	-	
ARGO SQ					2842.5	2843.6	-2493.3	-2494.0		0.7	-	-	23.	6.5	100	D	-	
ARGO SQ					2843.6	2849.3	-2494.0	-2499.7	W	5.7	5.7	-	8.	13.	100	C	-	
ARGO SQ					2853.5	2853.1	-2502.9	-2503.6		0.6	-	-	42.	7.9	73	D	-	
ARGO SQ					2853.1	2853.8	-2503.6	-2504.3	W	0.6	0.6	-	19.	12.7	83	C	-	
ARGO SQ					2858.5	2858.6	-2508.7	-2508.8		0.3	-	-	54.	6.6	91.	D	-	
ARGO SQ					2858.6	2859.5	-2508.8	-2509.8	W	0.9	0.9	-	31.	11.8	73	C	-	
ARGO SQ					2859.5	2859.7	-2509.8	-2512.1		0.2	-	-	36.	9.8	74	D	-	
ARGO SQ					2859.7	2860.6	-2512.1	-2513.0	W	0.9	0.9	-	30.	10.8	75	C	-	
ARGO SQ					2860.6	2861.2	-2511.0	-2511.6		0.6	-	-	41.	6.3	77	D	-	
ARGO SQ					2862.7	2863.2	-2513.1	-2513.6	W	0.5	-	-	41.	7.8	79	D	-	
ARGO SQ					2863.2	2864.6	-2513.6	-2515.0	W	1.4	1.4	-	32.	11.6	79	C	-	
ARGO SQ					2864.6	2865.4	-2515.0	-2515.8		0.8	-	-	36.	8.9	79	C	-	
HIDRA SQ					2861.6	2862.8	-2542.0	-2543.2		1.2	-	-	41.	7.8	78	D	-	
HIDRA SQ					2862.8	2863.1	-2543.2	-2543.5	W	0.3	0.3	-	23.	10.9	91	C	-	
HIDRA SQ					2863.1	2864.0	-2543.5	-2544.4		0.9	-	-	46.	6.	78	D	-	
HIDRA SQ					2864.0	2868.1	-2544.4	-2548.5	W	4.0	4.0	-	23.	12.6	85	C	-	
HIDRA SQ					2868.1	2869.0	-2548.5	-2549.4	W	0.9	0.9	-	18.	15.9	75	B	-	
HIDRA SQ					2869.0	2869.5	-2549.4	-2549.9		0.5	-	-	28.	8.1	85	D	-	
HIDRA SQ					2869.5	2901.1	-2549.9	-2581.5	W	1.6	1.6	-	11.	13.8	97	C	-	
HIDRA SQ					2901.1	2902.4	-2581.5	-2582.8	W	1.3	1.3	-	4.	15.6	100	B	-	
HIDRA SQ					2902.4	2907.4	-2582.8	-2587.8	W	5.0	5.0	-	7.	13.8	100	C	-	
HIDRA SQ					2907.4	2907.8	-2587.8	-2588.0		0.2	-	-	28.	7.7	88	D	-	
HIDRA SQ					2908.4	2908.8	-2588.8	-2589.2	W	0.4	0.4	-	28.	11.5	88	C_+	-	
HIDRA SQ					2908.8	2909.1	-2589.2	-2589.5		0.3	-	-	32.	5.1	85	D	-	
HIDRA SQ					2909.1	2910.2	-2589.5	-2590.6	W	1.1	1.1	-	18.	12.1	5	C	-	
HIDRA SQ					2910.2	2910.7	-2590.6	-2591.1		0.5	-	-	32.	7.1	84.	D	-	
HIDRA SQ					2910.7	2911.0	-2591.1	-2591.4	W	0.3	0.3	-	21.	13.2	96	C	-	
HIDRA SQ					2911.0	2911.3	-2591.4	-2591.7		0.3	-	-	29.	7.5	83.	D	-	
HIDRA SQ					2911.9	2912.1	-2592.3	-2592.5	W	0.2	0.2	-	23.	13.3	91	C	-	
HIDRA SQ					2912.1	2912.5	-2592.5	-2592.9		0.4	-	-	33.	8.4	89.	D	-	

11.3 RESERVOIR CHART

Reservoir	Reservoir MD KB (m) Top	Reservoir MD KB (m) Bot	Reservoir VD SS (m) Top	Reservoir VD SS (m) Bot	Layer MD KB (m) Top	Layer MD KB (m) Bot	Layer VD SS (m) Top	Layer VD SS (m) Bot	Fluid type	Gross int (m)	Net res (m)	Net pay (m)	Averages Vcl (%)	Averages Phi (%)	Averages Sw (%)	Res type	+/-fac (m)	Remarks
HIDRA SQ					2912.5	2914.0	-2552.9	-2554.4	W	1.5	1.5	-	17.	12.8	95.	C	-	
HIDRA SQ					2914.0	2915.0	-2554.4	-2555.4		1.0	-	-	25.	9.8	92.	D	-	
HIDRA SQ					2915.0	2916.1	-2555.4	-2556.5	W	0.9	0.9	-	13.	13.1	87.	C	-	
HIDRA SQ					2916.1	2917.6	-2556.5	-2558.0		0.5	-	-	24.	9.4	89.	D	-	
HIDRA SQ					2917.7	2919.0	-2558.1	-2559.4		0.3	-	-	49.	7.7	91.	D	-	
HIDRA SQ					2919.0	2919.9	-2559.4	-2560.3	W	0.9	0.9	-	20.	11.8	95.	C	-	
HIDRA SQ					2919.9	2920.1	-2560.3	-2560.5		0.2	-	-	24.	9.3	97.	D	-	
HIDRA SQ					2920.1	2920.5	-2560.5	-2560.9	W	0.4	0.4	-	14.	12.6	100.	C	-	
HIDRA SQ					2920.5	2922.2	-2560.9	-2562.6	W	1.7	1.7	-	10.	15.6	97.	B	-	
HIDRA SQ					2922.2	2922.7	-2562.6	-2563.1	W	0.5	0.5	-	25.	12.5	93.	C	-	
HIDRA SQ					2922.7	2922.9	-2563.1	-2563.3		0.2	-	-	34.	9.5	89.	D	-	
HIDRA SQ					2923.5	2924.4	-2563.9	-2564.8		0.9	-	-	41.	9.7	79.	D	-	
HIDRA SQ					2924.5	2925.9	-2564.9	-2566.3		0.4	-	-	32.	9.1	86.	D	-	
HIDRA SQ					2925.9	2927.4	-2566.3	-2567.8	W	1.5	1.5	-	24.	11.5	96.	D	-	
HIDRA SQ					2927.4	2927.9	-2567.8	-2568.3		0.5	-	-	31.	9.5	89.	D	-	
HIDRA SQ					2929.5	2931.1	-2570.9	-2572.5	W	1.6	1.5	-	23.	11.6	93.	C	-	
HIDRA SQ					2931.1	2932.3	-2572.5	-2573.7		1.2	-	-	33.	9.3	87.	D	-	
HIDRA SQ					2932.5	2933.6	-2573.9	-2575.0	W	0.9	0.9	-	25.	10.5	96.	C	-	
HIDRA SQ					2933.6	2933.1	-2575.0	-2575.5		0.5	-	-	43.	8.8	76.	D	-	
HIDRA SQ					2933.1	2933.4	-2575.5	-2575.8	W	0.3	0.3	-	19.	12.4	94.	C	-	
HIDRA SQ					2933.4	2934.7	-2575.8	-2577.1	W	0.3	0.3	-	11.	16.8	100.	B	-	
HIDRA SQ					2934.7	2935.2	-2577.1	-2577.6	W	0.5	0.5	-	15.	14.1	100.	C	-	
HIDRA SQ					2935.2	2936.0	-2577.6	-2578.4	W	0.8	0.8	-	14.	16.2	100.	B	-	
HIDRA SQ					2937.8	2938.1	-2579.2	-2579.5		0.3	-	-	33.	8.	90.	D	-	
HIDRA SQ					2938.1	2939.9	-2579.5	-2581.3	W	0.8	0.8	-	31.	12.	97.	C	-	
HIDRA SQ					2939.9	2940.1	-2581.3	-2581.5		0.2	-	-	41.	7.5	97.	D	-	
Averages:											-							
ARGO SQ					2940.5	2965.9	-2481.3	-2516.3	W	25.0	10.9	-	16.	10.3	90.	C	-	
HIDRA SQ					2965.5	2979.1	-2515.3	-2530.5	W	134.2	59.4	-	16.	10.5	95.	B-C	-	

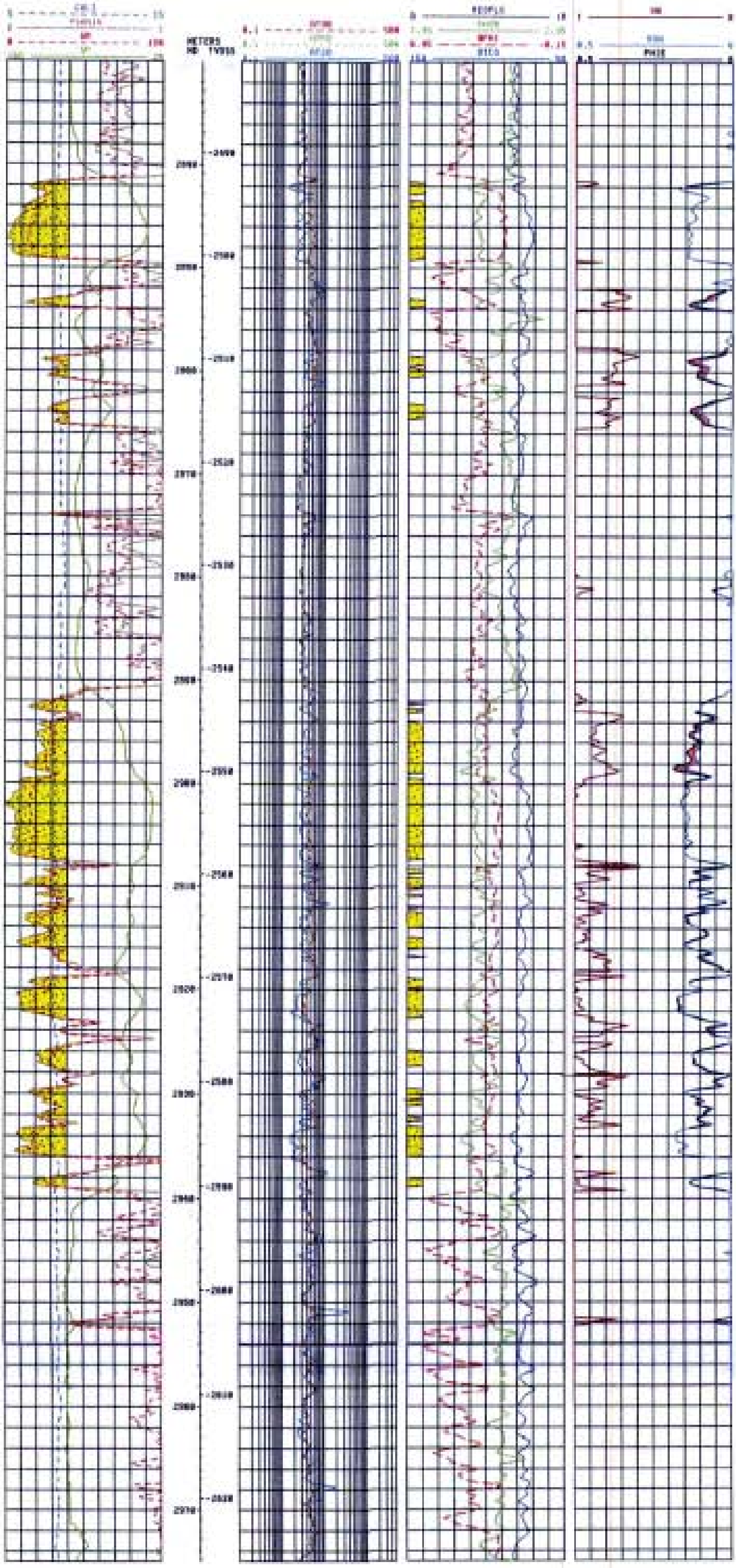
El Martillo.x-1 WELL
INTERPRETED COMPOSITE LOG

Name: El Martillo.x-1/1

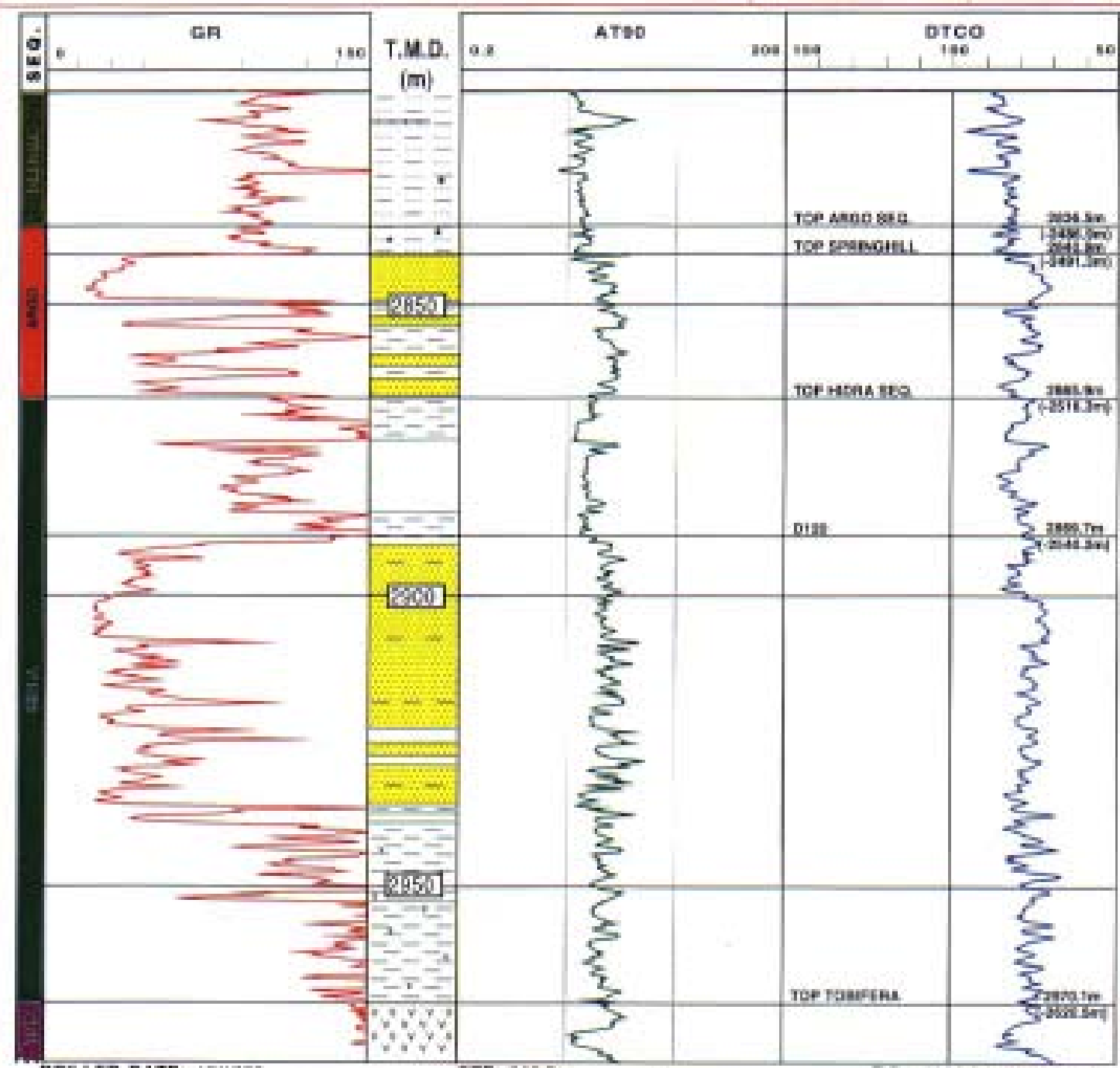
ELEV: KB 348.8 METERS MD

TD: 2992.0 METERS MD

ADJUNTO DE INFORME
Nº 24519
ORIGINAL



El Martillo.x-1
RESERVOIR COMPOSITE LOG (Scale: 1/1000)



DRILLED DATE: 12/1999 RTE: 348.5m T.D.: 2990.0m (-2640.4m)

RESERVOIR DATA

	ARGO SEQ	HIDRA SEQ	TOTAL
GROSS THICKNESS (m)	25.0	104.2	129.2
NET SAND (A+B+C) (m)	10.9	28.4	39.3
NET/GROSS (%)	44	27	30
GAS NET PAY (m)	-	-	-
OIL NET PAY (m)	-	-	-
POROSITY (%)	12.8	13.5	13.3
CORE PERMEABILITY (mD)	-	-	-
DST PERMEABILITY (mD)	-	-	-
WATER SATURATION (%)	92	95	94

COMMENTS:

CUT OFF Ø > 10% Vsh < 40% SW < 70%

FLUID DISTRIBUTION

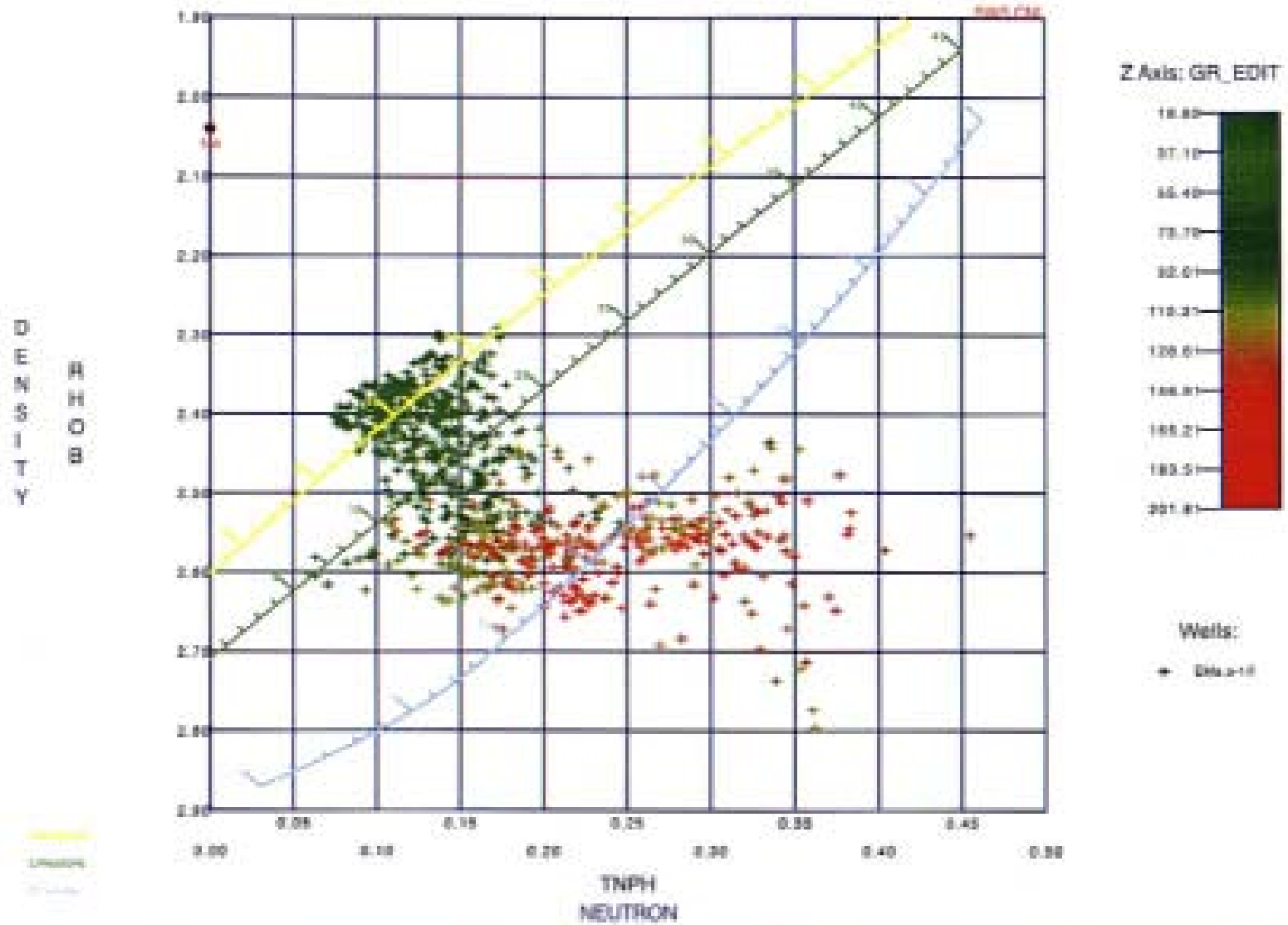
HPG		
LPG		
GOC		
HPO		
LPO		
OWC		
GWC		
HPW		

COMMENTS:

El Martillo.x-1
RHOZ / TNPH / GR CROSSPLOT

Date: Thu Oct 19 16:41:00 2000

Depth Interval: 2841.00 - 2970.00



12. DRILL STEM TESTING

12. DRILL STEM TESTING

No DST was performed in this well.

FINAL LOG

TOTAL AUSTRAL

TOTAL AUSTRAL PLANTA DE CALCULO - DEPTH

VERTICAL SI.MARTILLO.X-15

SCA-ZIRA-N-15

COUNTRY: ARGENTINA

LICENSE: SANTA CRUZ DEPTO

CONTRACTOR

FINAL LOG

Depth Angle: 0.0° — Scale: 1:1000

Rig: H.S. 400 J. 3000

Drilling Fluid: Water

Elevation: KB: 24.0 / DF: 0.0 / GL: 0.0

Surface Coordinates

Gauge datum: CAMPO CACHAUPUEN
Coordinates system: Gauss Kruger POSGAR 1994

Point of reference: Wellhead
Coordinates: Lat: 50°18'0.0" S Long: 68°0'0.0" W

Drilling Coordinates

Gauge datum: CAMPO CACHAUPUEN
Coordinates system: Gauss Kruger POSGAR 1994

Point of reference: Wellhead
Coordinates: Lat: 50°18'0.0" S Long: 68°0'0.0" W

Geological coordinates

Point of reference: Wellhead
Coordinates: Lat: 50°18'0.0" S Long: 68°0'0.0" W

Spud date: 15-Jul-2011
Completion date: 30-Jul-2011

Total depth (Driller): 1.000 m
Total depth (Logger): 1.000 m
Final drilled hole: 1.000 m
Casing: 13 3/8" @ 0.00 m
Total penetration: 1.000 m
Total penetration in reservoir: 0.0 m

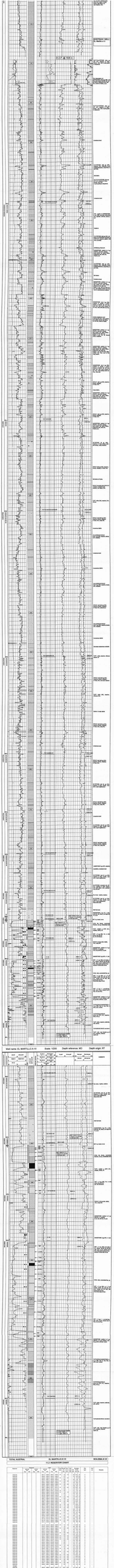
Operator: TOTAL AUSTRAL

Contractor: PIDE INTERNATIONAL
Rig Type: MOBIL/SEMI-S.A.
Engine: 3 CATERPILLAR 3508
Pump: 1 NATIONAL/PZ-8
Derricks: CAT PIDE DUCLEAN POLY CAMPTELL CHAPMAN

Log Interval: 0.0 m — 1.000 m

Log Interval: 0.0 m — 1.000 m

Log Interval: 0.0 m — 1.000 m


Well name: EL MARTILLO-E-1X
Scale: 1:200
Depth reference: MD
Depth origin: MD
TOTAL DEPTH:
EL MARTILLO-E-1X
COLOMBIA, S.A.
T.J. RESERVOIR CHART

MASTER LOG

Encl. 1a

MASTERLOG
MEASURED DEPTH

Petro-Canada

TOTAL ALISTRAL

WELL: El Martillo x-1P

Schlumberger

TOTAL ALISTRAL

TOTAL WELLSITE GEOLOGIST:

GEOMECHANICS PERSONNEL:

ORIGINAL

MD (m)	TWT (s)	Depth (m)	Lithology	Gas (%)	Oil (%)	Water (%)	Description
1000	1.000	1000					
1500	1.500	1500					
2000	2.000	2000					
2500	2.500	2500					
3000	3.000	3000					
3500	3.500	3500					
4000	4.000	4000					
4500	4.500	4500					
5000	5.000	5000					
5500	5.500	5500					
6000	6.000	6000					
6500	6.500	6500					
7000	7.000	7000					
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139000	139.000	139000					
139500	139.500	139500					
140000	140.000	140000					
140500	140.500	140500					
141000	141.000	141000					
141500	141.500	141500					
142000	142.000	142000					
142500	142.500	142500					
143000	143.000	143000					
143500	143.500	143500					
144000	144.000	144000					
144500	144.500	144500					
145000	145.000	145000					
145500	145.500	145500					
146000	146.000	146000					
146500	146.500	146500					
147000	147.000	147000					
147500	147.500	147500					
148000	148.000	148000					
148500	148.500	148500					
149000	149.000	149000					
149500	149.500	149500					
150000	150.000	150000					

Encl. 2b

MASTERLOG
MEASURED DEPTH

PROFILE TM21_01K.PR1

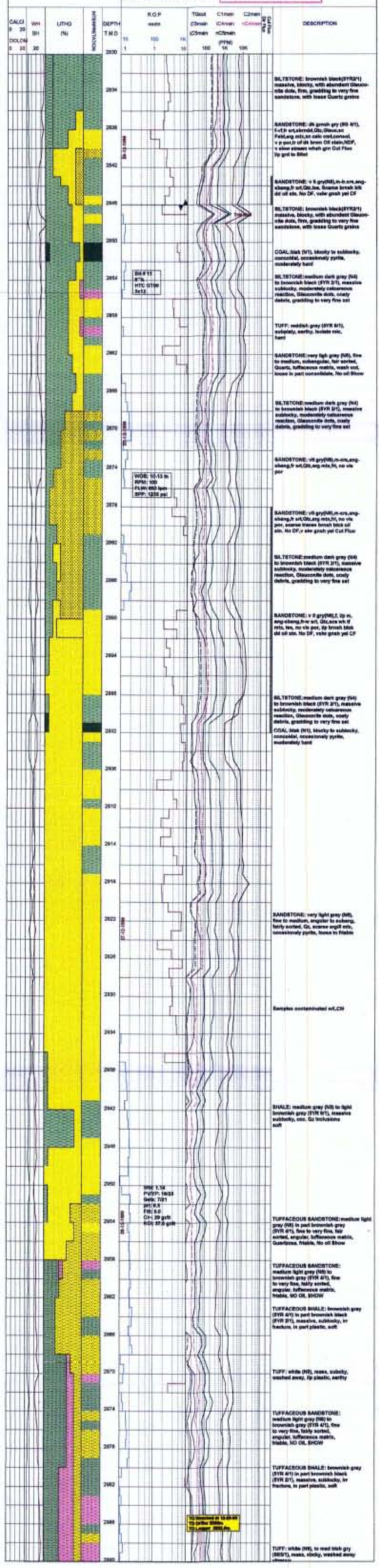
TOTAL AUSTRAL	COORDINATES (m)	CASINGS	WELL:
SUBSURFACE MASTERLOG : 1 / 200 DEPTH REFERENCE RT by GEOSERVICES	X(UTM) = 392306.83 Y(UTM) = 4391546.85 TD Driller (m): 2990 RT - MSL (m): 346.45	13"3/8 Shoe at m: 494 9"5/8 Shoe at m: 1776.0 7" Liner Shoe at m :	El Martillo x-1/I CONCESSION : Santa Cruz 1 - Oeste COUNTRY : ARGENTINA RIG : PI-306

Clstn. Shale · Silty Shale · Siltstone · Tuff. Shale · Tuff. Siltstone
Glauc.Siltstone · Calc. Shale · F Sandstone · Med Sandstone · Crs Sandstone
Conglomerate · Glauc.Sandstone · Tuff.Sandstone · Limestone · Dolomite
Tuff · Shaly TUFF · Granite · Coal · Cement
Metamorphics Rocks

TOTAL WELLSITE GEOLOGIST :
A. GUIDI / G. CAMPITELLI

GEOSERVICES PERSONNEL :
TDC:C.Falugi/C.Cantetti/G.Gui
ML:A.Allegerna/C.Drago/J.Zunino

ADJUNTO DE INFORME
Nº 24519
ORIGINAL



COMPOSITE SEISMIC CALIBRATION

Encl. 4

TOTAL FINA ELF
TOTAL AUSTRAL

Country: ARGENTINA

Permit: Santa Cruz I (Oeste)

COMPOSITE SEISMIC CALIBRATION
El Martillo.x-1

Scale: 1 cm for 50 ms

AUTHOR: GER - EF

DATE: 08/2000

FILE: HOME / EURIAT / SYNTOOL / martillo_withCS.mac

Processed by: SYNTOOL

WELL INFORMATION

Projection: UTM Zona 19 South
Datum: C. Inchauspe
x: 392 306.63 Lat: 50° 36' 51.425" S
y: 4 391 846.85 Long: 70° 31' 19.684" W

Rotary Table (RT): 348.45 m A MSL
GROUND LEVEL (GL): 342.0 m A MSL
Total depth (TD): 2992.5 m TVD

Operator: TOTAL AUSTRAL
Drilling Date: December 1999

SYNTHETIC SEISMOGRAM INFORMATION

Wavelet: Ricker 35 Hz- zero phase
Polarity convention: Impedance increase as black peak
Shift: 221msTWT
Replacement Velocity: 2100m/s

SEISMIC LINE INFORMATION

2 D LINE: VER 99-94-E-12
SP: 1026 Trace: 48
SEISMIC DATUM = 600 m AMSL
Note: The seismic loaded is shifted with reference to the seismic datum in + 200 ms TWT
Section Type: Migration - sampling rate: 4ms

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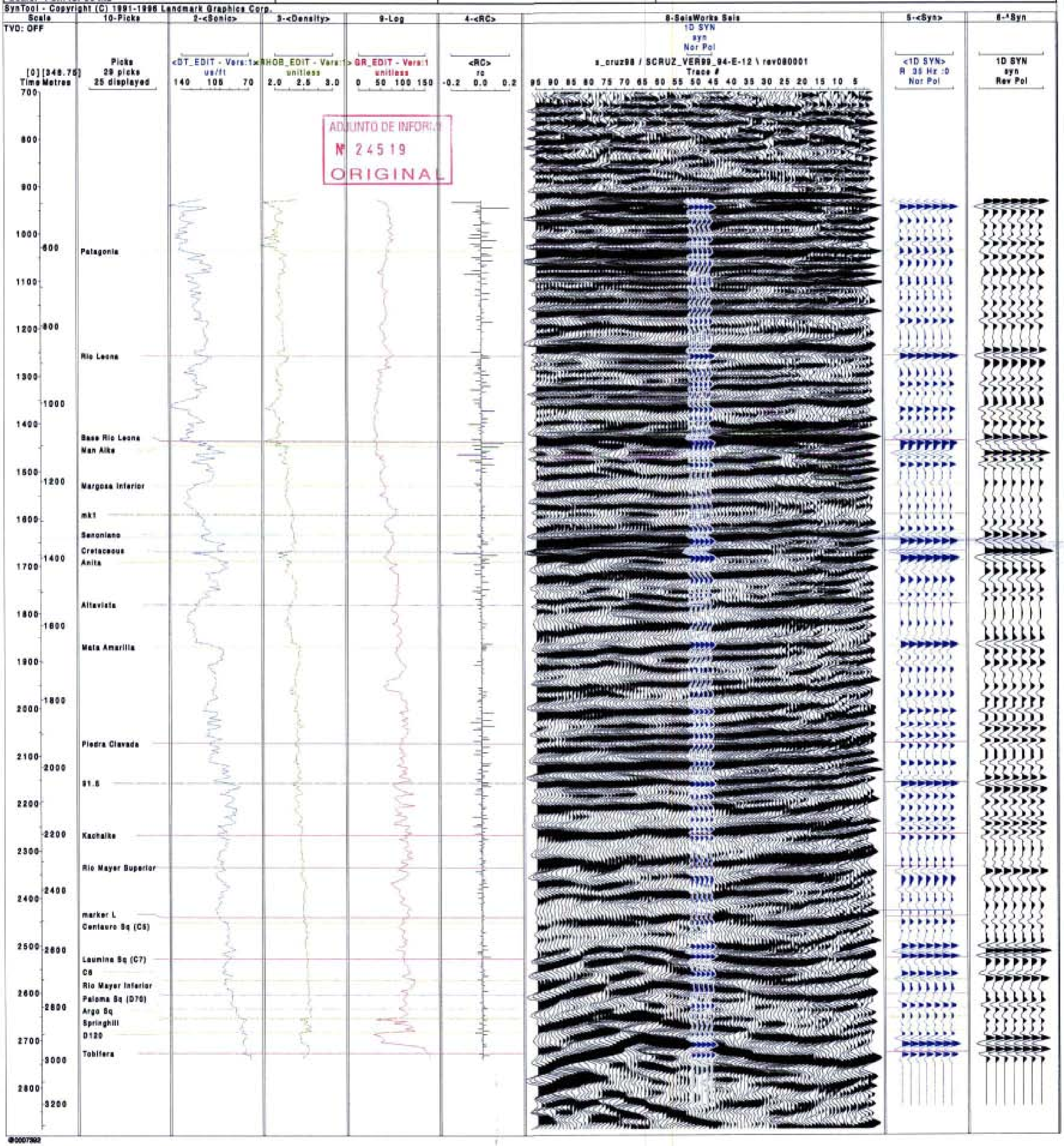

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