

Oficina principal
Av. Rivera
Navarrete 501,
Piso 11, San Isidro
Lima-Perú
T (511) 513 7500
F (511) 441 4217

Oficina Talara
Av. Jorge Chávez s/n
La Brea-Negritos,
Talara-Perú
Apartado 5-C Talara
T (51) (073) 284 000
F (51) (073) 393 137

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INTEROFFICE MEMORANDUM
DEVM- 008-13

To: Pedro Alarcon / Jin Seok Yi

From: H. Janampa, H. Cornejo, J.C. Muñoz, E. Borda

Date: March, 21st. 2013

Subject: **Proposal to Drill Development Well LO6-28D**

In order to continue developing the Rio Bravo reservoir towards south of LO6 platform in the Lobitos field, it is recommended to drill the proposed well **LO6-28D**, which will be located in a large reservoir block, where several wells have been drilled with good IPR's and cumulative production. Well control and 3D seismic data were used to locate the proposed well (Figures 1, 3, & 4)

Near production wells to proposed well are: LO6-22 with 624 BOPD of IPR and 352 MBO of accumulated, likewise the LO6-7, LO6-8 and LO6-9X with 155BOPD, 634 BOPD and 103 BOPD of IPR's and accumulates of 305 MBO, 249MBO and 87 MBO respectively. (Fig. 6)

Due to Rig capacity, the drilling design for **LO6-28D** is proposed as deviated well; with a maximum vertical angle of 61.96° towards S 35.16° W. Estimated final total depth is 9440 feet MD (-5190 feet VSS) (Figures 1, 2 & 4).

The top of Rio Bravo in the proposed **LO6-28D well**, will be located at 730 meters SW from LO6-22 and 518 meters SW from LO6-8 (Fig.1)
The Chance of success (COS) is 72 %

From sedimentary point of view, it is necessary to mention that the Rio Bravo formation consist of several sand bodies, which act as independent reservoirs (Fig. 3).

The vertical sequence of Rio Bravo suggest that this formation was deposited as Deep sea Fan complex in the lower section, grading to Shallow marine sands in the upper section, restricted to coastal facies with presence of shell fragments, with beach sand bars cut by channels. This sequence constitute the main reservoir sands based on production, lithology and electrical characteristics, likewise according to last 3D reprocessed seismic, several cross lines have confirmed the time line during the sedimentation of Rio Bravo, with progradation from northeast to southwest therefore is important to find the zones where these sands were deposited .

Due to future development of the block, it is important to keep the vertical angle and direction as close as possible to proposed LO6-28D well (Figures 1, 2, 4 & 5)

The proposed well **LO6-28D** ,is located in a large developed reservoir block, where it is expected to find the top of Rio Bravo at 5400 feet MD (-3242 feet VSS), with 240 feet of vertical net sand thickness (Figures 1, 2 & 5)

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Lithologically, Rio Bravo formation is composed of light gray, sub angular to sub rounded fine to medium grained sandstones, with calcareous cement, interbedded with thin shale breaks. According to seismic interpretation this well could find a different sand sequence in Rio bravo (Fig. 3), not penetrated by wells LO6-8 and LO6-22.

For a complete evaluation, better understanding and modeling of Rio Bravo reservoir, it is recommended a full logging set of gamma ray, resistivity, neutron-density and Pressure test points in Rio Bravo sands (Figure 2)

Based on production of neighboring wells for a Base Case, it is expected to produce with initial rate of 400 BOPD and reserves of 300 MBO for Rio Bravo (Fig. 7 & Table A)

The main risks associated with this well location are:

- Structural risk due to the existence of possible minor faults that could reduce the size of the block.
- Sedimentary changes that could reduce the net sand thickness and petrophysics properties.
- Unexpected low permeable sands could reduce production performance.

ECONOMIC SUMMARY

CASE	IP (BOPD)	EUR (MBO)	CAPEX (MUS\$)	NPV 10.5% (M\$)	PAY OUT (YRS)	AT PIR	ROR (%)
LOW	180	117	6,013	69	9.67	0.01	11
BASE	400	300	6,013	7,430	1.25	1.24	147.81
HIGH	620	420	6,013	12,426	0.67	2.07	>100

Base case reserves and IPR for this well are estimated 300 MBO & 400 BOPD respectively, the drilling cost estimated is US\$ 6013M, NPV is US\$ 7430M using portfolio parameters with discount rate of 10.5%

(Figures 7,8 & Tables A & B)

Cc: J. Duarte,	C. Hwang;	O. Nieto	K. Valencia
J. Garzon	R. Gilabert	V. Peralta	E. Gonzales
C. Valdizan	J. Chuyes	C. Montes	V. Delgado
C. Hamann	C. Ramírez	A. Agurto	Central File
J. Gwag	L. Torres	R. Corman	

Attached Documents

Fig. 1: Structural Map showing the Proposal Well ILO6-28D

Fig. 2: Geologic Prognosis

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- Fig. 3: NE-SW 3D seismic Line for proposal well LO6-28D
Fig. 4: NE-SW Structural Cross Section for proposal well LO6-28D
Fig. 5: Net Sand Thickness Map for Proposal well LO6-28D
Fig. 6: NE-SW Structural Cross Section for proposal well LO6-28D
Fig. 7: NE-SW Stratigraphic Correlation of Rio Bravo, south of LO6 Platform, including LO6-22, LO6-8, and LO16-26
Fig. 7: Estimated Oil Production and Reserves of Rio Bravo formation and closest producing wells
Fig. 8: Drilling Cost Time-Depth Chart of well LO6-28D.
Table A: Economic summary and Oil rate forecast for well LO6-28D
Table B: AFE for proposal well LO6-28D

TOP RIO BRAVO FM. - DEPTH STRUCTURE MAP

C.I. 100 ft

E. Borda

March 2013

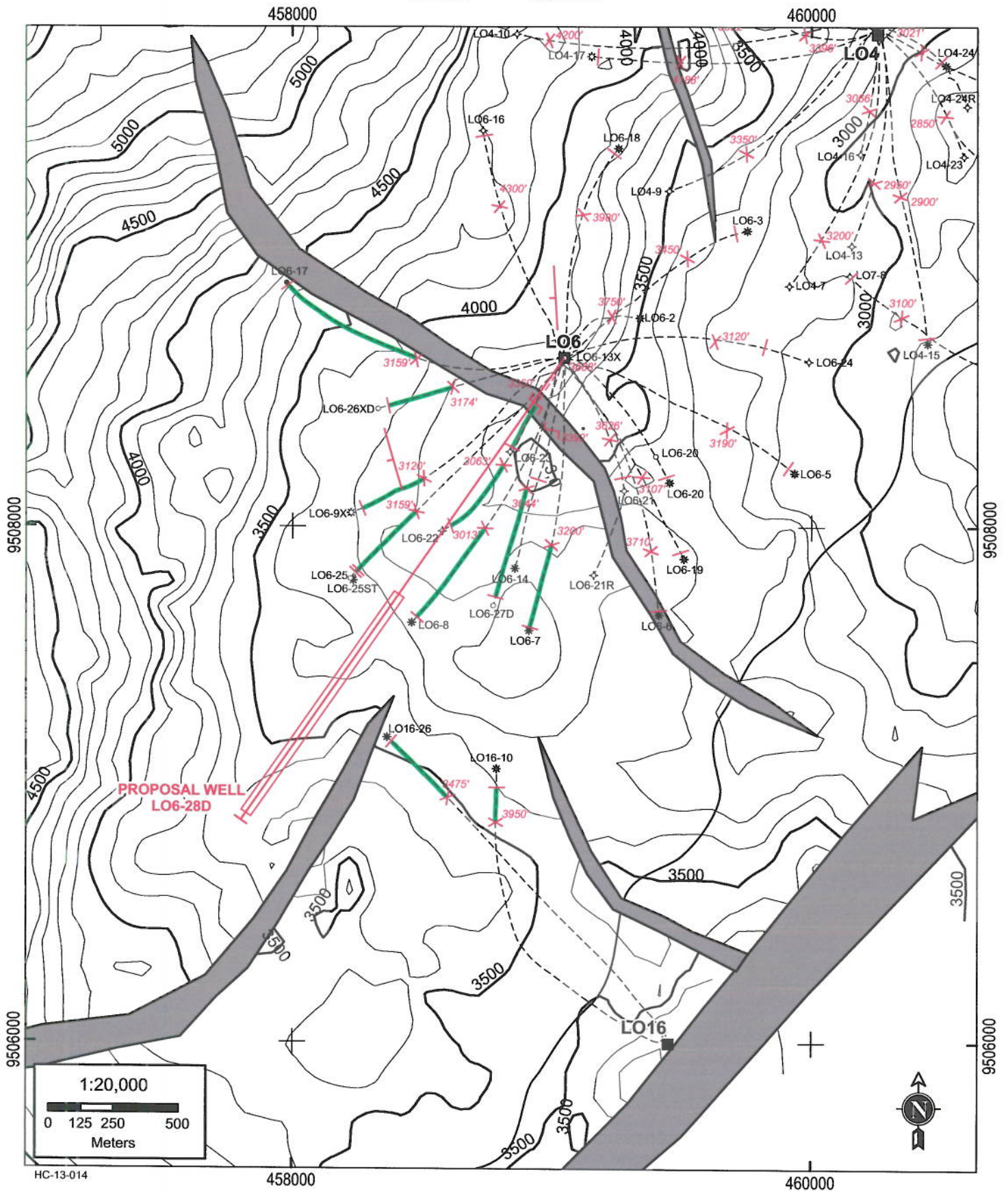
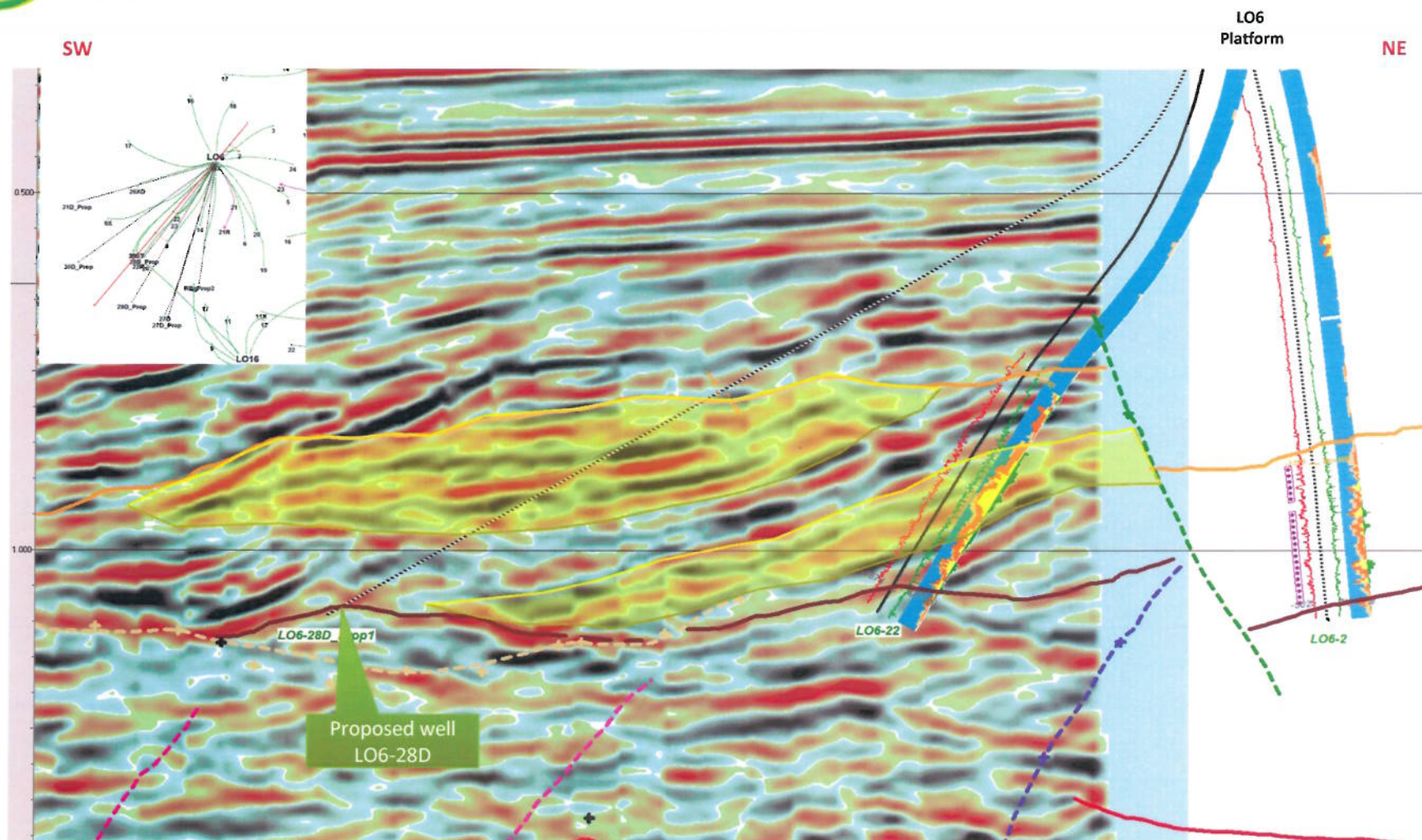


Fig. 1. Structural Map of Rio Bravo, showing the Proposal Well LO6-28D

Fig. 2 Geologic Prognosis

Fig. 2 Geologic Prognosis



Arbitrary seismic line showing proposed well LO6-28D where a new prograding sequence is observed. The well location might correspond to a different layer non-drilled by LO6-22 and LO6-8 wells.

Fig. 3 SW-NE Arbitrary Seismic line for proposal well LO6-28D

LOBITOS AREA
NW-SE STRUCTURAL SECTION
FOR PROPOSAL WELL LO6-28D

Scale 1:20,000

H. Comejo

March 2013

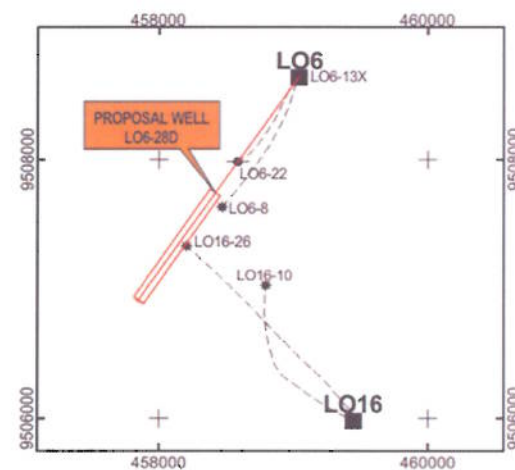
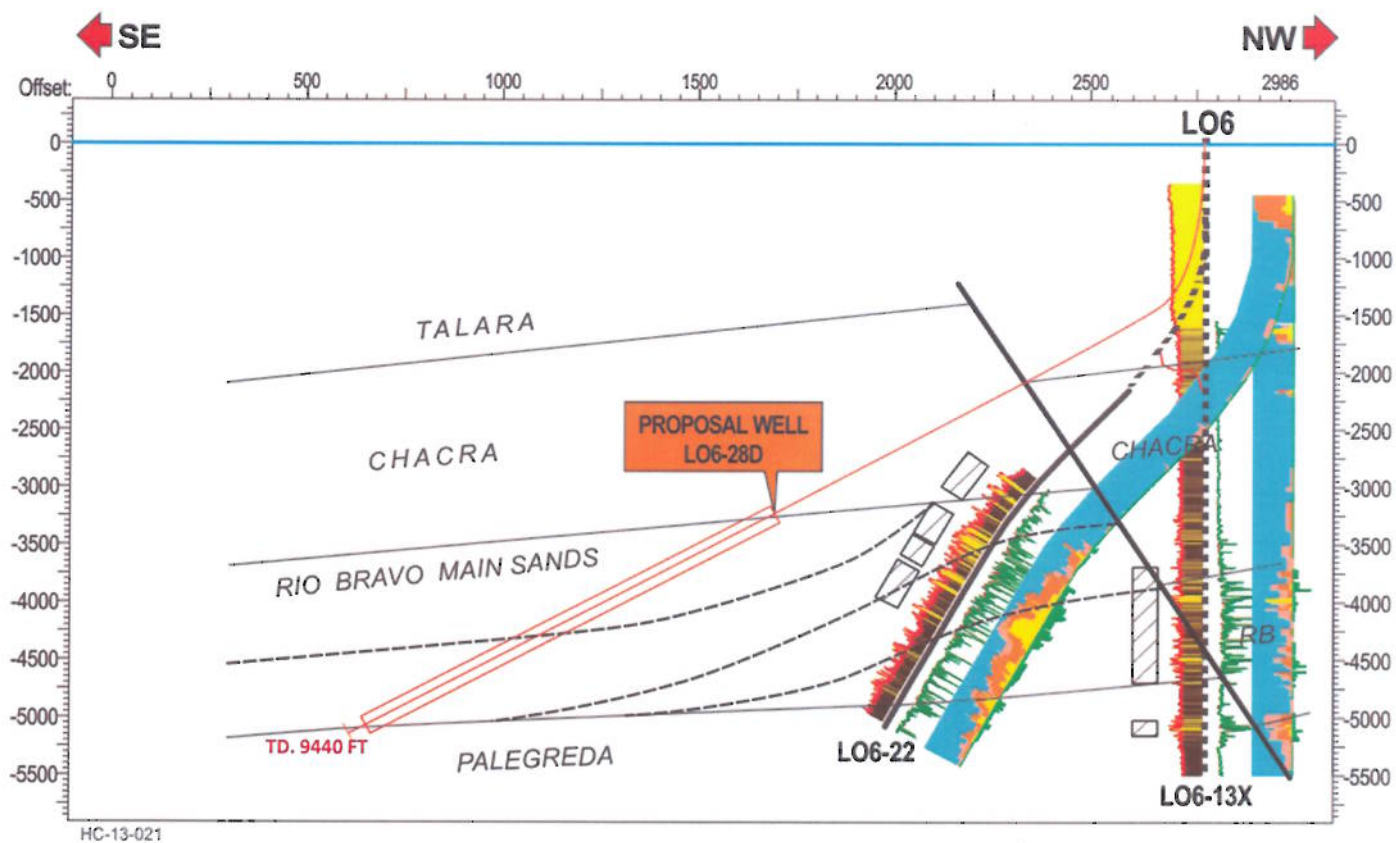


Fig. 4 Structural Cross Section for Proposal well LO6-28D

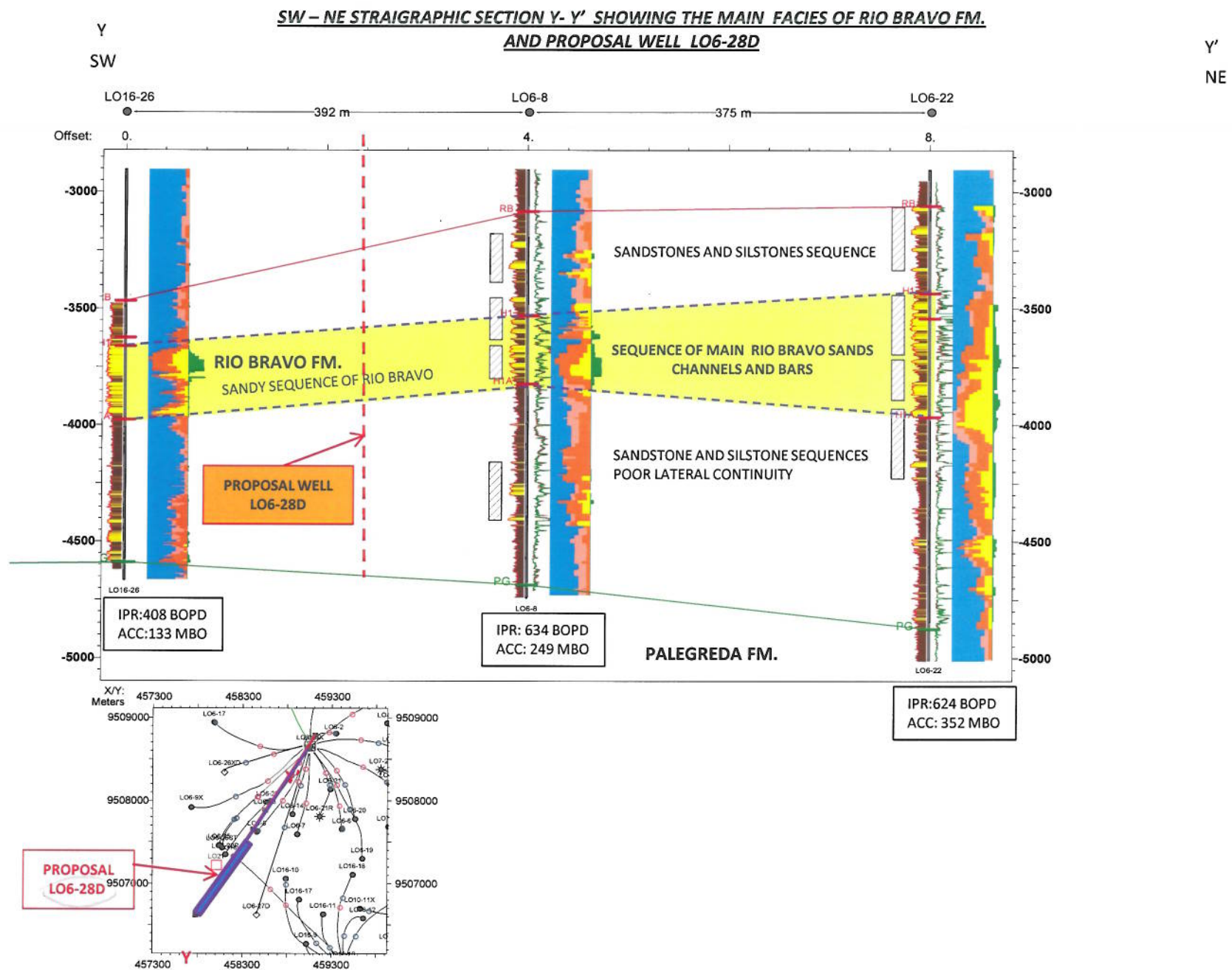
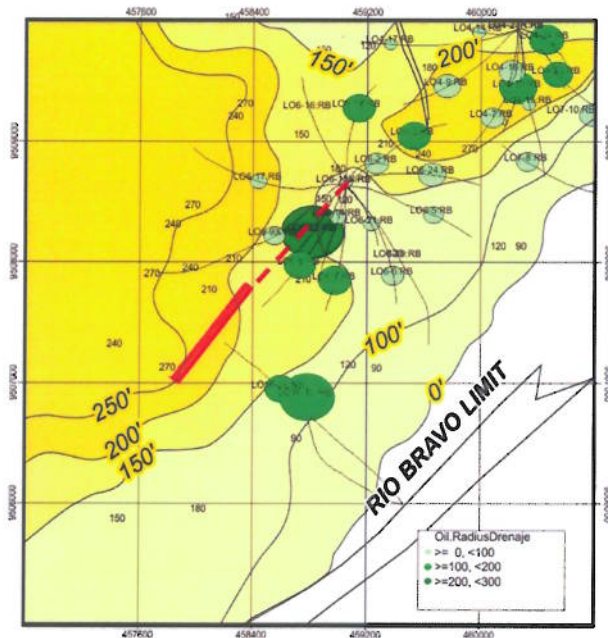


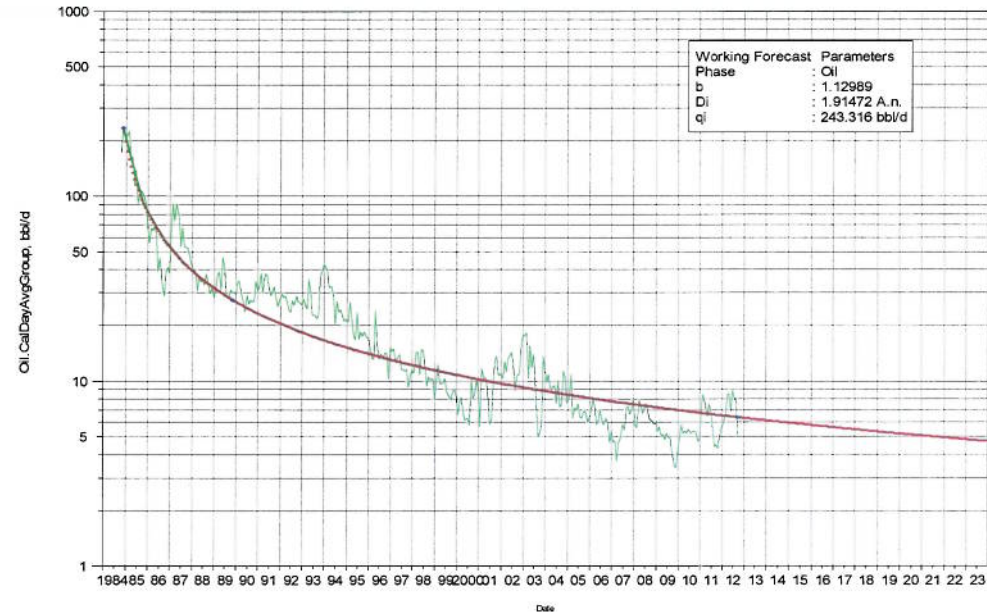
Fig.6 SW-NE Stratigraphic correlation of Main Rio Bravo Sands of proposal Well LO6-28D with LO6-22, LO6-8 and LO16-26 wells

Producción and Reservas – Rio Bravo Basal Salina

Drainage Radius – Rio Bravo Formation



Curve Type – Average Production



Flow Equation

Case	Fm.	Pr (Psi)	H (Feet)	Φ	k'	Sw	Bo	Uo	Ct	API°	Qi (BOPD)	Reserves MBO
LOW	RIO BRAVO	1298	90.0	10%	2.506	50.0%	1.194	0.629	1.379E-05	37	182	124
BASE	RIO BRAVO	1730	194.0	10%	2.506	50.0%	1.227	0.629	1.379E-05	37	400	300
HIGH	RIO BRAVO	2422	166.8	10%	2.506	50.0%	1.326	0.629	1.379E-05	37	620	420

Pi (Initial reservoir pressure estimated)= 2422 psi

Fig. 7 Estimated Oil Production and reserves of Rio Bravo Formation and closest producers wells

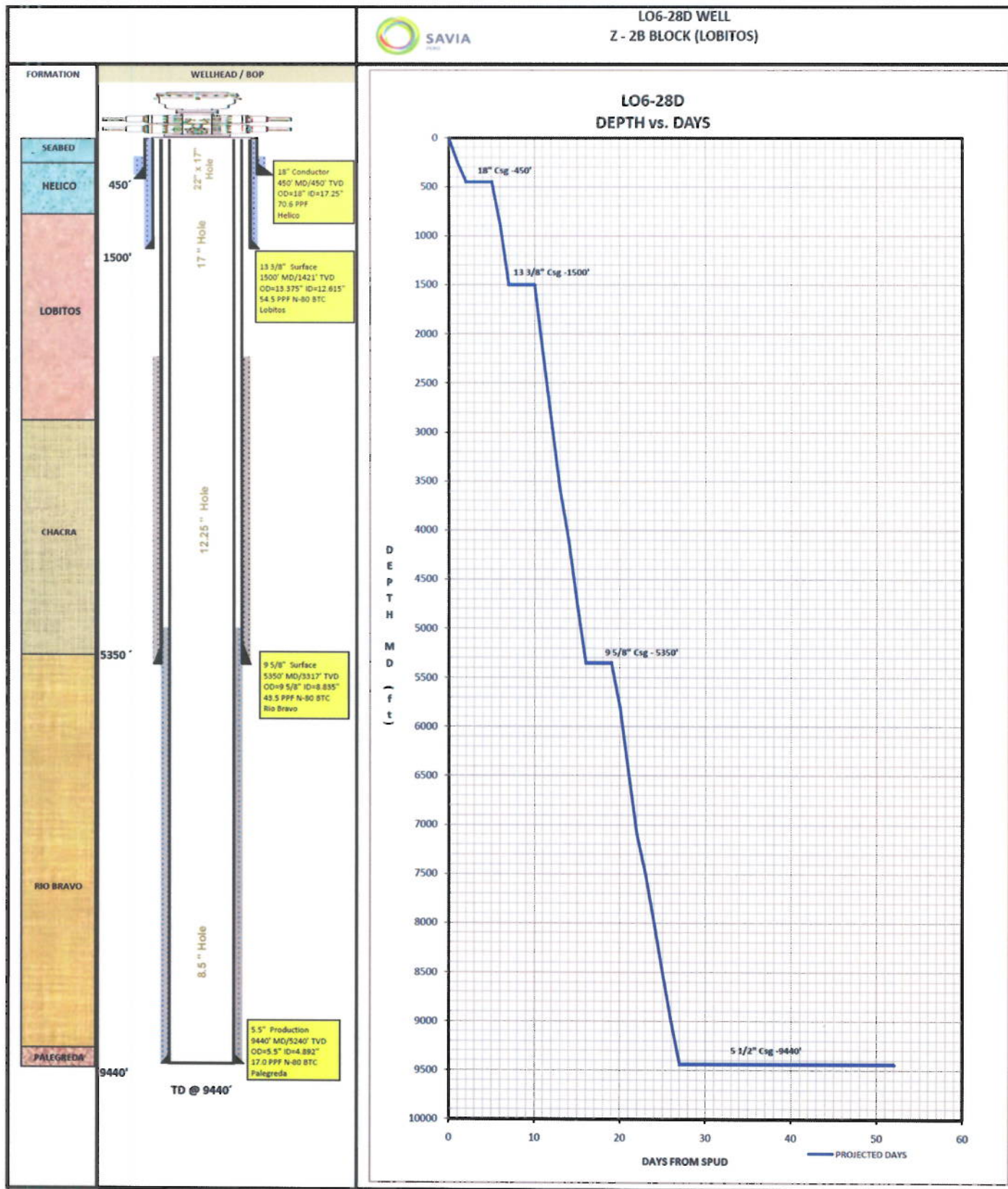


Fig. 8 ; Drilling and Cost Time-Depth of well LO6-28D

Economic Summary (Savia)

LO6_28D_BASE

(Nominal values)

Interests & Settings

Net Revenue

Net Expi

Net Dev

Net Opex

Disc. Rate

BT NPV

AT NPV

BT PIR

AT PIR

DPI

AT ME

AT IE

84.00

0.00

100.00

100.00

0.00

17,362.00

11,546.00

2.89

1.92

2.92

-6,013.00

1.92

Company (% of Total)

Company (% of Contr)

Partner (% of Contr)

Contr

NOC

Model

Global Params

Escalation Date

Discount Date

Economic Limit

100.00

0.00

0.00

84.00

0.00

Peru License R Fact (2003)

Sava Peru

2013/01

2013/01

2023/12

10.50

11,677.00

7,430.00

1.98

1.24

2.24

-6,013.00

1.24

12

11,342.00

7,028.00

1.89

1.17

2.17

0

0

AT ROR (%)

AT Payout (yrs)

F&D (\$/BOE)

Lifting Costs (\$/BOE)

147.81

1.25

23.81

1.98

147.81

1.25

23.81

1.95

147.81

1.25

23.81

1.86

Contr Take (%)

NOC Take (%)

Govt Take (%)

52.59

0.00

47.41

Cash Flow Breakdown

(M\$)

(\$/BOE)

(M\$) [10.5 %]

(\$/BOE) [10.5 %]

(%)

24,108.00

95.46

18,579.00

73.57

100.00

Oil

Gas

NGL

Tar

Total

(MSTB)

(MMSCF)

(MSTB)

(MSTB)

(MBOE)

301.00

0.00

0.00

0.00

301.00

Contr

Comp WI

Company

253.00

301.00

253.00

Less:

Bonuses & Fees

Operating Costs

Tariffs

Prod & Asset Taxes

Capital Costs

Plus: Other Income/Expense

0.00

0.00

0.00

0.00

0.00

0.00

Before Tax Cash Flow

Less Income Tax

After Tax Cash Flow

17,362.00

5,816.00

11,546.00

68.75

23.03

45.72

12,066.00

4,494.00

7,572.00

47.78

17.60

29.96

Reserves and Investments

Project

Contr

Comp WI

Company

0.00

0.00

301.00

253.00

Acquisition

Exploration

Development

Abandonment

Total

(M\$)

(M\$)

(M\$)

(M\$)

(M\$)

0.00

0.00

6,013.00

0.00

6,013.00

0.00

0.00

6,013.00

0.00

6,013.00

0.00

0.00

6,013.00

0.00

6,013.00

Comp Cash Flow

All values are Company (Comp) Share unless specified otherwise.

Sales Volume

Oil

Price

Net Revenue

Sales Volume

Oil

Price

Net Revenue

(-) Operating Costs

(-) Capital Costs

Amortization

Taxable Income

Before Tax Cash Flow

After Tax Cash Flow

Comp Cash Flow

After Tax Cash Flow

Comp Cash Flow

2013(12)

2014(12)

2015(12)

2016(12)

2017(12)

2018(12)

2019(12)

2020(12)

2021(12)

2022(12)

2023(12)

Total

71.00

57.00

37.00

28.00

23.00

19.00

16.00

15.00

13.00

12.00

11.00

301.00

95.00

95.00

90.20

92.01

93.85

95.72

97.64

99.59

101.58

103.61

105.69

97.33

5,657.00

4,525.00

2,806.00

2,161.00

1,774.00

1,523.00

1,346.00

1,217.00

1,110.00

1,028.00

961.00

24,108.00

71.00

57.00

37.00

28.00

23.00

19.00

16.00

15.00

13.00

12.00

11.00

301.00

83.33

95.00

90.2

92.01

93.85

96.72

97.64

99.59

101.58

103.61

105.69

—

5,657.00

4,525.00

2,806.00

2,161.00

1,774.00

1,523.00

1,346.00

1,217.00

1,110.00

1,028.00

961.00

24,108.00

90.00

91.00

74

67

62

60

59

58

57

57

57

733.00

6,013.00

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6,013.00

1,418.00

1,134.00

741

559

450

379

328

291

260

236

217

17,362.00

4,149.00

3,300.00

1,991.00

1,535.00

1,261.00

1,064.00

959.00

866.00

793.00

735.00

687.00

17,362.00

1,390.00

4,435.00

2,732.00

2,094.00

1,711.00

1,463.00

1,287.00

1,159.00

1,053.00

971.00

904.00

5,816.00

-1,836.00

1,106.00

667.00

514.00

423.00

363.00

321.00

291.00

266.00

246.00

230.00

11,546.00

-1,836.00

3,329.00

1,691.00

1,580.00

1,289.00

1,100.00

960.00

868.00

787.00

725.00

674.00

7,430.00

Peep Version 2009.1

CONSIDERATIONS

Net Revenue Interest %	84%
Discount Rate %	10.5%
Tax	30%
Variable Cost, US\$/BL	0.91
Fixed MUS\$/Year	36.6
Cost MUSD\$	6,013
Oil Price according Portfolio MTP 2012: 95 US\$/BL for 2013 & 2014	
phased 2% yearly from 2015 to 2023.	

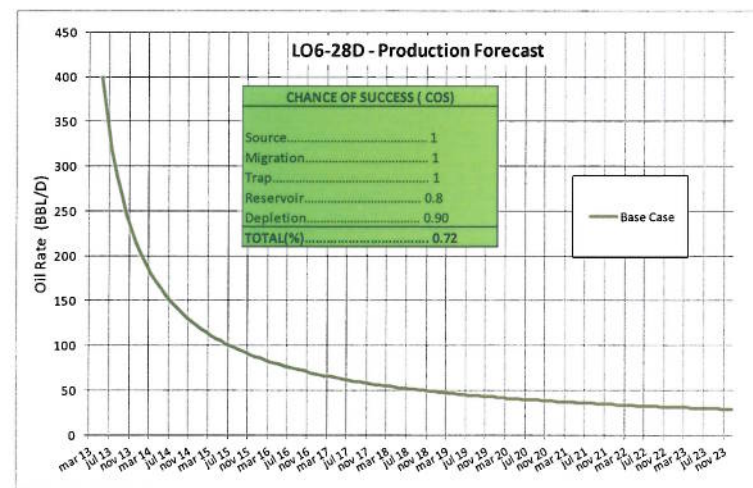


Table A; Economic Summary and Oil rate Forecast for Well LO6-28D



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CIA	ACD	BUDGET ITEM					AFE No.
06							
FU	WELL DESCRIPTION		OFICIAL NUMBER				MM / DD / AA
	LO6-28D		SAV-Z2B-24-LO6-28D				
TOTAL ESTIMATED DAYS							
FU	TYPE OF WELL	MOV / COND	DRILLING	COMPLETION	EST FOOTAGE	AREA	
	DEVELOPMENT	3	27	25	9440	LOBITOS	
FU	GEN	CC	AREA				
		702					
WELL COST BREAKDOWN							
SUB	DESCRIPTION		QUANTITY	UNIT COST	SUB-TOTAL	TOTAL US\$	
OUTSIDE SERVICES:							
201	DRILLING RIG		28	27		1,176,500 ✓	
203	DIRECTIONAL DRILLING					265,000 ✓	
204	MUD LOGGING		36	1500		54,000	
205	MUD ENGINEERING		36	20	1200 900	61,200	
206	CEMENT. CONDUCT.					28,400	
206	CEMENT. SURF. CSG					24,000	
206	CEMENT. INTERM. CSG.					27,680	
206	CEMENT. OTHERS					23,600	
206	CEMENT. CASING 7"					0	
206	CEMENT. CASING 5 1/2"					33,980	
207	ELECTRIC LOGGING					280,000 ✓	
208	PERFORATING					200,000 ✓	
209	STIMULATION					400,000 ✓	
211	TUBULAR INSPECTION					6,000	
213	DIVING					12,000	
212	HYDRAULIC TONGS					87,080	
219	WELL TESTING					9,000	
221	TOOL SERVICES					120,000 ✓	
224	METALIC STRUCTURES CUT & WELD					25,000	
226	CRANE MAINTENANCE					15,000	
228	MACHINE WORK					11,250	
229	BARGE OPERATIONS					291,500 ✓	
231	BOAT OPERATIONS					354,500 ✓	
237	MATER. & EQUIP. TRANSP.					18,200	
240	WATER FURNISHMENT					15,000	
244	TOOL RENTAL					61,094	
248	CATERING					70,125	
249	CONSULTING					68,750	
252	ENVIROMENTAL PROTECTION					35,000	
	TOTAL OUTSIDE SERVICES:					3,773,859	
MATERIALS & SUPPLIES:							
301	FITTING SCREWED					500	
303	VALVES AND PARTS					1,500	
304	API FLANGES & RING GASKET					1,800	
306	HARDWARE					2,000	
325	BITS					157,200 ✓	
326	TOOLS FOR DRILLING					63,780	
327	COMPLETIONS					146,700 ✓	
328	FLOATING EQUIPMENT - CMT.					21,760	
329	PRODUCTION FACILITIES EQUIP.					5,000	
335	OTHERS TUBULAR CONNECTIONS					12,500	
336	STRUCTURAL CONST. MAT.					5,000	
340	WELDING MATERIAL					1,000	
341	MAT. CMT. CONDUCT.					27,000	
341	MAT. CMT. SURF. CSG.					33,750	
341	MAT. CMT. INTERM. CSG.					38,000	
341	MAT. CMT. CASING 7"					0	
341	MAT. CMT. CASING 5 1/2"					40,500	
341	MAT. CMT. OTHERS					13,500	
342	STIMULATION MATERIAL					350,000 ✓	
343	DRILLING / COMPLETION FLUIDS					324,230 ✓	
344	CONDUCTORS		450	37.52		16,880	
344	SURFACE CSG.		1500	35.11		52,670	
344	INTERMED. CSG. (9 5/8")		5350	28.42		152,050 ✓	
344	7" CASING		0	18.33		0	
344	5 1/2" CASING		9440	11.24		106,110 ✓	
344	2 7/8" TUBING		8500	4.68		39,780 ✓	
346	DIESEL-FUEL					603,600 ✓	
347	OIL & GRASES					21,840	
348	LOGISTICS COST					0	
349	HELICOPTER					0	
	TOTAL MATERIALS & SUPPLIES:					2,238,650	
TOTAL PROJECT COST US \$						6,012,509 ✓	
APPROVAL BY :		DATE :					

Table B ; AFE for proposal Well LO6-28D