



BIDDING ROUND

BLOCK 192

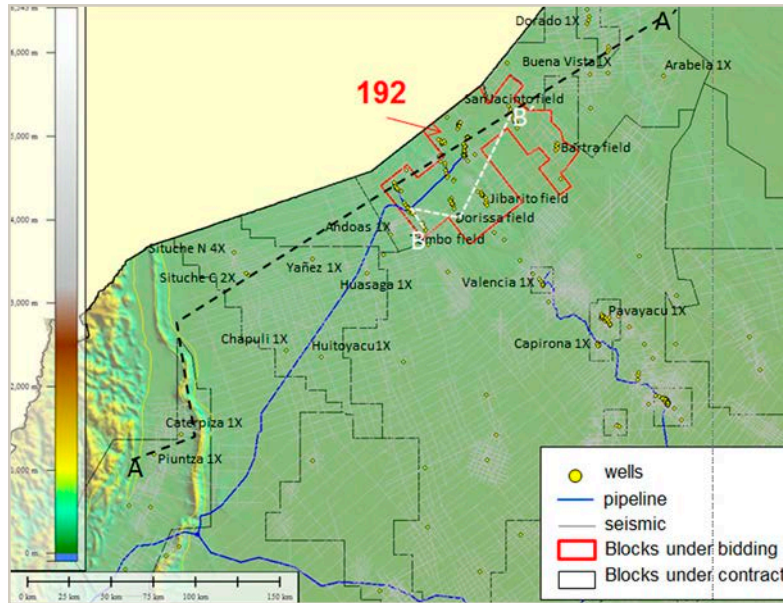
NORTH MARAÑÓN BASIN




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General Vision

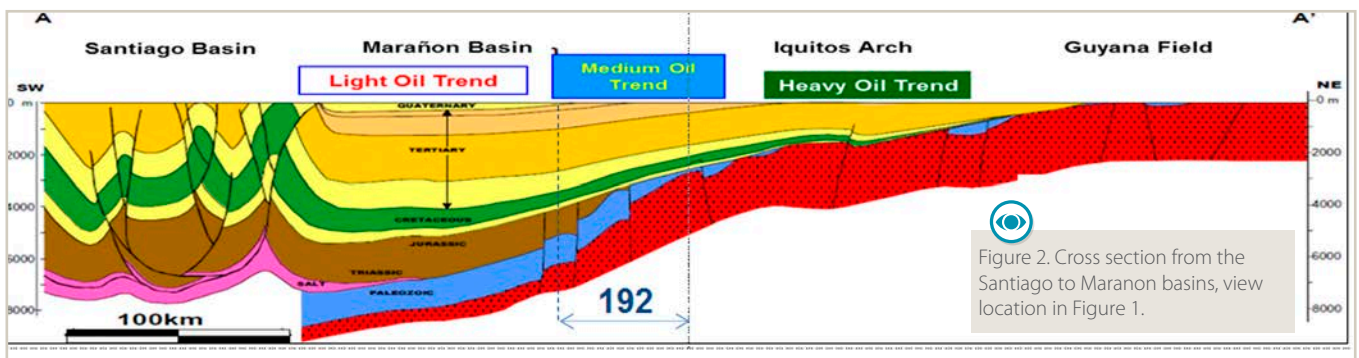



←  Figure 1. 2D Seismic and well map in the Northern Marañon Basin



General information

-  **LOCATION:** Block 192, located in the Loreto region.
-  **DISTANCE FROM LIMA:** 1,070 km
-  **AREA:** 512,347.241 ha
-  **LOGISTIC FACILITIES:**
Fluvial transportation
Iquitos and Pucallpa Airports
-  **AVAILABLE TECHNICAL INFORMATION:**
Fields: 12 fields under production, (Capahuari N/S, Carmen, Dorisa, Forestal, Huayuri N/S, Jibarito, Jibaro, San Jacinto, Shiviayacu and Shiviayacu NE fields).
Seismic: 2,850 km of 2D seismic and 8 cubes of 3D seismic, available in digital format.
-  **STRUCTURAL SETTING:** Block located in the foreland of the Marañon basin. The NW-SE alignment of the structures are influenced by the Andean compression related to the Miocene-Pliocene tectonic phase.
-  **STRATIGRAPHIC SETTING:** Paleozoic and Mesozoic deposits are covered by Miocene to Quaternary. Stratigraphy is described in Figure 3.



 Figure 2. Cross section from the Santiago to Marañon basins, view location in Figure 1.

POINT	COORDINATES WGS 84 UTM 18S	
	X - EAST	Y - NORTH
Est. Andoas (PR)	338,513.81	9'689,670.082
56 (PP)	323,838.26	9'705,085.677
45	339,563.40	9'717,444.333
51	345,735.55	9'709,576.257
39	361,460.69	9'721,934.910
23	349,102.30	9'737,689.014
3	382,726.47	9'763,968.235
7	387,643.14	9'753,597.189
1	400,401.81	9'770,342.527
2	408,480.02	9'764,444.548
6	402,673.38	9'756,823.998
13	412,124.91	9'749,638.887

POINT	COORDINATES WGS 84 UTM 18S	
	X - EAST	Y - NORTH
14	425,677.47	9'749,638.887
15	425,058.61	9'743,338.184
24	431,083.83	9'737,217.188
25	432,429.73	9'731,940.382
36	441,562.82	9'725,363.283
47	433,992.79	9'715,428.500
50	430,672.71	9'712,726.550
57	436,844.96	9'704,858.550
58	430,157.17	9'699,612.140
46	417,812.86	9'715,348.290
41	424,500.66	9'720,594.720
33	418,085.53	9'727,550.340
35	414,413.06	9'725,325.470

POINT	COORDINATES WGS 84 UTM 18S	
	X - EAST	Y - NORTH
37	411,604.41	9'723,200.480
22	399,260.10	9'738,936.640
34	383,534.96	9'726,577.990
65	408,223.58	9'695,105.684
78	376,773.30	9'670,388.394
73	364,428.99	9'686,124.542
77	348,693.65	9'673,779.194



Table 1. Coordinates of Block 192.

WELL	YEAR	COORDINATES (M)		OPERATOR	TD (M)	FORMATION AT TD	RESERVOIRS	° API AND COMMENTS
Situche Central 2x	2005	245943.92	9651620.10	OXY	5406.5	Cushabatay	Vivian/Cushabatay	35° API in Lower Vivian Fm.
Chapuli 1x	1981	268144.93	9606898.23	Superior Oil	5197.0	Cushabatay	Vivian/Cushabatay	No shows
Huitoyacu 3x	1982	288629.37	9603277.32	Superior Oil	5156.0	Cushabatay	Vivian/Chonta	Trace of oil fluorescence in Chonta Fm.
Limonyacu 1x	1995	283559.35	9541554.34	OXY	4406.6	Chonta	Vivian/Chonta	Oil traces in vivian Fm.
Huasaga 1x	1976	315535.82	9652539.17	Petroperú	4791.0	Cushabatay	Vivian, Agua Caliente and Cushabatay	No evidences
Huitoyacu 2x	1982	288629.37	9603277.32	Superior Oil	5156.0	Cushabatay	Vivian/Chonta, Agua Caliente and Cushabatay	Fluorescence in Chonta Fm.
Valencia 1x	1975	418226.62	9648631.46	Petroperú	3595.0	Sarayaquillo	Vivian/Chonta and Cushabatay	Fluorescence in Vivian, Chonta Sand and Agua Caliente.
Piraña 1x	1998	459839.74	9785887.97	Barret	2111.2	Basement	Vivian/Chonta and Agua Caliente	Shows in Vivian and Agua Caliente
Dorado 1x	1998	457354.49	9835275.68	Barret	2245.0	Basement	Vivian/Chonta and Agua Caliente	Shows in Yahuarango and Lower Chonta
Arabela 1x	1994	492534.00	9770531.00	Mobil	1763.0	Basement	Vivian/Chonta and Agua Caliente	Shows in Vivian (Biodegraded 10° to 15° API)
Capahuari Norte 1x	1972	333812.72	9702001.66	OXY	5580.0	Sarayaquillo	Vivian/Chonta, Agua Caliente and Cushabatay	35° API in Chonta Fm.
Dorissa 1x	1978	365878.05	9695013.27	OXY	3510.0	Agua Caliente	Vivian/Chonta and Agua Caliente	Trace of oil fluorescence in Vivian Fm (35° API)
Forestal 3x	1973	370521.00	974045.25	OXY	3653.0	Pucara	Vivian/Chonta, Agua Caliente and Cushabatay	Good fluorescence in Vivian Fm.
Huayuri 19x	1975	361952.53	9716242.31	OXY	3403.0	Agua Caliente	Vivian/Chonta and Agua Caliente	8-10° API in vivian Fm. And 36° API in Chonta Fm.
San Jacinto 1x	1978	404059.06	9742742.58	OXY	2680.0	Agua Caliente	Vivian/Chonta and Agua Caliente	13.4° API in Vivian Fm. And 30° API in Chonta Fm.
Shiviyacu NE 1XD	1973	373445.62	9723687.77	OXY	3324.0	Cushabatay	Vivian/Chonta and Agua Caliente	Shows in Chonta Fm.



Table 2. Exploratory wells in and around the Block 192.



Reservoirs

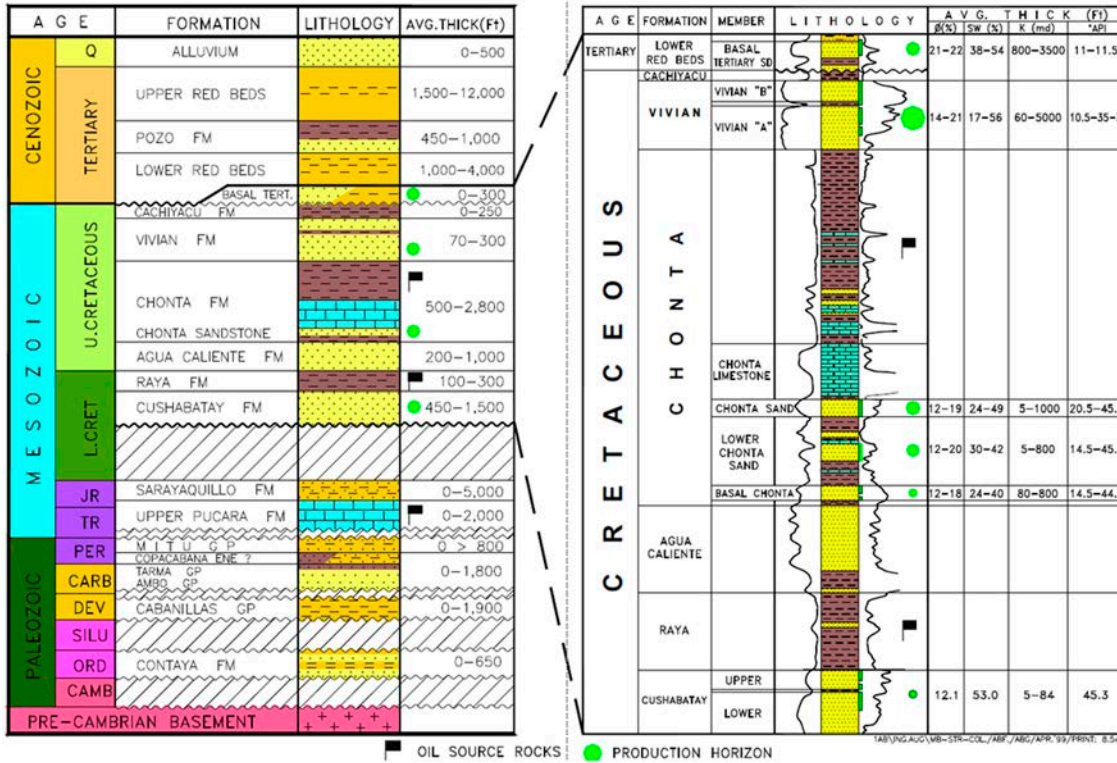


Figure 3. Generalized column for the Block 192, showing the main Petroleum system (PLUSPETROL, 2012)

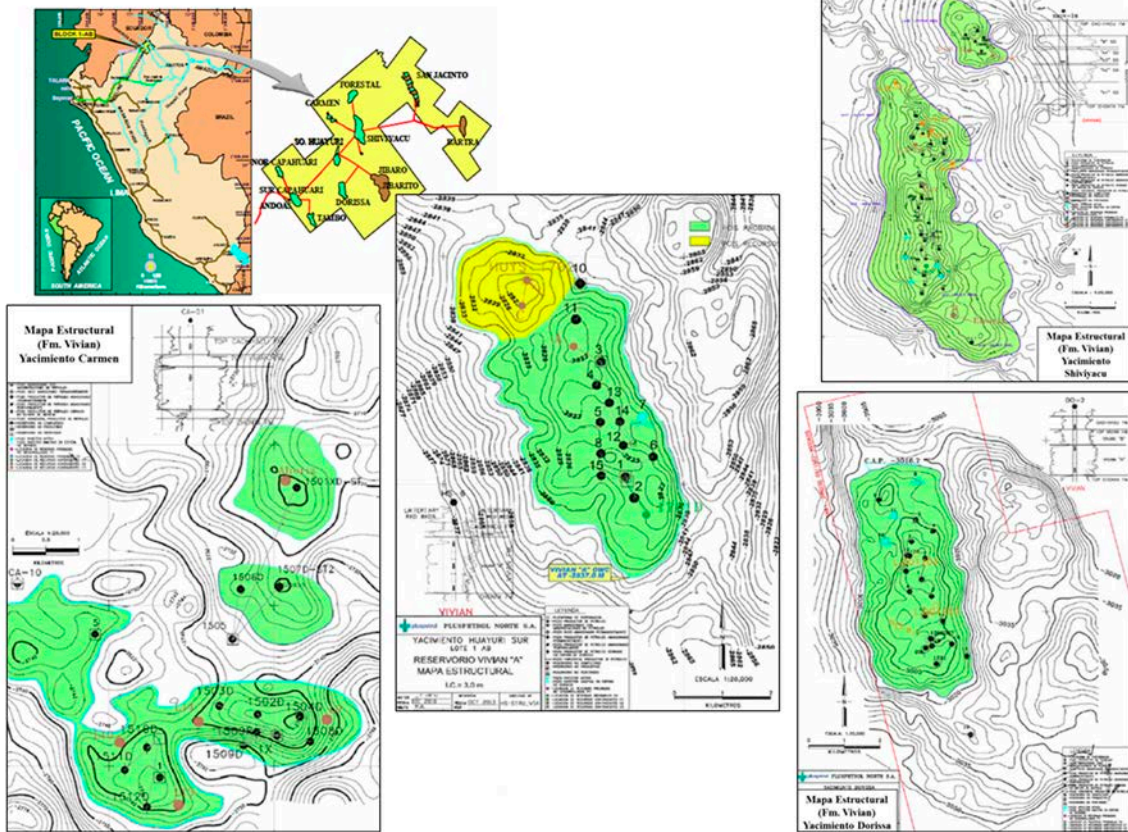


Figure 4. Some oil fields in the Block 192 (Pluspetrol, 2012)



Reservoirs

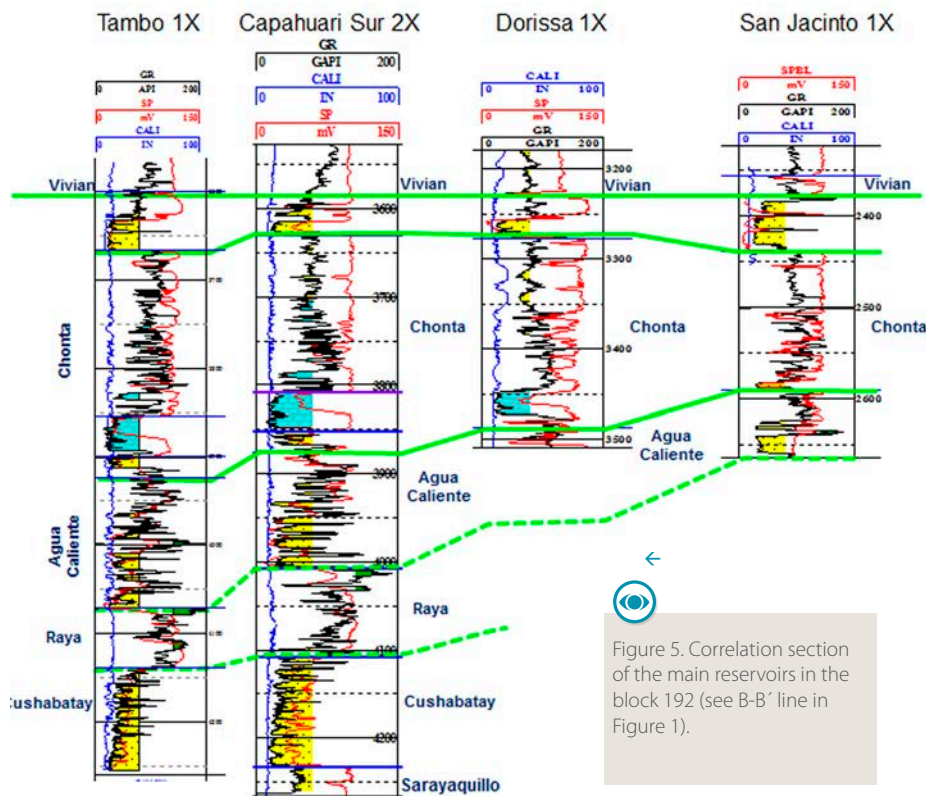


Figure 5. Correlation section of the main reservoirs in the block 192 (see B-B' line in Figure 1).

The Block 192 is located in the northern part of the Marañon basin (Figure 1). The oil is produced from the Upper Cretaceous reservoirs of Vivian and Chonta formations, which are also productive in Ecuador (Oriental basin) and Colombia (Putumayo basin).

The Vivian formation is the most important reservoir in this block and consists of white quartz sandstones deposited in a fluvial sedimentary environment. The porosity of this reservoir ranges from 18-24% and has been found to have permeabilities up to 5 darcies especially in heavy oil reservoirs.

The Chonta formation is a typical sandstone of a marine environment coast/shoreline where the maximum porosities are 18% and permeabilities can reach a maximum of 500 mD. There are other productive bodies located towards the bottom of the Chonta called Lower Chonta and basal Chonta which have been found in the Dorissa, Forestal and San Jacinto fields.

The reservoirs become deeper from east to west and range from 2,500 to 3,150 meters for Vivian and 3,000 to 3,900 meters for Chonta formations. The average gravity is 18° API, resulting from the mixture of light crude (30°-40° API), heavy oil (10.5°-16.5° API) and medium oil (18°- 22.5° API).

The Agua Caliente formation is a sequence of coarsening-upward sandstones which thickness can reach up to 350 m. Generally, this formation has favorable reservoir characteristics. In the central and eastern part of the basin, the formation was deposited in a shallow marine to deltaic environment. The wells that reached this unit found it in a fluvial environment.

The Pre-Cretaceous sequence is a new exploration play in the region. To the southwest of the basin, the potential reservoirs are related to Copacabana and Permian sandstone, which hydrocarbon potential has not been developed yet.

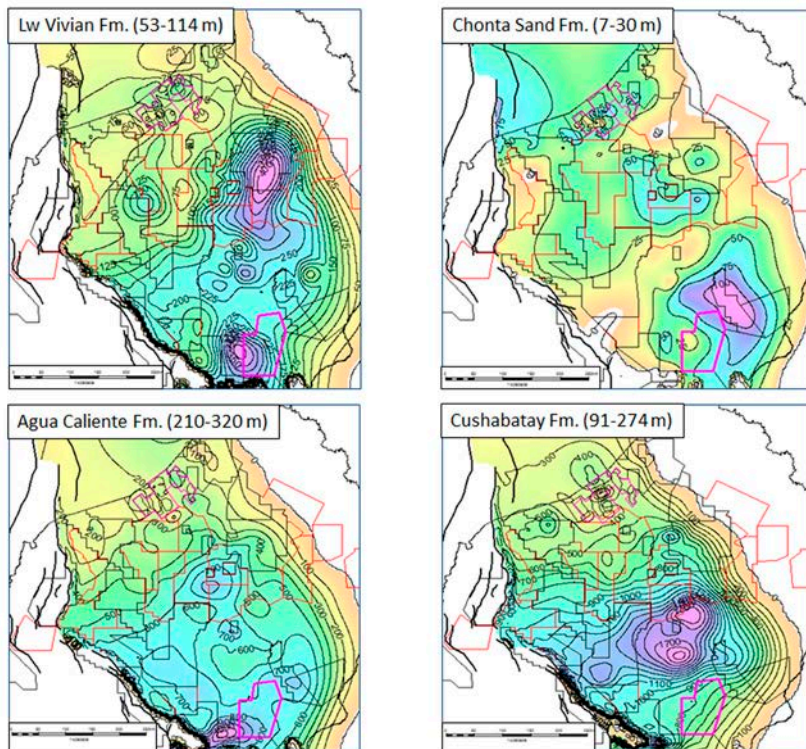


Figure 6. Isopach maps of the main reservoirs in the Marañon basin (TALISMAN, 2010).



Structural Framework

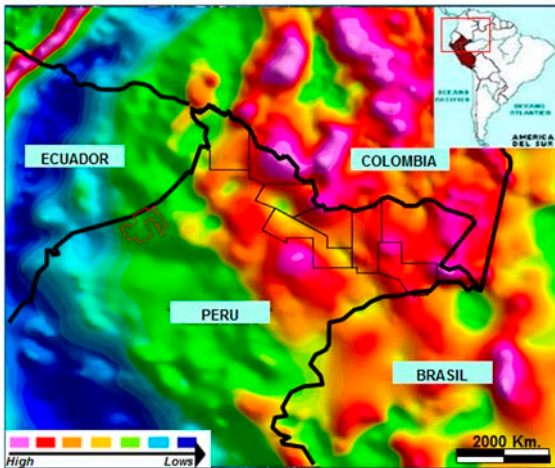


Figure 7. Satellite gravimetric map (Petrobras, 2006).

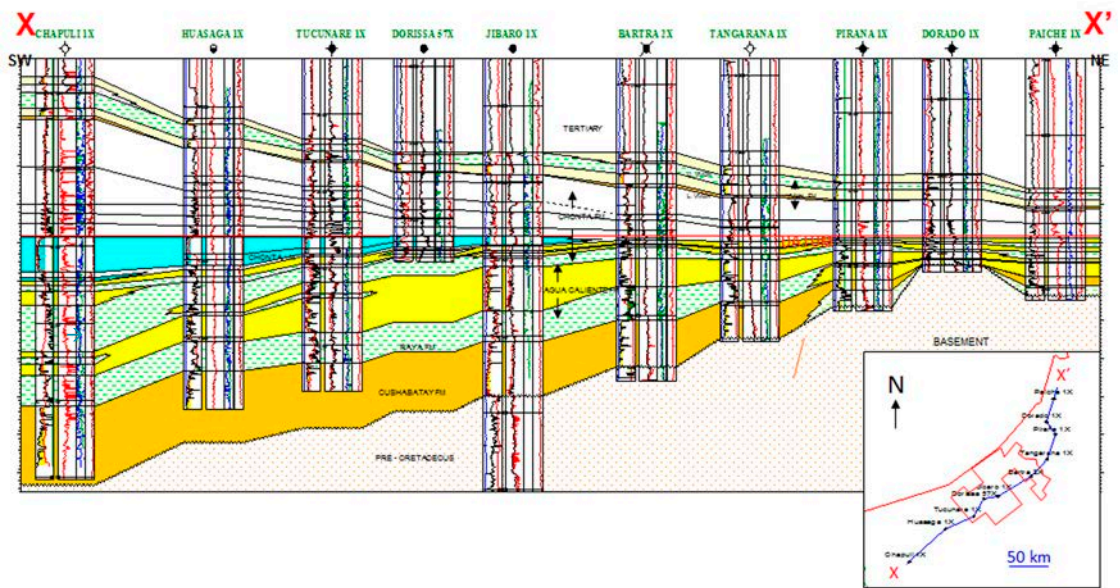


Figure 8. Structural and stratigraphic cross section, showing the cretaceous reservoirs (PARSEP,2003)

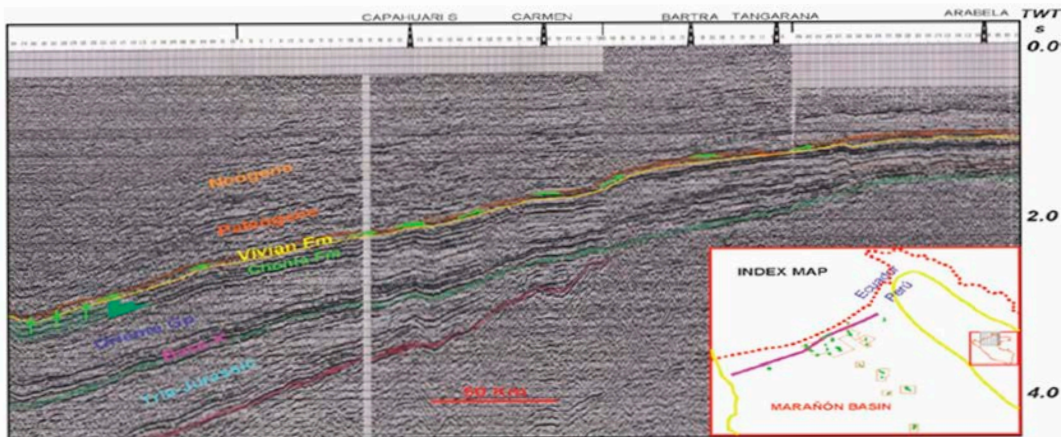


Figure 9. Chonta-Vivian, Petroleum System Migration Model.

Hydrocarbon Potential



Fig. 10 Petroleum Systems in Marañon Basin with maturity limits, locations of wells, exploration blocks, structural trends and location of Block 192. (Talisman, 2011)

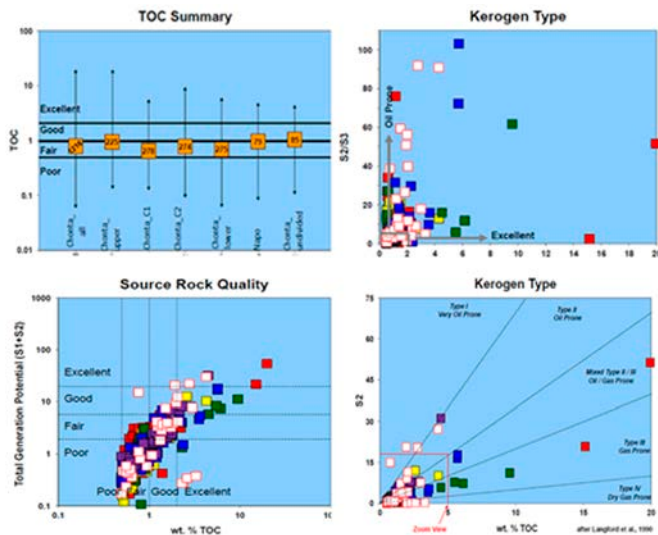
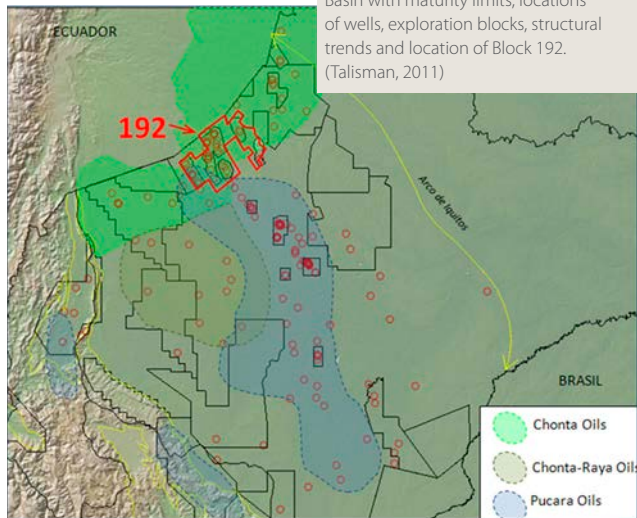


Fig. 11 Summary of source rocks in the Marañon basin (Talisman, 2011).

- Mi-Oligocene
- Pale-Eocene (Yahuarango)
- Late Cretaceous
- Late Cretaceous Coal
- Mid Cretaceous
- Cretaceous (Cushabaty)
- Jurassic
- Triassic-Permian
- Carboniferous
- Devonian (Cabanillas)
- Ordovician (Contaya)



The Block 192 located in the Marañon Basin shows three oil families from light oil (25° to 35° API), medium oil (16.3° to 23.3° API), and Heavy oil (10.4° to 15.1° API). The structures of Block 192 are anticlines of low relief, axes oriented NE-SW and N-S. The structural closures varies from 4 to 20 ms. The Top of the Chonta Limestone is also an excellent seismic reflector, with good continuity and seismic correlation in the block.

The two main reservoirs are Vivian Formation and Chonta Sand Member:

- > Structural Traps with lateral stratigraphic variations and Early Structural Evolution.
- > 85% Reserves: Vivian Reservoir.
- > Vivian: Porosity 14-21%; Permeability 20-5000md, Chonta: Porosity 12-19%; Permeability 5-1000md.
- > Vivian: strong water drive.
- > All reservoirs are filled to the spill point.

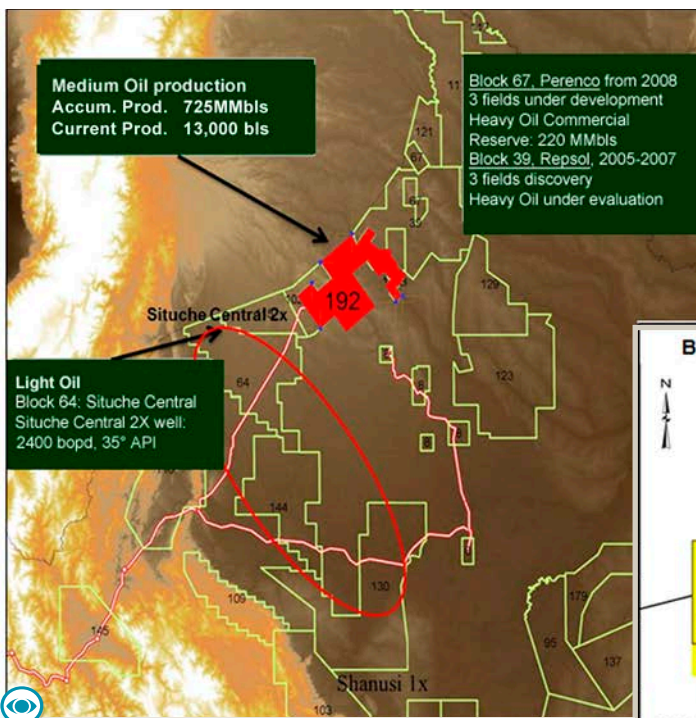
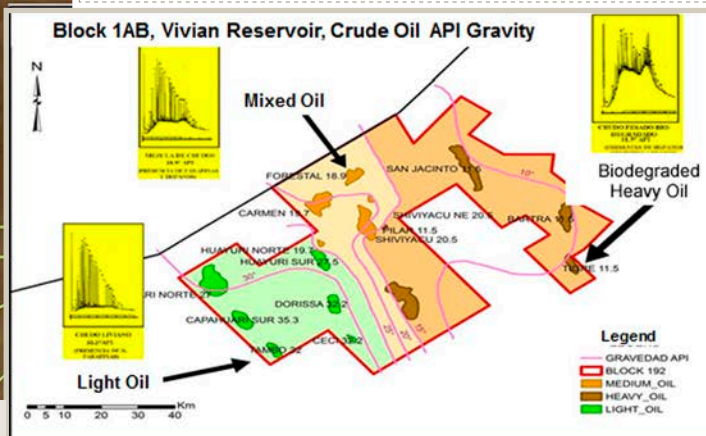


Figure 12. Hydrocarbon occurrences in the Northern Marañon basin.





Prospects in the area

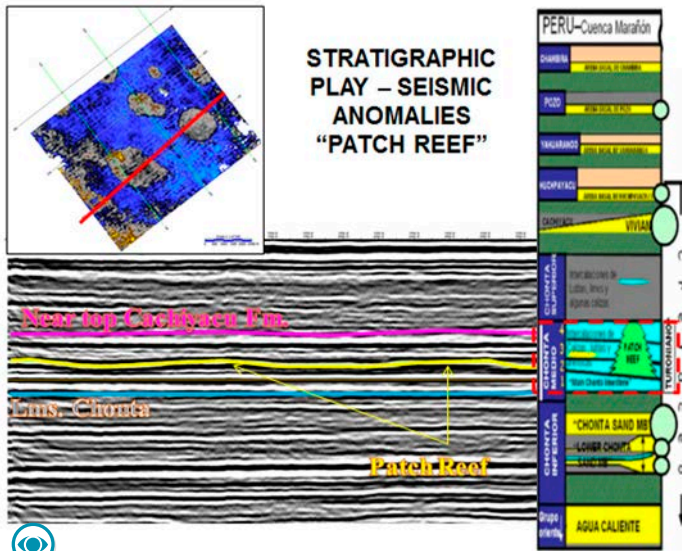


Figure 13. Composite map showing the Stratigraphic Play in The Tambo and Ceci areas (Modified from Guevara, 2007)

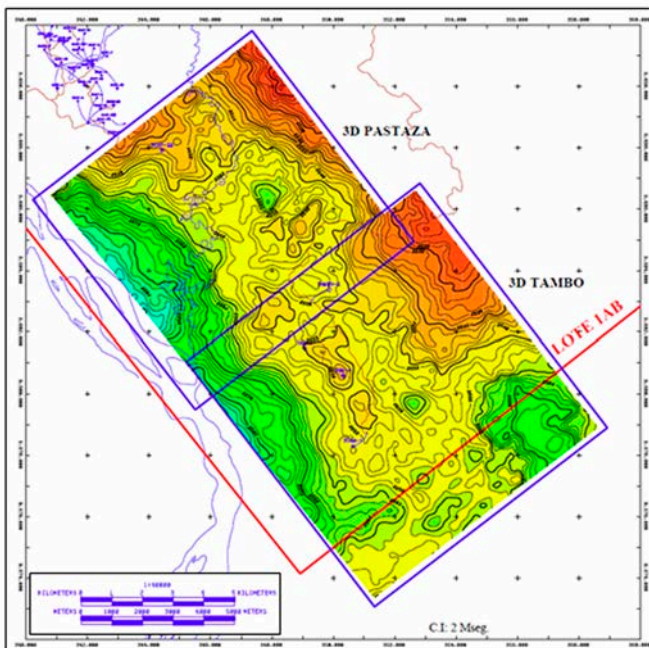
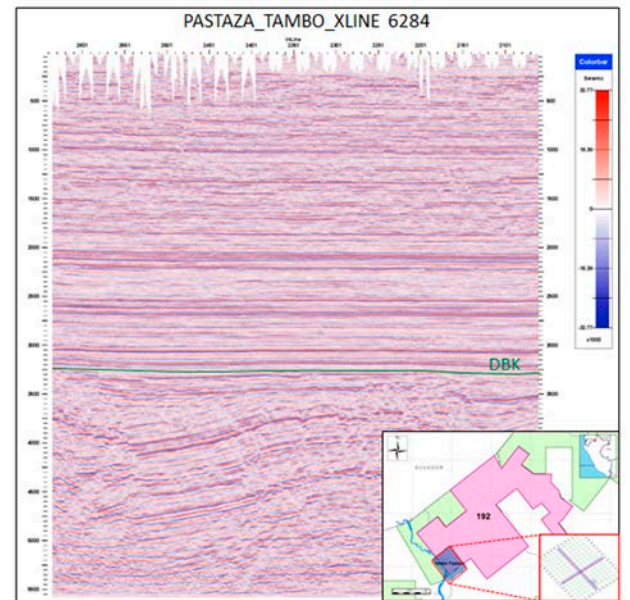
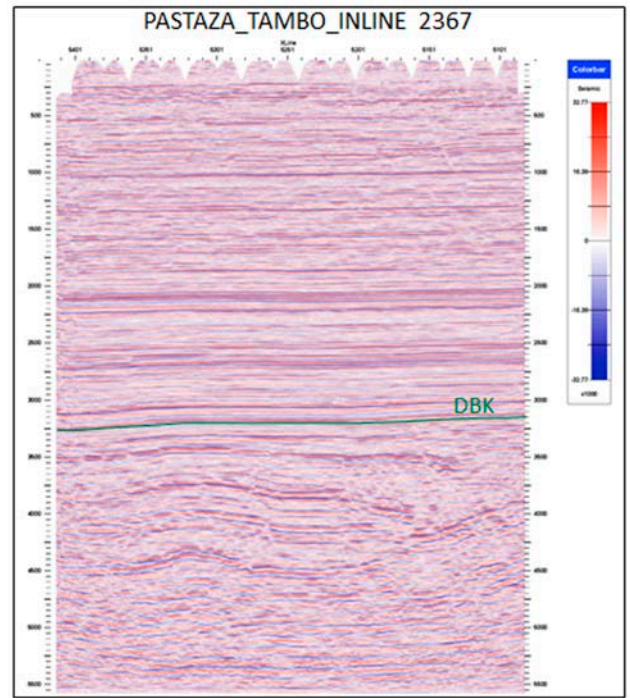


Figure 14. Two Way Time Chonta Limestone map showing the Pastaza and Tambo structures.

Figure 15. Seismic section in the Pastaza-Tambo 3D data showing some structure in the Pre-Cretaceous

Stratigraphic Play: Tambo area is located in the SW border of Block 192. Using the 3D seismic data from the Tambo area it was possible to detect seismic amplitude anomalies which could represent a new stratigraphic play concept in the Marañon Basin. The seismic anomalies are related to the middle and Upper Turonian carbonate sequences of the Marañon Basin. Its geometric expression in the seismic profiles and maps suggests that it could correspond to carbonate banks.

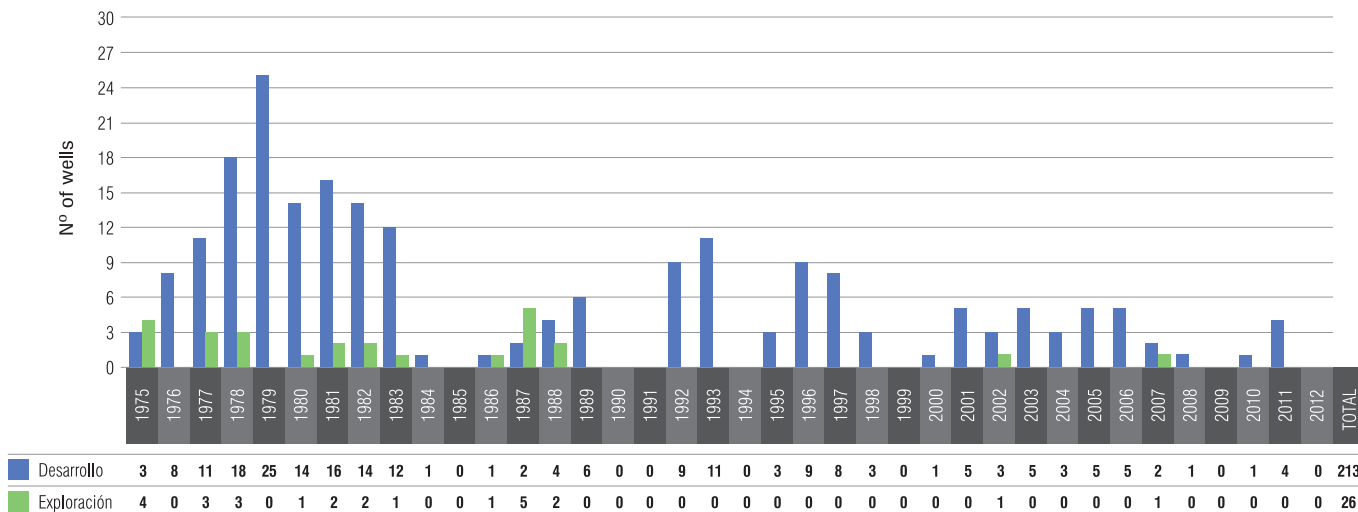
The 3D seismic data of the Pastaza area shows an exploratory play in the Pre-cretaceous, which structure extends to the north of Tambo area. These exploratory targets have not been tested or drilled. The review of more seismic data to determine the possibility of structures to the west of the Block 192 is needed.

Drilling of Wells

From 1971 to 2012, the Contractor drilled a total of 250 wells, from which 26 are exploratory wells.

In the following graphic the quantity of development and exploratory wells drilled during the mentioned period is shown.

Wells Drilled



Oil Reserves

(Source: General Bureau of Hydrocarbons - DGH, 2013)

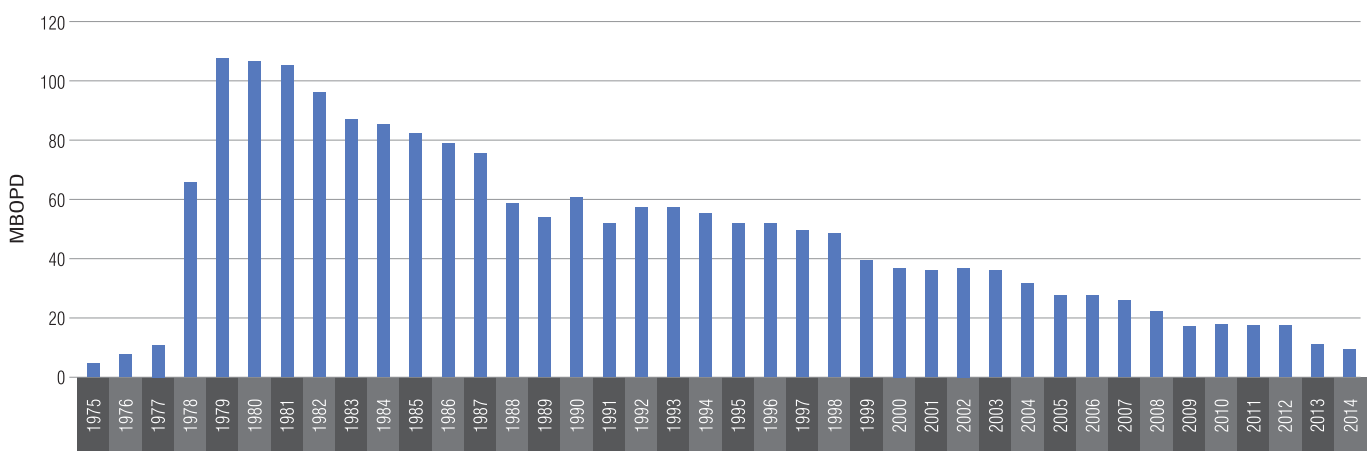
BLOCK	RESERVES (MMBO)				
	Proved Developed	Proved Non Developed	Total Proved	Probable	Possible
192	74.4	64.4	138.8	70.9	99.5



Fiscalized Oil Production

In the following graphic the annual average of fiscalized oil production, from 1975 to 2014 is shown.

Fiscalized Production



Analysis of Historical Data

- ▶ During the drilling campaign of the last 10 years, an average of 3 wells per year was drilled in the Block.
- ▶ From the 26 exploratory wells resulted 4 fields without producing. The best contributors were the south Capahuari and Shiviyaçu fields.

1. The oil cumulative production of the block is 723'203,150 barrels of oil.
2. The average GOR of the Block is 367 PC/BL.
3. Of the 250 wells of the Block, 107 from 13 fields are active.
4. The quality of crude focuses on three groups of fields:

Light: (> 30.0° API):
North Capahuari, South Capahuari,
Dorissa, South Huayurí, Tambo.

Medium: (16.3° – 23.3° API):
Carmen, Forestal, North Huayuri,
Shiviyaçu, Northeast Shiviyaçu.

Heavy: (10.4° – 15.1° API):
Jibarito, Jíbaro, San Jacinto.





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