



TOTAL Introduces New Drill Cuttings Treatment Technology

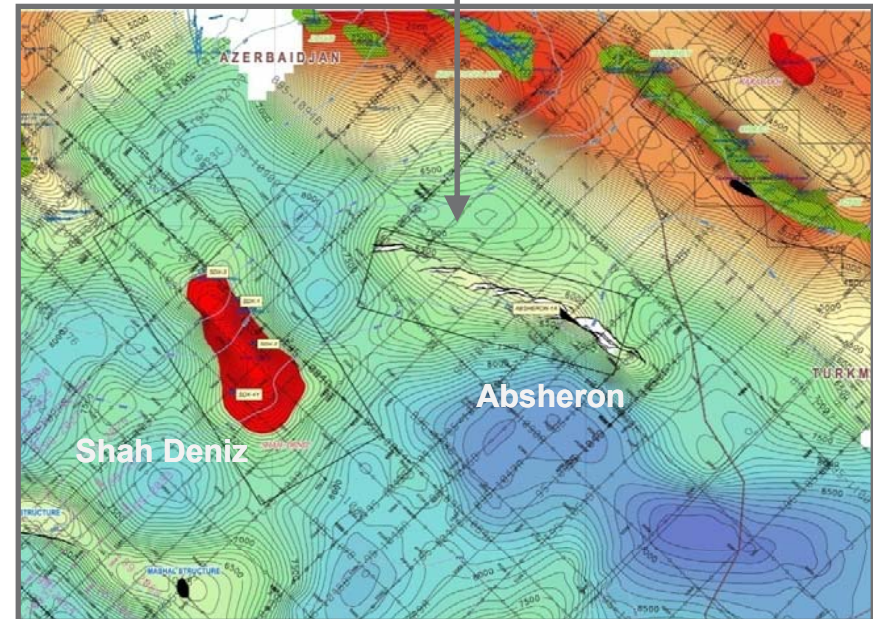
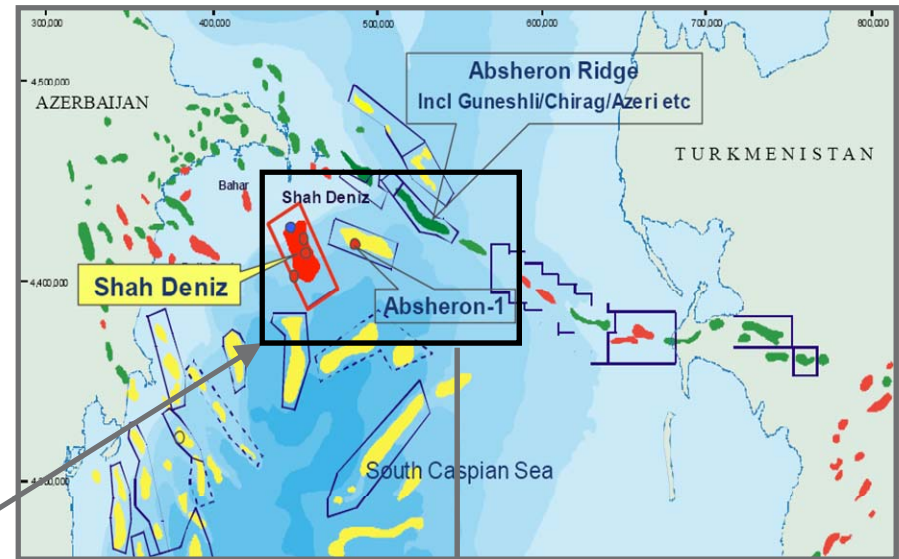
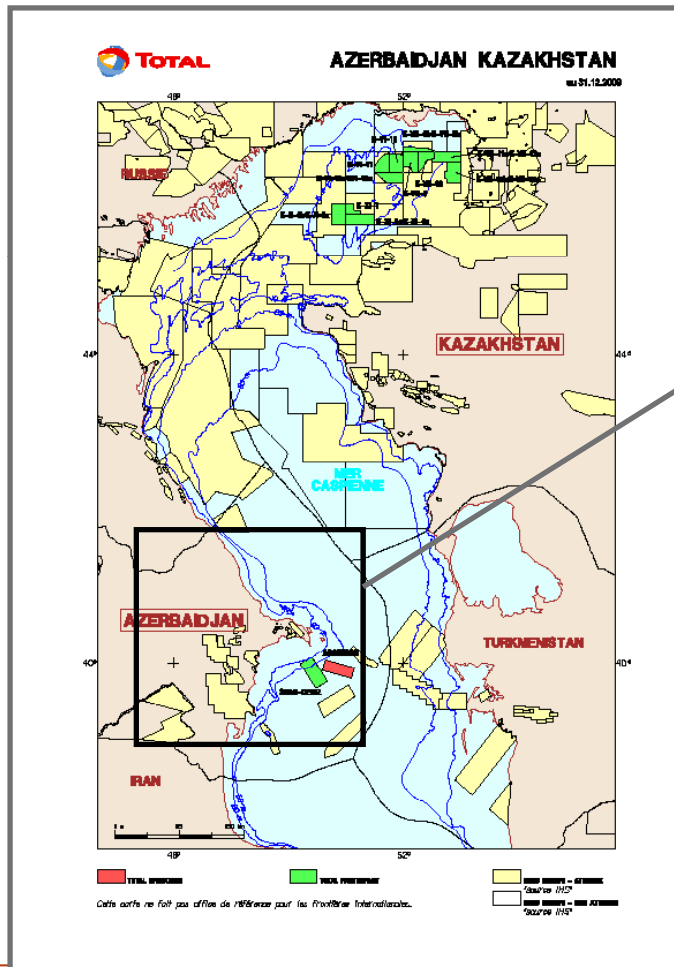


GLOBAL POLICY OF TOTAL

- Global Policy of Total is to comply with National/International legislative requirements in all areas where Total Operates.
- Compliance with environmental norms , commitment to minimization of environmental impact is stressed in Global Environmental Policy of Total.
- Total implements internal corporate Company Rules which serve as internal guide and procedure to ensure compliance with legislation and minimization environmental impact from operating activities.

1- GENERAL CONTEXT OF THE PROJECT

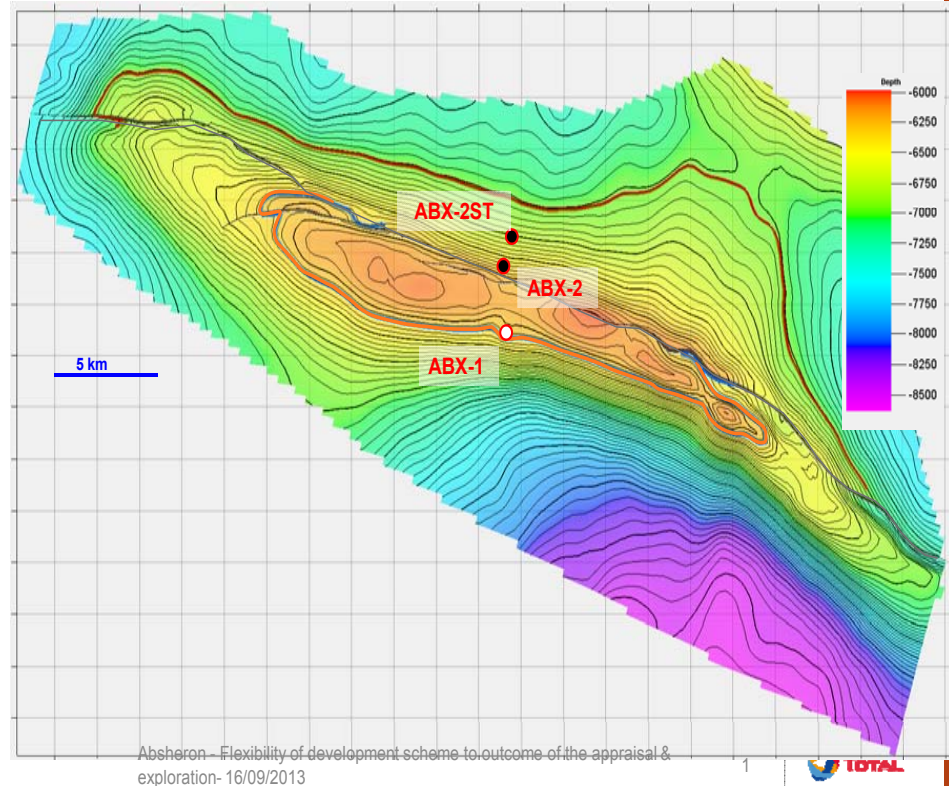
- Absheron Field is a gas field located in Caspian sea (Azerbaijan) approx 130km from Sangachal terminal (BP) and 35km away from Shah Deniz field.
- **Total (operator) 40%, SOCAR (40%), GDF (20%)**



ABSHERON FIELD HISTORY

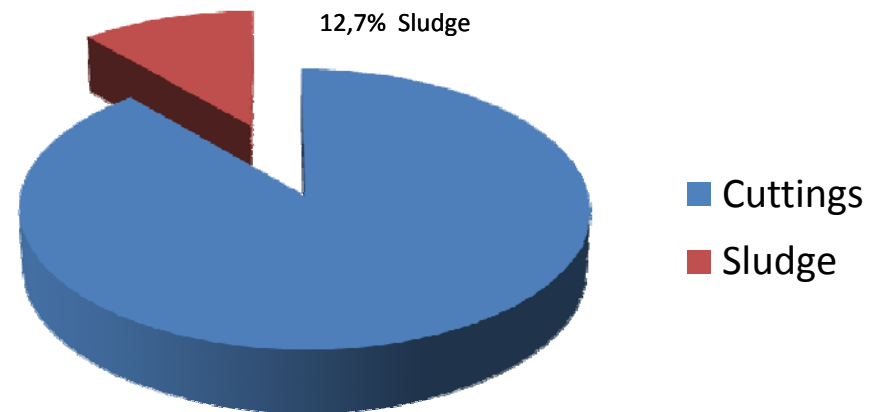
- ABSHERON PSA signed between TEP Azerbaijan and SOCAR in Q1 2009 (Effective date 30th June 2009)
- Partners : GdF SUEZ 20% & SOCAR 40%
- Exploration period is 3 years, Well spudded in December 2010.
- Discovery in September 2011 on 2 main reservoir intervals – positive tests - 2nd leg drilled toward North : positive results
- Notice of Discovery and its commerciality accepted in June 2012

FULL POTENTIAL ABSHERON:
SIMPLIFIED UNRISKED CONTINGENT & PROSPECTIVE RESOURCES



Total E&P Absheron awarded AAS-Ekol LLC a Contract for provision of onshore cuttings treatment services

Section	Cuttings (Tons)	Sludge (Tons)
22"	1,038.33	5.08
16.5"	3,630.93	101.21
12.25"	433	37.18
8.5"	385.41	89.49
6.5"	1,608.52	265.78
Well Test	11.22	78.89
Side Track	832.68	430.95
Totals	7,940.09	1,008.58



TCC technology was selected to be used in the Azerbaijan affiliate of Total for treatment of drill cutting from Absheron project.

Project Description

FACTS

Contract award date- 28.02.2010

Drill Cuttings transportation period- 19 month as of February 2011

Drill Cuttings Processing started April 2013 and lasted 3 month.

Total weight of cuttings transported to contractor's site- 7940 tons

4 lagoons used

Total weight of sludge transported to contractor's site- 1008 tons

1950 Drill Cutting Boxes used

7709.6 tones of clean cuttings and sludge were disposed to NHWC on 18th of July 2103

32800 km driven

Picture. Transportation of cuttings

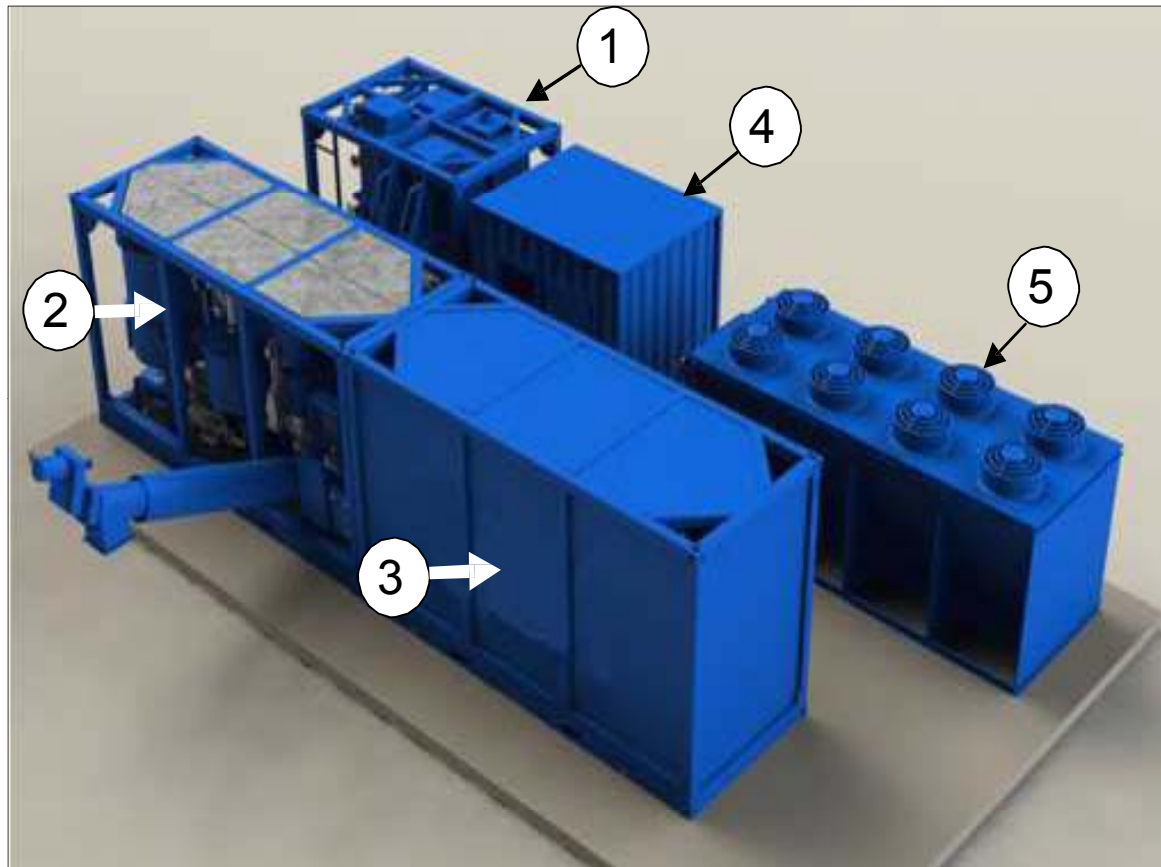


Picture. Transportation of TCC



Model –Thermo Mechanical Cuttings Cleaner

Picture. Model of Thermo-mechanical Cuttings Cleaner (TCC)

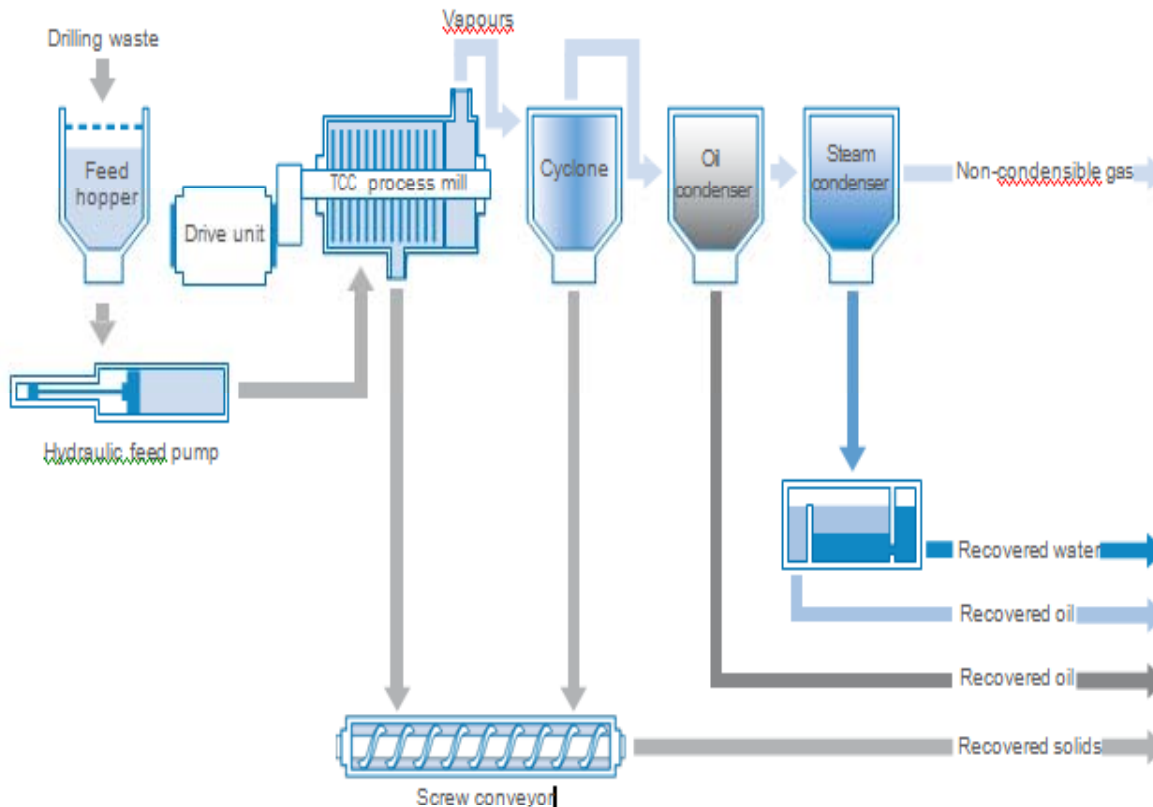


The TCC is a mobile cuttings treatment process consisting of five units:

1. Feed unit
2. Process unit
3. Drive unit
4. Control unit
5. Main Cooler

Thermo- Mechanical Cuttings Treatment

Main Operating Principles



In the TCC the drilling waste is heated to a temperature just high enough to evaporate the oil and water from the waste. All the heat is created in the waste itself by friction, meaning that kinetic energy from the drive unit, typically with an effect of 700kWh, is transformed to thermal energy by means of hammer arms beating into the solid parts of the waste.

The heat transfer is such that a friction dryer is much more efficient than in other thermal desorption technologies. The oil and water will flash evaporate in the reaction chamber, and leave the chamber as vapours after a few seconds. The oil and water will be brought back to a liquid phase in separate condensers for the oil and the water.

Thermomechanical Cuttings Cleaner (TCC) product is manufactured by Norwegian Company Thermtech AS.

Picture. Model of Thermo-Mechanical Cuttings Cleaner (TCC)



Safety Benefits

- Automatic shut-down – when temperatures /pressures are exceeded
- External emergency stop switches on all units
- Modular mobile system easy to install
- Safer – no naked flames, lower surface temperatures, small unit footprint thus easy to control, less volume of inert air to control in process mill.

Environmental Benefits

- Uses less energy – cuttings heated uniformly by friction, less retention time
 - Less retention time – quicker process and better oil quality
 - Quality of recovered oil – Oil not cracked by excessive temperature (hot spots),
 - Reused as base oil or fuel for diesel engines, requires little or no further treatment
 - Reduced environmental footprint (less fuel use, less emissions)
 - Bigger throughput- Less CO2 emissions
- All recovered water was reused for cooling and rehydration of cuttings.

Note : The light oils are removed from the water phase in an oil/water separator before the water is cooled and re-circulated in the condenser Non condensable gases from the unit pass through an activated carbon filter to remove non condensable gasses which reduces the emission of VOC and other related gases.- **This feature is also considered as environmental benefit.**

Regulatory and Compliance

Target Compliance Requirement

No more than 1% OIW in final effluent

Actual Performance

Average OIW content -0.1%

Treated cuttings were tested six times a day during the processing for oil retort content.

Third party lab analysis of OIW results exceeds legal requirements:

8 April 2013 - 0.1%
13 May 2013 - 0.05%
25 May 2013 - 0.1%

Each consignment was accompanied with a waste transfer note (WTN). On arrival at the Government site the cuttings were weighed and the WTN stamped and signed. The top copy of the WTN with weighbridge ticket attached was then returned to the polygon.

DISPOSAL OF DRILL CUTTINGS

- MENR granted permission to landfill up to 5000 m³ of treated cuttings at the National Hazardous Waste Centre in Sumgait.
- The cuttings and sludge were processed through TCC to reduce oil content to 0.1%.
- 7.709 tones of cleaned drill cuttings were transported to National Hazardous Waste Center at Sumgait for Final Disposal.
- Total affiliate in Azerbaijan is committed to use the same technology for utilization of Drill Cuttings from future drilling operations





TOTAL



GDF SUEZ

ACKNOWLEDGEMENTS

The authors would like to thank the Absheron partners (Total E&P Absheron, Socar and GDFSUEZ) for granting the permission to present.



Rig Heydar Aliyev on ABX-2 location