



BANKERS Petroleum Environment and BAT issues

ECRAN Workshop 8-10 September 2015

Tirana

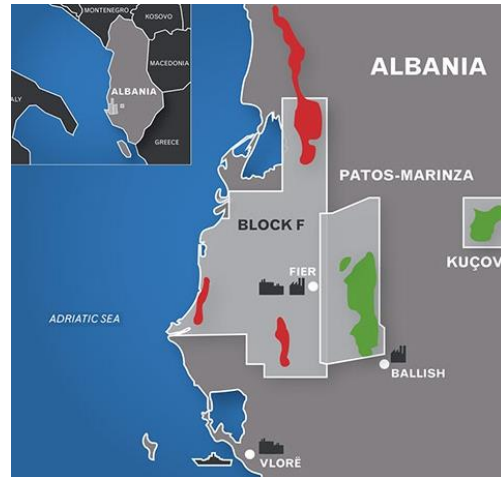
Content

- Oil exploration
- Environmental concerns
- EU regulations – BAT storage
- Inspection strategies
- Group work for questions

Bankers

Bankers Petroleum Ltd. is a Canadian-based oil and gas exploration and production company in Albania.

Established in 2004 Bankers Petroleum Albania Ltd. operates and has the full rights to develop the Patos-Marinza and Kuçova heavy oilfields pursuant to 25 year license agreements with the Albanian National Agency for Natural Resources (AKBN) and a Petroleum Agreement with Albpetrol Sh. A. (Albpetrol), the state owned oil and gas corporation.



Occurrence of Oil & Gas

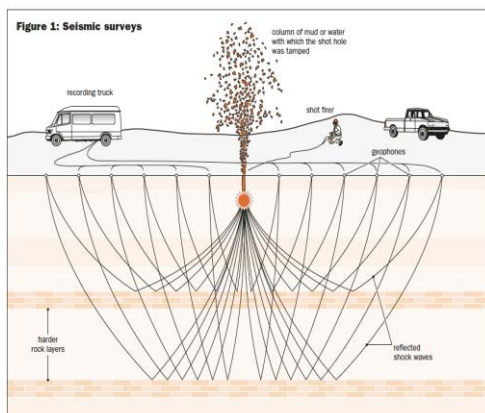
- On land
- Offshore
- Continental Shelves
- Deep sea
- Deserts
- Wetlands
- Forests
- Mountainous areas
- Arctic Region

Technological & Environmental challenges change with location type

Oil exploitation in Europe

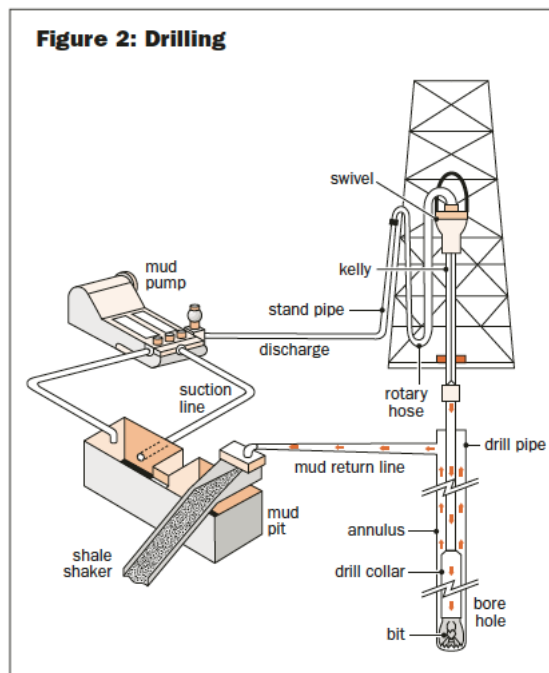
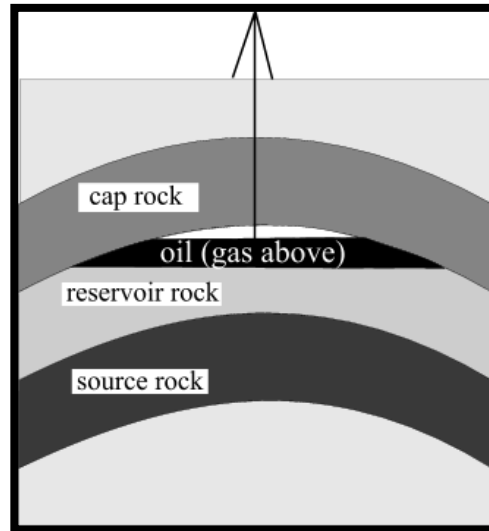
Country	BPD	
Norway	1,539,000	2.79%
United Kingdom	801,000	1.78%
Denmark	175,000	0.31%
Italy	106,000	0.17%
Romania	85,000	0.14%
Germany	52,000	0.19%
Turkey	48,000	0.06%
Netherlands	28,000	0.07%
Albania	21,000	0.01%
Serbia	12,000	0.01%
Croatia	10,000	0.03%

Exploitation



- Noise/Vibration
 - Dynamite
 - Vibration Truck
 - Air Gun
 - Marine Vessels
- Disturbance to human/wildlife/marine life
- Low Impact/Transient

Oil location conditions

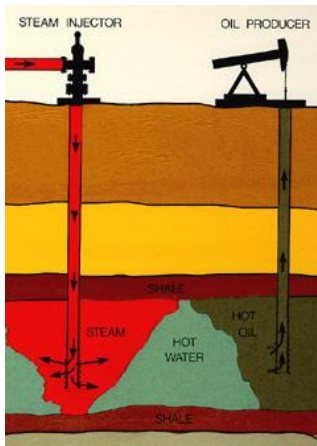


- Drilling Fluid (Mud)
 - Water/Oil/Synthetic based
 - Recycle, treatment, disposal by injection
- Drill Cuttings
 - Land farming, burial, bio-remediation, injection
- Site preparing
- Roads
- Camps-waste generation
- Long lasting Impact

Oil drilling fields



Exploration and Production: Enhanced Recovery

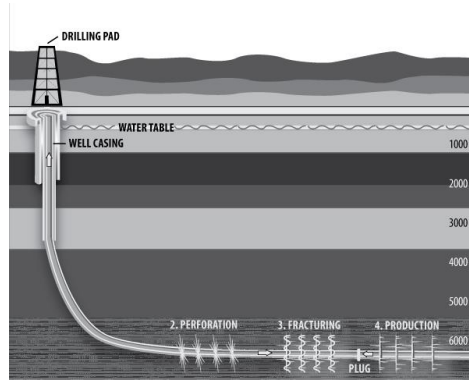


© California Department of Conservation

- Although oil and gas are less dense than water and naturally rise up a well to the surface, in reality **only 40-50%** of the total will do so.
- To **enhance recovery**, a hole is drilled adjacent to the well and steam is pumped down. The hot water helps to push the oil out of the rock and up into the well.

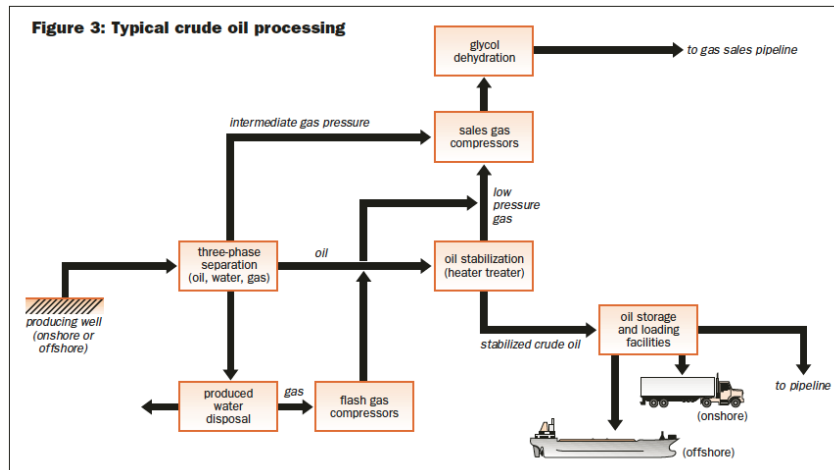
Horizontal Drilling and Hydraulic Fracturing

- Increased technology allows us to retrieve “tight” formations.
- The drilling process is similar, except for a specialized bit that allows for horizontal drilling.
- If oil and gas are trapped, fracturing may be used to allow liquids to flow.



Activities in the Petroleum Industry

- Upstream
 - *Exploration*
 - Land & Aerial surveys, Satellite Images
 - Gravitational, Magnetic & Seismic Surveys
 - Exploration Drilling (“Wildcat”)
 - Formation Evaluation
 - *Development*
 - Drilling Appraisal/production wells
 - Production Facilities
 - Gathering Systems
 - *Production*
- Downstream
 - Transportation
 - Refining
 - Marketing



Produced water

- Salinity
- Chemicals
- Oil content
 - Treatment
 - Re-injection

Camp waste

- Leakage/spillage
- Flare
- Noise/vibration
- Engine exhaust

Environmental Impact

Atmospheric impacts

- flaring, venting and purging gases
- combustion processes such as diesel engines and gas turbines
- fugitive gases from loading operations and losses from process equipment
- airborne particulates from soil disturbance during construction and from vehicle traffic - dust
- The principal emission gases include
 - carbon dioxide, carbon monoxide, methane, volatile organic carbons and nitrogen oxides

Environmental Impact (Contd.)

Aquatic impacts

- produced water
- drilling fluids, cuttings and well treatment chemicals
- process, wash and drainage water
- sewerage, sanitary and domestic wastes
- spills and leakage

Waste

- muds
- solid waste
- chemicals

Noise and vibrations

- plant equipment
- transport

Waste Stream of Concern

- Drilling Fluid
- Drill Cuttings
- Workover and completion waste
- Produced Water
- Bottom Waste
- Dehydration and Sweetening Waste
- Camp Waste
- Radioactive Material

5R Principle for waste management:

Reduce, Re-use, Recycle, Recover, Dispose

Transportation

Oil tanker



Pipeline under construction

LPG tanker



- land affected by construction
- leakage/spillage
- accidents – pipeline explosion, oil and gas spills and explosions from tankers, etc.

Potential Emergencies

Oil rig on fire



Oil spill from a tanker



- Spillage of fuel, oil, gas, chemicals and hazardous materials
- Oil or gas well blowout
- Explosions and Fires (facility and surrounds)
- Natural disasters such as flood, earthquake, lightning
- War and sabotage

Potential Emergencies (Spill)

- The spill may include crude oil, or refined products such as gasoline, diesel fuel, etc.
- Spills take months or even years to clean up.
- Oil is also released into the environment from natural geologic seeps on the sea floor
- Cleanup methods:
 - **Bioremediation**: use of microorganisms to break down or remove oil
 - **Controlled burning**: can reduce the amount of oil in water, but it can cause air pollution.
 - **Dispersants**: act as detergents, clustering around oil globules and allowing them to be carried away in the water.
 - **Dredging**: for oils dispersed with detergents
 - **Skimming**: Requires calm waters
- *Exxon Valdez* accident, occurred in Alaska, on March 24, 1989. The vessel spilled about 40 million litres of crude oil into the sea, and the oil eventually covered 28,000,000 sq. km of ocean.

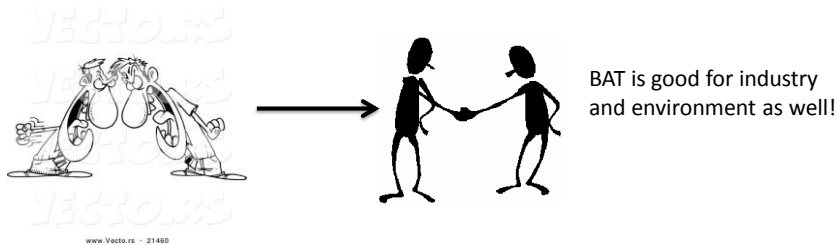
Potential Emergencies (Contd.)

- **Explosion and Fire**: The Piper Alpha oil production platform operated by Occidental Petroleum in the North Sea. An explosion and resulting fire destroyed it on July 6, 1988, killing 167 persons. Total insured loss was about US\$ 3.4 billion.
- **Indonesia Mud Volcano**: It is in East Java, Indonesia that has been discharging mud since May 2006. Approximately 2,500 m³ of mud is expelled per day. It is expected that the flow will continue for the next 30 years. As of November 2008, the mud flow is contained by levees, but further breakouts are possible. It is not conclusively decided whether it started due to drilling activity or by a local earthquake

Why BAT?

What are we here for?

- 1) To protect and improve the environment!
- 2) To allow/urge/support installations to run and develop effective production – as far as possible



EU legislation applicable

- IE directive – Annex A listing (waste installations)
- Seveso III directive 2012/18
- Petrol storage directive 1994/63
- Waste directives
- Water directives
- Chemical directives

BREF documents and guidelines

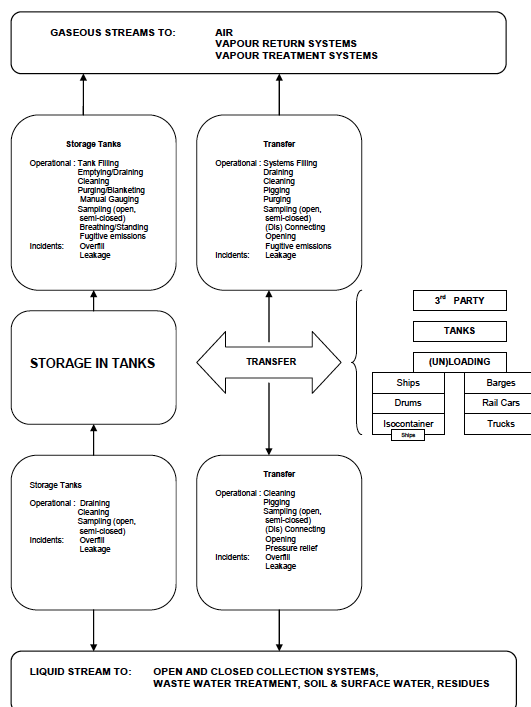
- [Emissions from Storage](#) **EFS BREF** (07.2006)
 - [Waste Incineration](#) **WI BREF** (08.2006) [MR](#) (01.2015) Review
 - [Waste Treatment](#) **WT BREF** (08.2006) [MR](#) (11.2013)
 - [Monitoring of emissions from IED-installations](#) **ROM REF** (07.2003) [FD](#) (10.2013)
 - [Economics and Cross-media Effects](#) **ECM REF** (07.2006)
- UK PPG guidelines
- US EPA guidelines



Scope of BREF document

- Solids, liquids and liquefied gases
- Storage modes
- Transfer and handling techniques
- Process control equipment
- Abatement techniques
- Safety

Horizontal BREF





Storage techniques



Chapter 3 describes:

- 11 different tank types + equipment
- Storage of containers
- Basins and lagoons
- Caverns
- Floating storage



and identifies their main emission sources

Transfer and handling techniques

Chapter 3 describes:

- Piping systems
- Pumps and compressors
- Flanges and valves

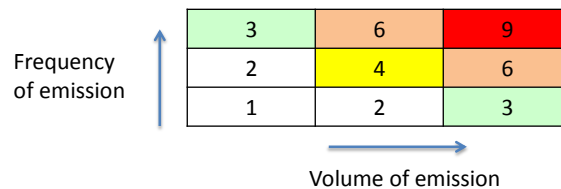


Emission Control Measures (ECM)

Chapter 4 describes **ECM** to prevent and/or reduce emissions:

- > 90 ECM for storage
- > 30 ECM for transfer and handling

Prioritizing tool



ECM assessment methodology

A scoring system to determine the best performing ECM, or combination of ECM, for each specific storage mode. The scores relate to:

- The emission reduction potential of the ECM being considered
- The ‘operational features’ of the ECM
- The cost to install and to operate the ECM

Emission Control Measures (ECM)

ECM for a fixed roof tank described in Chapter 4:

- Management tools, design, inspections
- Techniques for reducing emissions to air:
 - tank colour
 - internal floating roofs
 - vapour balancing/treatment
- Techniques for reducing emissions to soil:
 - corrosion and erosion
 - double tank bottoms
 - double wall tanks
 - containment

ECM Scorecard for handling of liquid and liquefied gases

Aboveground Transfer Systems: Closed Piping: Operational emissions				
Note 1:	Emission Frequency Score 1 - 3: 3 = frequent (daily), 1 = infrequent (once per few years)			
Note 2:	Emission Volume Score 1 - 3: 3 = large, 0 = zero or negligible			
	These scores are relative values and are to be considered only for each storage mode			
Potential Emission Source	Emission Frequency Note 1	Emission Volume Note 2	Emission Score	POSSIBLE ECM's
Gas Emissions				
Filling	2	2	4	Operating procedures/training Vapour collection - treatment

Liquid and

LPG

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Example of ECM

Technique	Emission Reduction Potential	Operational Score	Financial Score	Overall Score
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Technique	Emission reduction potential	Operability	Applicability	Safety	Waste, energy, cross-media	Operational score	Score CAPEX (retro)	Score opex	Financial score RETRO	Overall score RETRO
	A	B	C	D		$O = A * (B+C+D+E)$	F	H	$Cr = F * H$	$OS = O * Cr$
Instrumentation	1	5	5	5	5	20	4	3	12	240
Shell/Roof colour	1	5	4	5	3	17	3	5	15	255
Dome Roof	4	2	2	1	4	36	1	3	3	108
Primary Seal - Mechanical Shoe	2	5	5	4	5	38	3	4	12	456
Primary Seal - Liquid Mounted (LM)	3	5	5	4	5	57	3	4	12	684
LM Primary + Secondary Seal	4	4	5	4	5	72	3	4	12	864
Still Well Float	1	2	5	4	5	16	5	4	20	320
Still Well Sleeve	1	4	5	4	5	18	5	4	20	360
Roof Leg Socks	1	5	5	4	5	19	5	5	25	475

BAT on storage tanks

Example: BAT identified for all tanks are on:

- Inspection and maintenance
- Tank colour
- Monitoring of VOC
- Risk-based approach to emissions to soil
- Containment; bunds, double wall tanks
- Fire protection/fire-fighting equipment

BAT on storage tanks

Example: BAT for a fixed roof tank

For volatile substances which are toxic,
very toxic

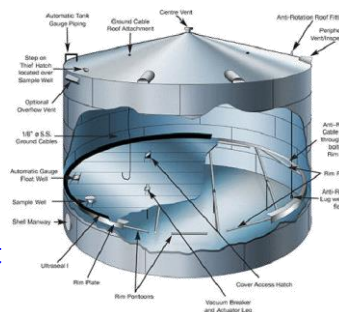
or CMR (carcinogenic, mutagenic and
reproductive

- toxic) categories 1 and 2:
- BAT is to apply a vapour treatment
installation

For other substances:

- BAT is to apply a vapour treatment
installation, or to install an internal
floating roof

BAT associated emission levels are given



Additional guidelines



Environmental management – guidance

Choosing and using oil storage tanks, PPG2: prevent pollution

<https://www.gov.uk/government/publications/choosing-and-using-oil-storage-tanks-ppg2-prevent-pollution>



SUMMARY OF REQUIREMENTS FOR OIL WELL SITES AND EQUIPMENT USED IN
OIL PRODUCTION SUMMARY OF REQUIREMENT

<http://www.epa.gov/airquality/oilandgas/actions.html>

Inspection strategy

- Overview of company, plant and production
- Context of interaction with company
 - Environmental policy and organization
- Environmental impacts and risks
- Regulatory situation
 - Mandatory international, national and local
 - Recommendations, BAT and BREF notes
- Prioritizing

Questions for related to Bankers

- Emission sources ongoing and possible?
- Environmental Impacts?
 - Air
 - Water
 - Ground and groundwater
 - Noise and vibrations
- Risks?
- Compliance – Law, BAT, Standards?
- Remediation?
- Company documentation – reporting (EMS SMS), emissions, pollution, monitoring, compliance?
- Inspection Focus points?
- Prioritizing – Phases?

Group work

1. Input materials and possible impact (incl chemicals and Seveso risks)
 2. Process and environmental impacts
 3. Waste and waste treatment
- Define 5 questions