

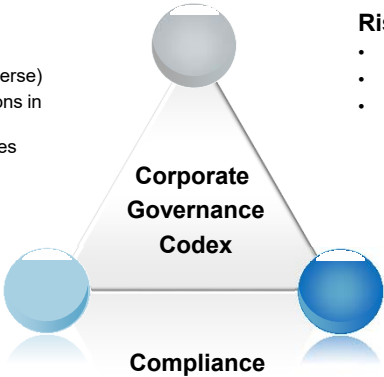



Risk Management
The Mittelplate Drilling and Production Island

WSF Plenary Forum, 7th/8th April 2016,
Dr. Michael Zettlitzer, Dr. Heiner Mattfeld



DEA's Risk Management Approach
Integrated approach spans Internal Audit, Compliance and Risk Management



Internal Audit

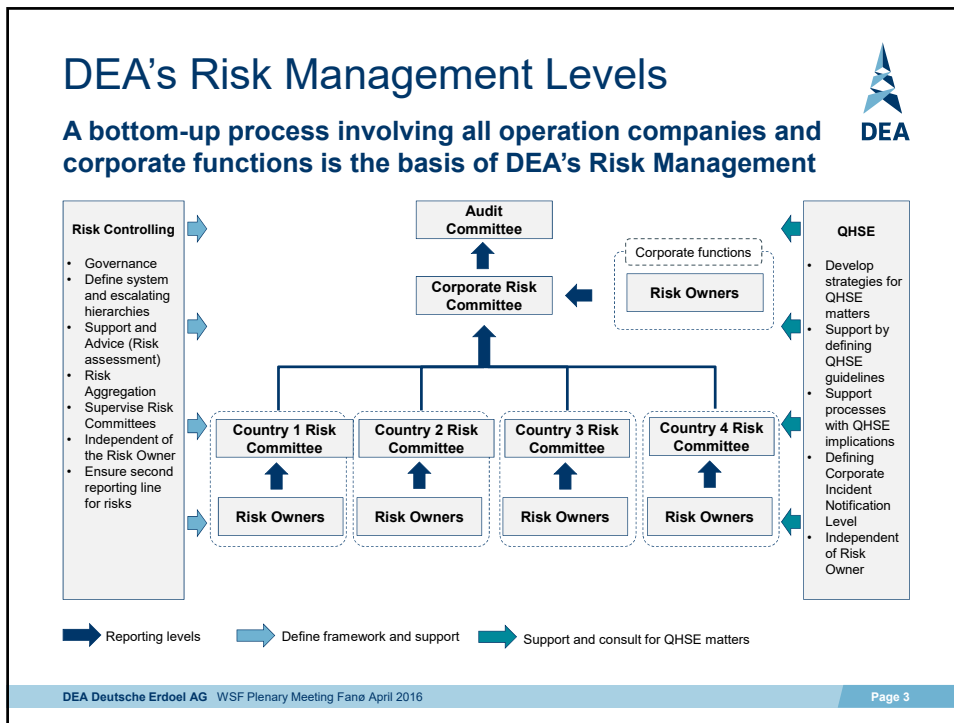
- Risk-oriented audit activities (Audit Universe)
- Improve the operations in DEA's affiliated and associated companies

Risk Management

- Risk Assessment
- Risk Mitigation
- Risk Monitoring & Analysis

Compliance
Compliance with legislations, regulations and company policies. The focus of DEA Compliance Team is anti-corruption

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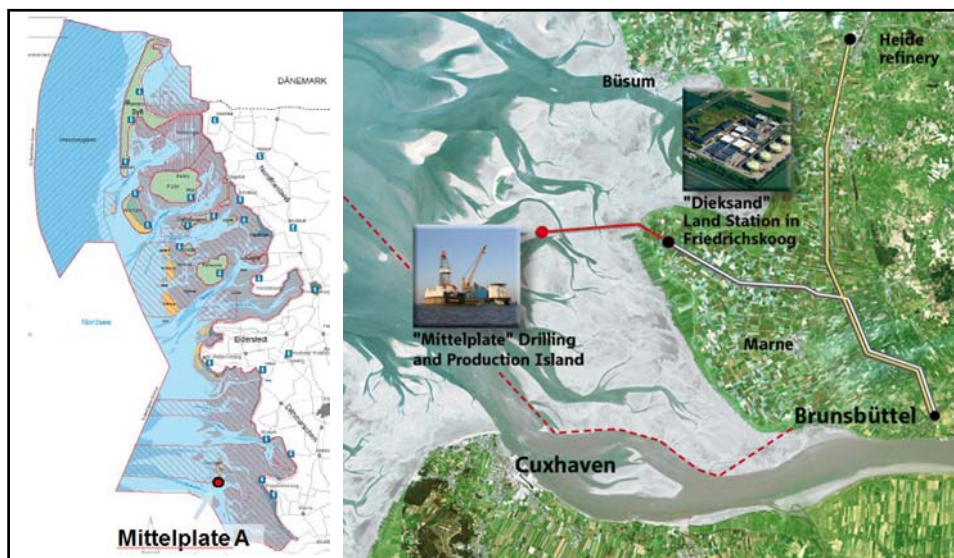


DEA's Risk Categories

DEA's risk categories reflect typical E&P risks environment






1. QHSE and Legal risks
2. Operational risks
3. Market risks
4. Strategic and Business risks
5. Financial risks



- Consortium of DEA and Wintershall (50 : 50) – DEA as operator
- Situated in the „Schleswig-Holstein Wadden Sea National Park“
- Since 2009 world natural heritage site

Oil field Mittelplate

30 years safe operations




1980	Discovery Mittelplate 1
1982	Mittelplate 2 and 3 / 3a
1985	Begin of construction works
1986	Well spud
1987	„First Oil“ in October
1997	1st extended reach well
2000	Startup of onshore facilities Dieksand
2005	Pipeline to Dieksand, new drilling rig T150, 15 MMt (103 MMbbl) oil production
2007	20 MMt (137 MMbbl) oil production, 1st intelligent well
2010	1st multilateral well
2012	25th production anniversary
2014	30 MMt (206 MMbbl) oil production, 2nd multilateral well

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Selected risks considered for Mittelplate (I)

1985 to 1987: Building of the artificial island Mittelplate



- Drift/shift of the construction
 - ✓ Bottom of the Mittelplate facility directly on top of a sandbank - firmly anchored in place, formally no offshore construction
 - ✓ Designed to withstand severe ice drift in winter conditions, in addition to calculations and simulations also tests with models in Hamburg Ship Model Basin (“Hamburgische Schiffsbau-Versuchsanstalt”)
- High waves, prevention of water inflow into construction
 - ✓ Designed to take hundred year floods plus plus safety margin
- Storm, prevention of damage by storm
 - ✓ Designed to take once-in-a-hundred years storm
 - ✓ Procedures regulating stop of work in adverse weather conditions

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Example of ice test in HSVA

100 years of experience in HSVA contributed to the meanwhile proven suitability of the Mittelplate facility construction



Selected risks considered for Mittelplate (II)

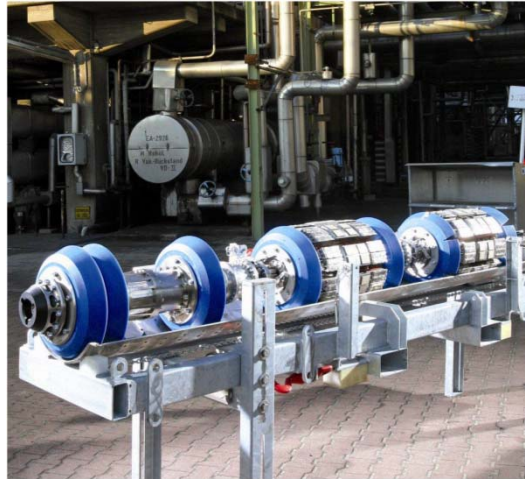
Reliable protection of the environment



- Prevention of loss of containment (crude oil)
 - ✓ At least two barriers during drilling phase
 - ✓ Subsurface safety wells in all well completions
 - ✓ Compact, leak-proof steel and concrete basin
 - ✓ Doubled-hulled ships during crude transport in first production phase
 - ✓ Double-hulled tanks for crude oil, supervision of barrier sheet for potential leaks from inner hull
 - ✓ Pipeline made from non-corrosive duplex stainless steel
 - ✓ Cathodic corrosion protection of pipeline
 - ✓ "Intelligent pigging" of pipeline at regular intervals

Intelligent pigging

Proving the corrosion resistance and the mechanical integrity of the pipeline



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Selected risks considered for Mittelplate (III)

Minimising effects on the environment



- Light and noise emissions, Prevention of disorientation of migrating birds as well as prevention of disturbance of birds in general in the vicinity
 - ✓ In general, rather use of vibratory drivers instead of pile drivers
 - ✓ Completely hulled drilling rig to prevent light and noise emissions
 - ✓ Intelligent control technology for lighting
 - ✓ Removal of several light bulbs (under observance of safety requirements) and changeover to LEDs

- Gaseous emissions
 - ✓ Connection of Mittelplate to the grid to minimise use of Diesel generators
 - ✓ Transport of associated gas to shore, separate marketing of hydrocarbon condensate and gas

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- Helicopter landing pad for emergencies
- Evacuation chamber requiring no outside air supply and capable of accommodating over 100 people
- Lock gate with off island and docking bay
- Double-skinned crude oil storage tank
- Leak-proof steel and-concrete basin
- State-of-the-art, electrically powered drilling rig
- Robust steel mud-casting indicates tower and legs
- Large drilling and production vessel fitted with advanced shock-off system. Some general safety valves at depth of 90 m
- Positive and negative steel decking for drill rig cellar
- Screen protection made of mesh to protect against total currents

➤ Compliance with particularly high safety and environmental protection requirement
 ➤ Incident-free operation since start of production in 1987

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Operational Excellence

Increasing safety standards

DEA

- › New Fire fighting room
- › Equipment of fire fighters
- › Storage for respiratory protection and fire protection equipment
- › Administration of fire protection organization
- › Completed at the end of 2014





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Legal requirements EU Offshore Directive



DIRECTIVE 2013/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 June 2013

on safety of offshore oil and gas operations and amending Directive 2004/35/EC

Annex I, 2. INFORMATION TO BE SUBMITTED IN A REPORT ON MAJOR HAZARDS FOR
OPERATION OF A PRODUCTION INSTALLATION

(5.) demonstration that all the [major hazards](#) have been identified, their [likelihood and consequences](#) assessed, including any environmental, meteorological and seabed limitations on safe operations, and that their [control measures](#) including associated [safety and environmental critical elements](#) are suitable so as to reduce the risk of a major accident to an acceptable level; this demonstration shall include an assessment of oil spill response effectiveness.

Main Components Risk Management System Mittelplate (I)



HAZID-Study (HAZard IDentification – Centre for Marine and Petroleum Technology (CMPT) Standard 99/100a):

- Structured identification of basic risks – survey of the effectiveness of safety devices
- Overall perspective
- Workshops with teams of experts – concept design by DNV GL
- Covers scenarios which are very unlikely
- Complies with the requirements of a risk management pursuant to the EU Offshore Directive (Germany: OffshoreBergV) for the identification of „major hazards“ and „safety and environmental critical elements“

Main Components Risk Management System Mittelplate (II)



HAZOP-study (HAZard and OPerability – DIN EN 61882: 2014-11 (draft)):

- Structured examination of plant and process safety
- Technical perspective
- Workshops with teams of experts under the external guidance of the TÜV
- Results are integrated in HAZID



Thank you
for your attention!