Shallow Water Shipwrecks
Environmental Impact: MS VOLARE case study

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WRECKS OF THE WORLD III
October 12-13 2015, Gothenburg, Sweden
Wrecks in the archive
- total 1185
- found 85
- risk of oil pollution 14

Shipwrecks with oil pollution risk in Estonian waters
MS VOLARE

• Built 1957 in Sweden as MS ALTA
• Ore carrier
• Beached 1980 (probably the insurance fraud)
MS VOLARE recksite
MS VOLARE wreck

Depth 4-5m

MS VOLARE today

Stern

Main engine

Bow
• No owner
• Burned many times
• Wild metal scrappers
Aims of on site observations

• Inspection of the wreck, its condition, damages, corrosion etc
• Identification of environmental concerns at the wreck site
• General mapping of the sea bottom around the shipwreck
• Characterisation of hydrodynamic conditions at wrecksite (time series)
• Identification of possible pollution transport pattern, local flow scheme and wave regime
• Analysis of local ice regime affecting the wreck
• Sampling of sea bottom sediments, lab analysis for oil and heavy metals contamination in order to identify pollution pattern around the wreck
• Estimation of environmental harm caused by shipwreck on surrounding marine environment and coastline.
Unknown amount of oil onboard
Surrounded by permanent oil slick

Nearby is Nature Conservation Area!!!!!!!
Wreck’s condition deteriorates
Trap for birds (cormorant), fishes, marine mammals?
Measurements of local hydrodynamics at wrecksite
Local hydrodynamics at MS VOLARE wrecksite

Wind speed [m/s]

Days from the beginning of the measurements

Current speed (cm/s)

Mean and maximum wave height [m]

Days from the beginning of the measurements

Maximum wave height
Mean wave height
Summary flow local characteristics around wreck
Role of extreme storm events???
January 9, 2005
Hazardous substances in bottom sediments

Volare/Alta (EERC)

Oil products, mg/kg DM
- below detection limit < 20 mg/kg DM
- below target value 20-100 mg/kg DM
- below target value 100-500 mg/kg DM
- above target value >500 mg/kg DM

Metals
- below target value
- above threshold limit
- above target value
## Summary of bottom sediments sampling

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<tr>
<th>Parameter</th>
<th>Method</th>
<th>Sample [mg/kg DM*]</th>
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Salvage operations, summer 2015
Summary

• MS VOLARE wreck condition and basic parameters identified
• Environmental concerns identified, salvage needed!!!
• Salvage of the wreck completed (as first approach)
• Sea bottom around the shipwreck and local hydrodynamic regime characterised
• Pollution transport pattern, by local flow and wave regime generally identified
• Analysis of long term processes at wrecksite using models (HIROMB, HBM, NEMO). Forecast of general hydrodynamic pattern and its temporal variability allow net load to marine environment and forecast environmental risks development in future.
Thanks for listening!