Reducing Human Exposure in Shipping Operations

10th Annual Maritime Risk Symposium (MRS 2019)

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The companies in which Royal Dutch Shell plc directly and indirectly owns investments are separate legal entities. In this press release “Shell”, “Shell group” and “Royal Dutch Shell” are sometimes used for convenience where references are made to Royal Dutch Shell plc and its subsidiaries in general. Likewise, the words “we”, “us” and “our” are also used to refer to Royal Dutch Shell plc and subsidiaries in general or to those who work for them. These terms are also used where no useful purpose is served by identifying the particular entity or entities. “Subsidiaries”, “Shell subsidiaries” and “Shell companies” as used in this press release refer to entities over which Royal Dutch Shell plc either directly or indirectly has control. Entities and unincorporated arrangements over which Shell has joint control are generally referred to as “joint ventures” and “joint operations”, respectively. Entities over which Shell has significant influence but neither control nor joint control are referred to as “associates”. The term “Shell interest” is used for convenience to indicate the direct and/or indirect ownership interest held by Shell in an entity or unincorporated joint arrangement, after exclusion of all third-party interest.

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13 Nov 2019

We may have used certain terms, such as resources, in this press release that United States Securities and Exchange Commission (SEC) strictly prohibits us from including in our filings with the
Agenda

- Overview of Shell Shipping & Maritime
- Risk Areas:
  - Vessel Mooring
  - Confined Space Entry
  - Diving Operations
  - Personnel Transfer/Working in areas without fall protection
- Maritime Partners in Safety
SHELL TRADING AND SUPPLY

Our global Trading and Supply business is one of the largest energy trading operations in the world. Our largest trading hubs are in London, Houston, Singapore, Dubai and Rotterdam, trading in crude oil, natural gas, LNG, electrical power, refined products, chemical feedstocks and environmental products.

Trading, combined with an integrated network of supply and distribution activities and industry-leading shipping and maritime capabilities, adds value for Shell across its Upstream, Downstream and Integrated Gas businesses.

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Inherent hazards of Vessel Mooring

Failure of mooring line on board LNG carrier Zarga with 1 person injured

South Hook LNG terminal, Milford Haven, Wales.
Alternative Mooring Methods

Vacuum Mooring Systems:

- Improved Safety:
  - Reduces reliance on personnel for mooring operations.
  - Reduced risk of mooring accidents for personnel.
  - Real time monitoring of the mooring process & forces while alongside.
  - EX rated for use with hazardous cargoes

- Efficiency/Operational Cost:
  - Reduced mooring (30 secs)/unmooring time (10 secs)
  - Increased berth utilization (quicker vessel turnarounds)
  - Does not require vessel modification.

- Reduced Environmental Impact:
  - Reduced mooring time, equals less idling and running of vessel engine alongside
Alternative Mooring Methods

Magnetic Mooring Systems:

- **Improved Safety:**
  - Eliminates reliance on personnel for mooring operations.
  - Real time monitoring of the mooring process & forces.
  - EX rated for use with hazardous cargoes

- **Efficiency/Operational Cost:**
  - Reduced mooring (<1 min) / unmooring time (20 secs)
  - Increased berth utilization (quicker vessel turnarounds)
  - No equipment deterioration from UV, moisture, and heat.
  - Can be installed on a berth or on a vessel.

- **Reduced Environmental Impact:**
  - Reduced mooring time, equals less idling and running of vessel engine alongside
Usage of Unmanned Aerial Vehicles (Drones) for Confined Space Entry

Safety:
- Reduces/eliminates confined space entry for personnel.

Efficiency:
- Time for inspection greatly reduced.
- Set up/break down time significantly reduced.

Cost:
- Scaffolding not required to reach elevated locations.

Added Value:
- Up close HD video/photos remotely analyzed by software.
- Improved visual inspection of remote inaccessible locations.
- Allows for more frequent inspection due to time required.
- More frequent and detailed data captured for improved trending analysis.
Remote Operated Vehicle (ROV) Deployment for Vessel/Terminal Inspection

Safety:
- Reduces/eliminates need for divers to enter the water.

Efficiency:
- Can be launched from dockside or from a small boat.
- Can be moved with a small davit or 2 by people.

Cost:
- Dive team and associated equipment not required for operation.

Added Value:
- Sidescan & Imaging Sonar
- Scanning Laser (LiDAR)
- Ability to add probe and grab tools as required.
Inland Barge Engineering Barriers – Prototype Trials
Zero Incident Industry

Leadership Visits

Reflective Learning

Learning from Incidents

RESILIENCE