Operations and Requirements

FPSO and Shuttle Tanker Positioning

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FPSO & Shuttle Tanker Positioning

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Separation about 70m

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Background

- Ref 1 QRA of shuttle tanker collisions published 1998 (all types all areas)
- HSE in the UK set a target for improvement
- Contracted Global Maritime in 2001 and 2004 to independently assess improvement
- FPSOs & DP tanker offtake increasing
- What are the present risks?
Position from 1998 Report

OFFSHORE OFFTAKE TANKER OPERATIONS - NUMBERS OF COLLISIONS and OTHER STATION KEEPING INCIDENTS BY YEAR 1979 - 1998

Number of offtakes
Other Station Keeping Incidents
Contact Incidents
Trend of Station Keeping Incidents 1979-1998

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1998 Shuttle Tanker QRA Report

- Loss of Life
- Collision
- Major Near Miss
- Minor Near Miss

Collision frequency per DP hour $5.89 \times 10^{-5}$
Incident Types

• Re-categorised (expanded) the four levels
  
  **L1** - Loss of Position and Loss of Life or Major Pollution
  
  **L2** - Loss of Position and Collision with Loading Point, ESD and Minor Pollution
  
  **L3** - Loss of Position causing ESD, near miss or high Hawser Tension
  
  **L4** - Station Keeping problem causing concern to operator
Incident Frequencies

- **L1** \(3.92 \times 10^{-6}\) Loss of Position and Loss of Life or Major Pollution
- **L2** \(5.89 \times 10^{-5}\) Loss of Position and Collision with Loading Point, ESD and Minor Pollution
- **L3** \(4.94 \times 10^{-4}\) Loss of Position causing ESD, near miss or high Hawser Tension
- **L4** \(3.06 \times 10^{-3}\) Station Keeping problem causing concern to operator
Problems

*People, procedures, position references & propellers*

The collision frequency of $5.89 \times 10^{-5}$ per DP hour was far too high especially with an increasing number of tankers offtakes being performed.

The incident frequency was also too high; the expectation of the 1998 QRA study was 7 incidents per vessel per year.

The UK HSE had set a target to deliver a 25% improvement and wanted to prove it had been achieved.
1998 - 2001 Data

Distribution by level

- 6 of 16 reported to HSE (37.5%)
- Total hours 41,638
- Frequency of level 2 incidents $3.84 \times 10^{-4}$
- About once in every 108 loadings
There was only one incident that resulted in collision
1998 - 2001

Distribution by level

- To compare with the ‘98 work only collisions should be placed in Level 2
Comparison before and after 1998

- To 1998
  - Collision frequency
    $5.89 \times 10^{-5}$

- 1998 - 2001
  - Collision frequency
    $2.4 \times 10^{-5}$
There were no level II incidents reported in 2004
Comparison before and after 1998

• To 1998
- Collision frequency: $5.89 \times 10^{-5}$

• 1998 - 2004
- Collision frequency: $1.45 \times 10^{-5}$
Distribution of Incidents 1998 to August 2004

Number of incidents vs. Year and Type

- I
- II
- III
- IV

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Causes of Improvement

• Close attention by Oil Companies backed by good budgets and pushed by authorities.
• Training and Auditing by owners and Oil Companies.
• Better procedures and DP CAP (DP Competence Assurance Practice)
• Tanker Offtake simulator training.
• Improvement in hardware and software.
DP CAP™; Scope of Work for the development programme

- Create a programme to secure practical DP experience to the Shuttle Tanker DPO’s.

  - Shuttle tankers are operating as little as 5-10% of total operational time on DP.

DP Cap™ aim:

- increase the DP practice time
- make DP practice time more qualitative

Taken from IMCA seminar 2004 Teekay presentation
Hardware & Software

- SHUTDOWN
- SHUTTLE TANKER / FPSO HEADING DIFFERENCE: 50°
  ESD CLASS 2 SHUTDOWN

- ESD CLASS 2 SHUTDOWN
- Optimal Position
- Distance from stern of FPSO to bow mooring point

- ESD CLASS 1 SHUTDOWN
- 15° Heading Difference Alarm

- ESD CLASS 2 SHUTDOWN
- 30°

- ESD CLASS 2 SHUTDOWN
- 55m

- ESD CLASS 2 SHUTDOWN
- 85m

- ESD CLASS 2 SHUTDOWN
- 105m

- SHUTDOWN
- SHUTTLE TANKER / FPSO HEADING DIFFERENCE: 15°
  HEADING DIFFERENCE ALARM
Typical DP Display showing short and long distance alarms
Remaining Problems (FPSO)

- Heading control
- Marine Personnel
- Weather (limits & visibility)
- Position References
- Consistent Standard
- Thruster reliability
Shuttle Tanker Approaching FPSO
Approach Continues Satisfactorily
FPSO Changes Heading and Approach is Lost
Remaining Problems (Shuttle Tanker)

- Maintaining the improvement
- DP Class 2 or Class 1 or 1.75?
- Personnel Changes
- DP Control System differences
- DP experience
- Position References
- Consistent Standard
- Thruster reliability
  - control $4.35 \times 10^{-5}$ - ME/DG $4.35 \times 10^{-5}$ - Thruster fail $1.45 \times 10^{-5}$
- Misalignment
Conclusions

- There has been a marked improvement in DP shuttle tanker safety
- There are still some areas that need attention
- The biggest challenge is to maintain the improvement
- If there is a significant collision one of the likely findings will be inconsistency