



Operating Experience With
MBC's at Tetney Monobuoy

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- ❖ Tetney monobuoy is a crude oil import facility at the mouth of the Humber Estuary.
- ❖ It is the primary supply route for crude oil to the Phillips 66 Humber Refinery.
- ❖ Approximately 110 vessel / year use the facility
- ❖ Throughput is in the region of 9 million m³ / year



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- ❖ Hose string consists of a single string of 20 x 24" hoses, split at 'Y' tank into 2 strings of 4 x 16" hose.
- ❖ MBC were incorporated into string in 2003.
- ❖ Manufacturers recommendation was to install between 1st and 2nd hose after 'Y' piece
- ❖ Maintenance intervals were set at 5 years.



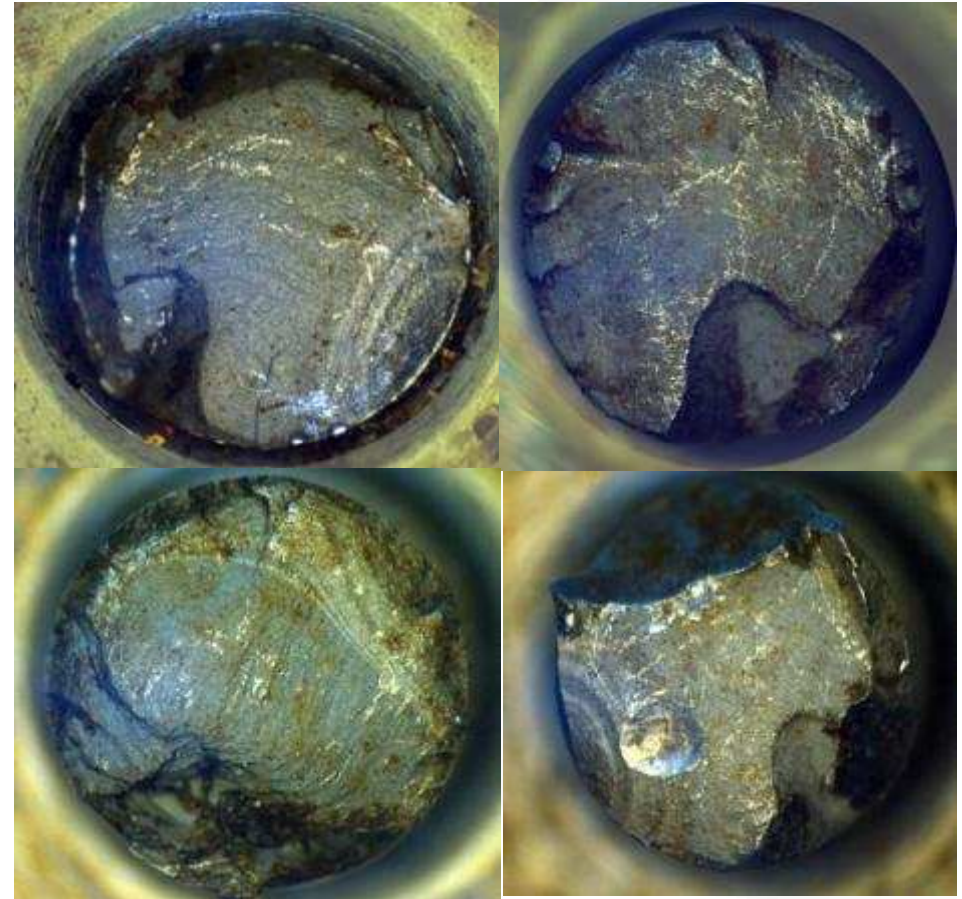
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- ❖ Less than 4 years later, the MBC in the aft string suffered a spurious activation.
- ❖ Conditions at the time were calm, and there had been no evidence of pressure spikes.
- ❖ Pollution was estimated at 3 m3.



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- ❖ Breakstuds were retrieved and analysed independently.
- ❖ At least four of the breakstuds failed due to fatigue
- ❖ Fatigue failures were all initiated on the studs outer radius.



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- ❖ Stud from activated MBC showing failure originating at radius.



- ❖ Breakstud from in tact coupling tested to destruction, showing normal 'cup and cone' failure mode.



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❖ Remedial actions

- ❑ Increased the neck radius to give better fatigue resistance properties to previously failed areas
- ❑ Increased stud thickness
- ❑ Pre tension studs to only 80% of yield value.
 - (studs had been previously tensioned to 95% of yield value)
- ❑ Enhance maintenance regime.
 - Studs to be changed out annually, and tested for signs of cyclical fatigue.

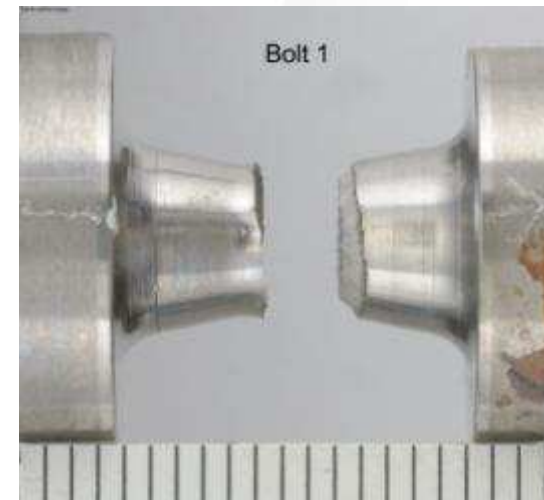
❖ MBC's were reinstated in early 2009

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- ❗ **Further spurious activation experienced in November 2011.**
- ❗ **Occurred during maintenance operations**
 - ☐ Hoses were being slid back into water from stern of work boat.
- ❗ **No pollution, as hoses had previously been flushed with water.**
- ❗ **MBC studs had been replaced only 3 months earlier.**

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- ❖ All studs exhibited signs of ductile failure.
- ❖ Technical analysis report concludes that failure of studs was as a result of overload.
- ❖ Review of incident and operation has not identified any conclusive evidence of overloading.



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❗ Possible causes of overloading were considered:

- ❏ Lifting MBC out of water during discharge
 - Freeboard limitation at terminal of 16.7m
 - MBC fitted between 3rd and 4th hose from manifold.
 - On this basis, 3rd hose can be partially lifted clear of water at opposite end of hose from MBC
- ❏ Y tank introducing additional forces into hose string:
 - During mid tide conditions, tidal flow of up to 5 kts can be experienced
 - This can have effect of rotating 'Y' tank through 90 degs.



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❖ Remedial Actions.

- ❖ Y tank to be replaced by single 24" to 16" reducer. Single connection to be presented at manifold.
 - This will remove possibility of any rotational forces being transmitted to the MBC.
- ❖ Additional 16" hose to be added to the string.
 - This will increase distance of MBC from ships manifold by 10 metres, and reduce possibility of MBC being lifted clear of water.

❖ MBC to be reinstated September 2012