TECHNICAL AND OPERATIONAL GUIDANCE (TECHOP)

TECHOP (O-03 - Rev1 - Jan21)

DEFINING CRITICAL ACTIVITIES REQUIRING SELECTION OF CRITICAL ACTIVITY MODE

JANUARY 2021

DISCLAIMER

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EXECUTIVE SUMMARY

An industry meeting was held to define DP operations that are to be carried out with vessels configured in Critical Activity Mode (CAM) or in Task Appropriate Mode (TAM). The meeting was attended by representatives from the MODU, construction vessel and logistics vessel communities. USCG and oil company representatives also participated and the meeting was facilitated by the Marine Technology Society's DP Committee. The meeting and associated workshop was hosted at the premises of IADC Houston on the 1st of May 2013.

There was convergence between the views of the Construction and MODU communities, which was that all DP operations were considered to be critical until demonstrated to be otherwise and documented by established HEMP processes. The logistics community had some divergence from this view. It was acknowledged that further work and engagement with this community was needed to achieve convergence.

This document provides background information on the process used to arrive at the conclusion stated above and on the concepts of Critical Activity Mode and Task Appropriate Mode as a structured means to address the range of consequences associated with an unintended station keeping event during DP operations.

NOTE: This document does not preclude the use of any DP vessel (classed or unclassed) for an industrial mission. The minimum acceptance criteria may be established either by statutory bodies, contractual requirements and / or established HEMP processes. There should be concurrence on the choice of candidate vessel between Contractor / Vessel Owner and Charterer based on the technical capabilities of the vessel to carry out the industrial mission with the appropriate barriers in place to facilitate delivery of incident free execution.

1 INTRODUCTION

1.1 PREAMBLE

1.1.1 The guidance documents on DP (Design and Operations and People) were published by the MTS DP Technical Committee in 2011, 2010 and 2012, respectively. Subsequent engagement has occurred with:

- Classification Societies (DNV, ABS)
- United States Coast Guard (USCG)
- Marine Safety Forum (MSF)
- Oil Companies International Marine Forum (OCIMF)

1.1.2 Feedback has also been received through the comments section provided in the MTS DP Technical Committee Web Site.

1.1.3 It became apparent that a mechanism needed to be developed and implemented to address the following in a pragmatic manner.

- Feedback provided by the various stakeholders.
- Additional information and guidance that the MTS DP Technical Committee wished to provide and a means to facilitate revisions to the documents and communication of the same to the various stakeholders.

1.1.4 The use of Technical and Operations Guidance Notes (TECHOP) was deemed to be a suitable vehicle to address the above. These TECHOP Notes will be in the following categories:

- General TECHOP (G)
- Design TECHOP (D)
- Operations TECHOP (O)
- People TECHOP (P)

1.2 TECHOP NAMING CONVENTION

1.2.1 The naming convention, TECHOP (CATEGORY (G / D / O / P) – Seq. No. – Rev.No. – MonthYear) TITLE will be used to identify TECHOPs as shown in the examples below:

Examples:

- TECHOP (D-01 - Rev1 - Jan21) Addressing C^3EI^2 to Eliminate Single Point Failures
- TECHOP (G-02 - Rev1 - Jan21) Power Plant Common Cause Failures
- TECHOP (O-01 - Rev1 - Jan21) DP Operations Manual

Note: Each Category will have its own sequential number series.

1.3 MTS DP GUIDANCE REVISION METHODOLOGY

1.3.1 TECHOPs as described above will be published as relevant and appropriate. These TECHOP will be written in a manner that will facilitate them to be used as standalone documents.

1.3.2 Subsequent revisions of the MTS Guidance documents will review the published TECHOPs and incorporate as appropriate.

1.3.3 Communications with stakeholders will be established as appropriate to ensure that they are notified of intended revisions. Stakeholders will be provided with the opportunity to participate in the review process and invited to be part of the review team as appropriate.

2 PREAMBLE

2.1 FORMAT OF THIS TECHOP

2.1.1 The format of this TECHOP differs from previous documents. The decision to deviate from the established format was deliberate and consciously made as it is anticipated that users of this TECHOP may be different from the traditional readership. This TECHOP represents the output of an on-going industry engagement by US Coast Guard facilitated by the DP Committee of the Marine Technology Society on Critical Activity Mode and Task Appropriate Mode for DP operations.

2.2 BACKGROUND

2.2.1 In May of 2012, the USCG published a Federal Register Notice to owners of MODUs operating on the US Outer Continental Shelf recommending voluntary compliance with the DP Operations Guidance produced by MTS DP Committee (DP_FR_Notice_2012-10669-1).

2.2.2 The DP Committee of the Marine Technology Society had recognised the need to publish guidance on the design and operation of dynamically positioned vessels. The process to accomplish this has been started. The US Coast Guard notice to legislate was seen as an opportunity to achieve convergence between industry guidance and statutory requirements.

2.2.3 The DP committee of the MTS published the following documents:

1. DP Operations Guidance October 2010 Parts 1 & 2 (Rev3 - Jan21):
    a. Part 2 Appendix 1 (Rev3 - Jan21) P MODUs.
    b. Part 2 Appendix 2 (Rev3 - Jan21) DP Project / Construction Vessels.
    c. Part 2 Appendix 3 (Rev3 - Jan21) DP Logistics Vessels.
2. DP Vessel Design Philosophy Guidelines (Rev2 - Jan21).

2.2.4 In October of 2012, the US Coast Guard published a similar Federal Register Notice to owners of logistics and project construction vessels.

2.2.5 The Federal Register Notices of May and October drew attention to the concepts of Critical Activity Mode (CAM) and Task Appropriate Mode (TAM) as an integral part of Activity and Well Specific Operating Guidelines (ASOG / WSOG).

2.2.6 The USCG has stated in industry forums and events, the intent to publish rules addressing DP operations. Continuing dialogue between regulators and industry surfaced the need to better identify the criticality and consequences of loss of position for industrial activities and the CAM or TAM configuration they are to be performed in.

2.2.7 It was thus recognised that the MTS DP Operations Guidance needed clarity on the applicability of CAM and TAM with respect to industrial operations.

2.2.8 An effective way to achieve the above was to facilitate a collaborative effort between representatives of the MODU, logistics and project construction vessel segments.

2.3 PROCESS

2.3.1 An industry meeting was convened at the offices of the IADC in Houston on the 1st of May 2013. The objective was to identify operations triggering requirements to operate DP vessels in Critical Activity Mode (CAM) or Task Appropriate Mode (TAM). Representatives from the logistics vessel, construction vessel and drilling vessel communities participated in a workshop type setting with representatives from lease operators (International oil companies and independents). The meeting was facilitated by the Marine Technology Society's Dynamic Positioning Committee. Representatives from the US Coast Guard participated as observers.

2.3.2 A grounding session presented existing MTS DP operations guidance on critical activities and the concepts of Critical Activity Mode and Task Appropriate Mode.

2.3.3 Representatives from logistics, project construction and MODU communities shared their experience from implementation of the MTS DP Vessel Operations Guidance documents and validated that correct selection of CAM and TAM as part of the ASOG / WSOG process reduces the frequency and severity of DP incidents.

2.3.4 Participants then dispersed to three breakout sessions associated with the three industry segments (MODU, Construction and Logistics). Participants were asked to consider, comment and expand upon:

1. Pre-prepared examples of potential critical activities.
2. The drivers for adopting Task Appropriate Mode.
3. The Hazards and Effects Management Processes (HEMP) that should be applied to determine whether an activity should be conducted in Critical Activity Mode or Task Appropriate Mode.
4. An additional task to broadly assess the impact of adopting critical activity mode on their respective industry segment was undertaken. The output is not reported out in this document. The information was to be communicated to their respective segment's companies.

2.3.5 During the process it became apparent that care, clarity and appropriate detail are required when defining critical activities to aid understanding by all stakeholders. This is particularly important when a decision is being made to conduct certain operations in Task Appropriate Mode. Such decisions require the participation of a multi-disciplinary team and all stakeholders (vessel management team, shore based technical and operational support, client representatives).

2.3.6 During the process, the need to identify operations to be conducted in CAM or TAM and achieve concurrence between all stakeholders prior to execution was surfaced.

2.3.7 It was recognised that visibility and documentation of such CAM or TAM operation was essential and the ASOG / WSOG was seen as a means to provide this.

2.4 GENERAL CONCEPT OF CAM AND TAM

2.4.1 Critical activities are those that have potential for escalation that could lead to unacceptable consequences such as personnel injury, major equipment damage or damage to the environment. Typically, such industrial operations have any or all the following:

1. A low tolerance for unintended position changes.
2. A long termination time.
3. Involves vessel operations within 500 metre (m) zone of another asset.

2.4.2 MTS DP Vessel Operations Guidance describes the concepts of configuring DP vessel systems in either CAM or TAM as a means to address the varying risks associated with the consequences of loss of position and the disadvantages and restrictions imposed by operating continuously in CAM. MTS DP Vessel Operations Guidance discusses the concepts but does not provide detailed guidance on identifying or defining which activities require CAM or TAM. It was expected that proven HEMP processes could be leveraged by vessel owners / operators to provide activity specific identification and definition. The output of such HEMP processes is one of the inputs into the development of the ASOG / WSOG.

2.4.3 The guidance provided in this document is not intended to:

- Stipulate a minimum DP equipment class.
- Exclude non classed DP vessels from carrying out an Industrial Mission.

2.4.4 This document is not intended to prohibit the use of an existing unit because its design, construction and equipment do not conform to the guidance. It is acknowledged that many existing offshore units have operated successfully and safely for extended periods of time and their operating history may be considered in evaluating their suitability to conduct operations.

2.4.5 Certain Coastal states may have prescriptive statutory requirements on the minimum DP equipment class required for carrying out specific industrial missions. When statutory minimum requirements have not been established, the suitability of a vessel to carry out an industrial mission should be based on the output of established HEMP processes considering the risks presented by the activity and degree of station keeping integrity provided by the DP system of the candidate vessel. There should be a concurrence on the suitability of the vessel to carry out the industrial mission by all stakeholders.

2.4.6 It is acknowledged that irrespective of DP equipment class, every vessel has a CAM configuration that provides the highest degree of station keeping integrity. This configuration should be documented in the ASOG/WSOG and agreed between all stakeholders. The default configuration for carrying out DP operations should be CAM. The basis of any decision to operate in TAM should be well documented and risk assessed using established HEMP processes. The foregoing is valid and applicable for non-classed vessels too.

2.5 CRITICAL ACTIVITY MODE

2.5.1 Critical Activity Mode (CAM) is the DP system configuration that provides the highest level of station keeping integrity. All DP Class 2 and DP Class 3 vessels should have a class approved FMEA of the DP system. This FMEA should identify the system configurations that have been analysed. Such configurations meet classification society requirements for the assigned DP notation but may not include the configuration which provides the highest level of station keeping integrity.

2.5.2 It should be understood and promulgated that the difference between CAM and TAM includes elements other than power plant configuration, for example position references, auxiliary systems, thrust limits, equipment availability, including restrictions on IRM.

2.5.3 The configuration for CAM should assess the vessel's design, addressing the seven attributes that contribute to providing the highest level of station keeping integrity. The process should surface effective procedural barriers to supplement the attributes listed below. These attributes are discussed in the MTS DP Vessel Design Philosophy Guidelines.

1. Autonomy.
2. Independence.
3. Segregation.
4. Differentiation.
5. Fault ride-through.
6. Fault resistance.
7. Fault tolerance.

2.5.4 The impact of Critical Activity Mode is not limited to equipment but also affects people and processes such as:

1. Equipment:
   - DP power plant and control system configurations adopted to provide the highest level of station keeping integrity.
   - Equipment availability.
2. People:
   - Manning levels.
   - Crew familiarisation and development.
   - Development and implementation of appropriate procedures.
3. Process:
   - Consideration and imposition of Positioning Standby.
   - Suspend Inspection Repair Maintenance (IRM).
   - Pre-activity trials and validation.

2.6 TASK APPROPRIATE MODE

2.6.1 Task Appropriate Mode is a risk based mode. In this mode the vessel is setup in a defined configuration which strives to offer station keeping integrity and fault tolerance. TAM is intended to address issues brought about by continuously operating in CAM. This is further discussed in Section 2.7.

2.6.2 In this mode, the DP vessel's systems may be configured in a manner that could cause the effects of single failures (as defined for the assigned DP class notation) to exceed the worst case failure design intent, resulting in loss of position.

2.6.3 It should be understood and promulgated that operating in TAM includes addressing elements other than power plant configuration, for example position references, auxiliary systems, thrust limits, equipment availability.

2.6.4 In TAM the vessel may be operated at thrust levels beyond its post worst case failure DP capability. This is a choice that is consciously made.

2.6.5 TAM may be appropriate in situations where it is determined that the potential consequences of loss of position can be avoided because the operation in progress can be safely terminated before the position excursion reaches the point at which it may cause unacceptable consequences.

2.6.6 MTS DP Vessel Design Guidelines espouse a design process which produces a DP vessel which is fault tolerant in CAM and TAM in respect of defined failure criteria. In CAM, the vessel is operated within the post worst case failure environmental envelope considering the failure criteria defined for its assigned DP class notation. In TAM the failure criteria used limits single failure effects to the loss of one engine and/or one thruster with the exception of a very limited number of low probability failure modes.

2.6.7 The risks of adopting TAM should be understood and documented through HEMP and reasonable measures taken to reduce those risks in relation to the consequence of loss of position.

2.6.8 Vessels with the potential to undertake certain operations in TAM should analyse and prove the intended configurations. This may have an impact on the FMEA and capability plots.

2.6.9 Experience from implementation of the MTS DP Vessel Operations Guidance suggests that correct selection of CAM and TAM as part of the ASOG / WSOG process reduces the frequency and severity of DP incidents. However, it is important to understand that correct DP system mode selection is only one part of the process of ensuring an acceptable level of station keeping integrity. Even a fully fault tolerant DP system design operating in CAM depends on attributes that require maintenance and validation to remain effective including:

1. Performance.
2. Protection.
3. Detection.

2.7 DRIVERS FOR OPERATING IN TAM

2.7.1 It is not unreasonable to question why a DP vessel should operate in a mode that provides a lesser degree of station keeping integrity. In practice, it may be unsustainable for certain types of DP vessel to operate continuously in CAM because this mode may have disadvantages such as:

- Requires more or all DP related equipment to be online which precludes maintenance activities on DP.
- Increased fuel consumption and emissions with possible impact on environmental emissions permits.
- Increased equipment running hours.
- Potential for increased non-productive time caused by limiting the vessel’s operational environmental envelope to that provided by its post worst case failure DP capability.
- Restrictions placed upon the operation or capacity of industrial equipment created by the adoption of CAM.

2.8 IDENTIFICATION OF CAM IN FMEAS

2.8.1 DP vessel owners may need to review their DP system FMEAs to determine whether the analysis clearly identifies the configuration that provides the greatest station keeping integrity or provides sufficient information to allow it to be established. Once identified, the system configurations for critical activity mode should be documented in a class approved FMEA supplement and in the ASOG / WSOG.

2.8.2 Identifying the configuration that provides the greatest station keeping integrity can be carried out as part of the DP FMEA process. Guidance on DP FMEAs can be found in the MTS DP Vessel Design Philosophy Guidelines also published as DNV RP-E306 and in DNVs, 'Recommended Practice for FMEA of Redundant Systems', RP-D102.

2.9 LIMITATIONS OF IMO DP EQUIPMENT CLASS

2.9.1 IMO DP equipment classes and corresponding DP class notations are intended to provide a range of station keeping integrity (reliability) to match the consequences of a loss of position. In practice, the systems of a DP vessel of a particular class may be configured in a number of ways that meet IMO and classifications society requirements. Typically, only one of these possible configurations will provide the highest level of station keeping integrity. However, this configuration may not be one of those analysed in the class approved DP FMEA.

2.9.2 Historically, DP vessels are chartered with a particular DP equipment class. If this is the case, the DP vessel may be required to carry out the entire operation in a configuration that has been demonstrated to be fully fault tolerant in its DP FMEA and at thrust levels within its post worst case failure DP capability.

2.9.3 In such cases, TAM may effectively be a fully fault tolerant configuration but not necessarily that which provides the highest level of station keeping integrity.

2.9.4 Operations that are identified as critical by HEMP processes should be carried out in CAM configuration.

2.10 SUGGESTED IMPLEMENTATION STRATEGY

2.10.1 The processes listed below are intended to summarize the steps taken for each well or construction activity to identify and document activities that may be conducted in TAM and how CAM and TAM configurations may be identified.

1. Identify risks associated with consequences of loss of position for all operations to be undertaken on DP. CAM is the default configuration.
2. Document the basis for the decision to operate in TAM using established HEMP processes and the guidance in this TECHOP. Document concurrence from all stakeholders to operate in TAM.
3. Establish and document a TAM configuration for DP related systems in the ASOG / WSOG.
4. For CAM, identify items with impact on operational uptime in carrying out industrial mission.
5. Identify and document the system configuration for CAM and the method by which this configuration was determined to provide the highest level of station keeping integrity in the FMEA or a FMEA supplement.

   Note: Some classification societies state that a vessel is only considered to be in compliance with their requirements if it is operated in a configuration analysed in the approved FMEA. With this in mind, DP vessel owners may wish to discuss this issue with the appropriate classification society for the vessel and consider having a CAM amendment or supplement approved and validated by DP FMEA proving trials.

6. Document the vessel specific critical activity mode of operation in the ASOG / WSOG.

7. Document the list of activities requiring selection of CAM in the ASOG / WSOG.

   Note: Vessel owner and lessee should agree the activities which may be carried out in TAM.

2.11 EXAMPLES OF CRITICAL AND NON CRITICAL ACTIVITIES

2.11.1 The following examples were taken from the output of the industry meeting but are only given here for the purposes of illustrating the concept. The formal output from the on-going industry process is given in Section 3 in Table 3-1 with clarifications in the sections that follow it.

2.11.2 Example of critical activities performed by MODUs on DP include:

1. Any operation with non shearables through the stack.
2. Certain parts of well test and completion operations.

2.11.3 Example of non-critical activities that could be performed in TAM include:

1. Drilling ahead in non-hydrocarbon zones.
2. Riser-less top hole drilling.

2.11.4 Examples of critical activities performed by construction vessels on DP include:

1. Operating within the 500m zone of a surface asset.
2. Diving operations.

2.11.5 Examples of non-critical activities performed by construction vessels include:

1. Survey in open water.
2. Pipe laying outside the 500m zone.

2.11.6 Examples of critical activities performed by logistics vessels include:

1. Operations with a long time to terminate.
2. Operations with physical constraints connecting the DP vessel to another asset.
3. Heavy lifting operations.

2.11.7 Examples of non-critical activities carried out on DP by logistics vessels include:**

1. Operations down wind and down current within the 500m zone of an asset with a short time to terminate.

   **Note: The non-critical example given in 2.11.7 above conflicts with current MTS Operations guidance which does not recognise any logistics vessel operations as being non-critical inside the 500m zone. The MTS DP committee plans further engagement with the logistics vessel community to achieve convergence. In particular:

   a. Identify the extent of the gap between MTS Operations Guidance and the views of the broader logistics vessel community.
   b. Leverage the gap as a means to enhance awareness of the MTS guidance documents.
   c. MTS DP Committee to engage with the OSVDPA as key stakeholders in this process to explore opportunities for achieving effective standardisation.
   d. MTS DP Committee to offer invitations to industry provided courses such as DP SAFE and MDAT.

2.12 SUMMARY OF PREAMBLE

2.12.1 The view of the MODU and Construction vessel community recorded at the meeting is:

1. CAM is the default configuration.
2. TAM is used by exception.
3. Decisions are supported by HEMP.

3 CRITICAL ACTIVITIES – MEETING OUTPUT

3.1 CAM AND TAM ACTIVITIES IDENTIFIED FOR ALL VESSEL TYPES

3.1.1 The sections that follow Table 3-1 provide greater clarity on the activities listed in the table below that cannot be provided in tabular format due to space restrictions.

Table 3-1 Critical and Non-critical Activities for All Vessel Types

<table>
<tr><th colspan="2">Vessel Type</th><th>Logistics</th><th>Project & Construction Vessels</th><th>MODU</th></tr>
<tr><td rowspan="7">MODE</td><td rowspan="5">CAM</td><td rowspan="5">As indicated by HEMP process.
Operations with constraints such as lifting operations or connections to surface assets.
Operations in a drift-on condition within 500m Zone of a surface asset.</td><td>Operating inside 500m zone of surface assets, including fixed and floating production facilities and vessels.</td><td>Exposure to non shearables through stack that serves as a barrier to successful EDS function.</td></tr>
<tr><td>Operating inside of a defined zone of sub surface assets and structure where the consequences of an unintended station keeping event are unacceptable.</td><td rowspan="2">Certain well test / completion operations.</td></tr>
<tr><td>Manned diving operations.</td></tr>
<tr><td rowspan="2">Operating outside the 500m zone – Default is CAM with TAM by exception (Basis to be documented) e.g. pipe lay outside 500m zone, ROV support.</td><td>SIMOPS with project / construction vessels in 500m Zone.</td></tr>
<tr><td>Riser analysis dictated limited red watch circles (</=10m).</td></tr>
<tr><td rowspan="2">TAM</td><td rowspan="2">Down wind & current of an asset in the 500m Zone when the time to terminate the operation is short.</td><td rowspan="2">ONLY BY EXCEPTION</td><td>Drilling ahead in non-hydrocarbon zones.</td></tr>
<tr><td>Top hole / riser less drilling ahead.</td></tr>
</table>

3.2 COMMENTS FROM OUTPUT OF BREAKOUT SESSIONS

3.2.1 All three segments concluded that there were no show-stoppers for operating vessels configured for CAM albeit with impacts in the following areas:

1. Fuel consumption and emissions.
2. Equipment running hours.
3. Extended operations time.
4. Inspection Repair Maintenance.
5. Manning levels (shore side and vessel based).
6. Management of change.
7. Operability and feasibility.
8. Contract negotiations.

All the above could result in additional cost.

3.2.2 The potential for increased costs was identified where higher operational uptime and availability in CAM can only be achieved by retrofitting equipment.

3.2.3 The HEMP processes applied should be readily understood and consistent across industry for the benefit of all stake holders, but particularly for the benefit of those involved in a verification role who might be expected to review the process output from several different contractors, lessees and operators.

3.3 MOBILE OFFSHORE DRILLING UNITS

3.3.1 Although the MODU community agreed that CAM was the default operating configuration, it was estimated that the proportion of a typical 120 day deep water well that would be conducted in CAM is estimated to be of the order of 30 to 40 days.

3.3.2 The list of activities in the MODU column of Table 3-1 was reviewed and agreed upon by participants as representative of CAM and TAM operations keeping in mind that creating a comprehensive list for the purpose of this exercise is impractical, thus highlighting the importance of the identification process.

3.3.3 The trend towards turnkey MODU projects and stock designs based largely on class minimum standards has focused attention on the importance and impact of enhancing uptime and availability on MODUs operating in CAM and TAM operations. In particular the need to develop designs that can take full benefit of the opportunities for IRM whilst operating in TAM.

3.3.4 Operations involving non shearables through the stack and well completion operations were identified as two CAM activities for which useful guidance was already provided in API publications and this has been presented in the sections that follow.

3.3.5 Extract 3-1 below is extracted in its entirety from Section 8.2.3.1 of API RP96, First Edition, March 2013, 'Deepwater Well Design and Construction'.

8.2.3 Riser Operational Considerations

8.2.3.1 Running Nonshearable Items Through the BOP

Because of operational and technology limitations, there are cases when nonshearable tubulars are run through the BOPs. Nonshearable components may include:

— drill collars and stabilizers;

— drill pipe tool joints;

— large OD and/or heavy-walled casing;

— casing string components such as float collars, stage collars, liner hangers, and associated running tools;

— casing hangers and associated running tools;

— retrievable casing bridge plugs and storm packers;

— BOP test plugs;

— VIT;

— completion components such as tubing conveyed perforating guns, packers, mandrels, hangers, SCSSVs, and sand control screens.

NOTE Some completion components, such as tubing with control lines and cables, may be shearable, but the cables and control lines can interfere with obtaining an effective pressure seal.

When a nonshearable tubular or component is to be run or pulled through the BOPs, additional operational precautions shall be in place to mitigate the potential risks of a marine riser disconnect. These precautions may include the following.

a) Additional supervision on rig floor (toolpusher, company representative, etc.).

b) Review well characteristics to determine if the well is stable and within acceptable parameters for continued operations (e.g. fluid gain/loss, gas quantities).

c) Heightened sense of awareness throughout rig (announcement over public address system, etc.).

d) Operational procedures to minimize the likelihood of a loss of stationkeeping to include the following:

— additional checks of weather window;

— a proactive assessment of the rig power management and distribution system;

— adjustment to the EDS emergency response procedures with predetermined provisions for removing nonshearable items from across the rams (i.e. drop workstring with nonshearables prior to enacting EDS);

— heightened sense of awareness on the bridge (dynamic positioning system operator, thruster adjustments, etc.) by:

a. delaying maintenance until critical operations are finished, and

b. placing additional generators/thrusters online;

— thoroughly understand the rig's EDS sequence and how the autoshear system will attempt to close on nonshearables. Understand the options for disarming the autoshear system during the time period nonshearables are across the stack.

Extract 3-1 Section 8.2.3.1 of API RP96, First Edition, March 2013, 'Deepwater Well Design and Construction'

3.3.6 It is acknowledged that 8.2.3.1 emphasises the additional operational considerations to mitigate the potential risks of a marine riser disconnect, including identifying the need to have operational procedures to minimise the likelihood of a loss of station keeping. Assessment of the rig power management and distribution system is identified in this section and is one of the elements taken into consideration for CAM.

3.3.7 Such operational procedures should include operating the vessel in CAM.

3.3.8 Extract 3-2 below is extracted in its entirety from Section 9.1.1 of API RP96, First Edition, March 2013, 'Deepwater Well Design and Construction'. It provides guidance on the general phases of a completion operation and emphasises the controls / barriers to be put in place.

9 Completion Operations Considerations

9.1 Completion Operation Phases

9.1.1 General

The general phases of a completion operation are:

— wellbore preparation,

— lower completion,

— upper completion,

— cleanup (flow initiation),

— BOP removal, and

— tree installation.

Physical barriers installed during temporary abandonment of a well are replaced with other verified barriers prior to their removal during the wellbore preparation and reentry phases. The fluid column may not serve as a barrier during completion operations. Wellbore displacements, sand control, stimulation, perforating, and circulating packer fluid often place non-kill-weight fluids in the wellbore.

At or near the end of the completion process, additional physical barriers are installed in the well before kill-weight fluid is displaced from the riser and the BOP is removed. The removal of the previously tested barriers and removal of kill-weight fluids creates the potential for well control incidents. Therefore, during the well completion process, it is important that the well is carefully monitored and the removal of barriers properly managed with a minimum of two barriers in place in all flow paths (one of which must be mechanical).

Extract 3-2 Section 9.1.1 of API RP96, First Edition, March 2013, 'Deepwater Well Design and Construction'

3.3.9 An unintended station keeping event can compromise the existence or effectiveness of barriers. A higher level of station keeping integrity should be exercised and consideration given to setting up the vessel in CAM to effectively manage the removal of barriers during completion operations.

3.4 CONSTRUCTION VESSELS

3.4.1 The construction vessel community concluded that CAM should be the default starting point for all project and construction operations and that TAM would only be used outside defined zones around surface and subsurface assets by exception only and accompanied by documented HEMP processes.

3.4.2 The 500m zone was considered appropriate for the surface assets but the influence of the industrial mission e.g. water depth and touch down points, risk of dropped objects etc. for subsea construction operations, precluded a general definition of the zone to be observed around sub-surface assets other than that it would be defined by established HEMP processes and not less than 500m.

3.4.3 It was also established that selection of TAM should be a guideword to be used in the HEMP process to help identify and document risks.

3.4.4 The community also emphasized the need to review the definition of construction vessels to ensure appropriate applicability and to not create conflict with other regulatory definitions.

3.5 LOGISTICS VESSELS

3.5.1 The logistics vessel community considered that TAM would be the default condition for logistics vessel operations with HEMP processes being used to determine when CAM should be adopted. This was based on the assumption that logistics vessels perform many activities that have a short time to terminate and the ability to switch to manual control and leave the scene of operations if the DP control system malfunctioned.

3.5.2 DP system malfunctions resulting in blackout preclude transfer to manual control and the risk of collision with surface assets in a drift on condition was recognised as one of the activities requiring CAM.

3.5.3 Unlike the MODU and Project Construction communities which had identified CAM as the default with TAM being the exception, accompanied by the appropriate documented risk assessments aided by HEMP processes, the logistics vessel community identified TAM as the default with operations to be conducted in CAM to be identified by risk assessments. Some examples of identified activities that should be conducted in CAM were listed as :

1. Activities with constraints / connections to surface assets.
2. Activities within the 500m zone of an asset upstream and up current of assets.

3.5.4 Current MTS Operations guidance does not recognise any logistics vessel operations as being non-critical inside the 500m zone.

4 REPORT OUT

4.1 All three communities reported out the results from the breakout sessions. There was convergence between the project and construction communities and the MODU community on CAM being the default and TAM by exception accompanied by documented risk assessments aided by established HEMP processes. The logistics community reported a differing view with TAM being the default and risk assessments being used to identify activities to be conducted in CAM.

4.2 There was unanimous agreement that all DP operations were to be risk assessed.

4.3 There was unanimous agreement that operations and modes (CAM or TAM) that they would be executed in were to be pre-determined. Basis of decision for TAM operations are to be documented and concurrence achieved and documented between all stakeholders prior to execution.

4.4 The ASOG / WSOG should identify operations permitted to be carried out in TAM.

4.5 The following actions were identified:

1. Efforts to be undertaken to achieve convergence between logistics and the other two segments.
2. MTS DP Committee to seek engagement opportunities with the logistics community to facilitate convergence with a view to enhancing awareness and understanding of MTS guidance documents by:
    a. Identifying the extent of the gap between MTS Operations Guidance and the views of the broader logistics vessel community.
    b. Leveraging the gap analysis as a means to enhance awareness of the MTS guidance documents.
    c. MTS DP committee engaging with the OSVDPA as key stakeholders in this process to explore opportunities for achieving effective standardisation.
    d. MTS DP committee facilitating invitations to industry provided awareness training courses such as DP SAFE and MDAT.
3. Dissemination of output of the work session in draft format (this document) for review and comment.
4. The potential need for a follow-up engagement with the participants of this work session.

5 GLOSSARY

ASOG	Activity Specific Operating Guidelines, analogous to WSOG but used by the Construction and Logistic community.
Critical Activity	Critical activities are those that have potential for escalation that could lead to unacceptable consequences such as personnel injury, major equipment damage or damage to the environment. Typically, such industrial operations have any or all the following: 1. A low tolerance for unintended position changes. 2. A long termination time. 3. Involves vessel operations within 500m zone of another asset.
Critical Activity Mode (CAM)	Critical Activity Mode (CAM) is the DP system configuration that provides the highest level of station keeping integrity.
Construction Vessel	Vessels engaged in project or construction work such as pipelay vessels, heavy lift crane vessels, dive support vessels, accommodation vessels.
DP SAFE	A course developed to help project management and industrial process supervisory personnel understand the contributing factors and consequences of a station keeping event, and the tools and processes that are available to help manage such issues to aid delivery of incident free DP operations. Currently offered by Kongsberg but developed in cooperation with a major oil company.
FMEA	Failure Modes and Effects Analysis is a structured process to determine single fault tolerance as applied in the Dynamic Positioning context. It is primarily a technical analysis to verify a DP vessel's Worst Case Failure Design Intent. It includes failure and performance testing of the vessel's DP related systems. The Worst Case Failure found by the analysis should comply with the design intent and defines the vessel's maximum post failure DP capability. This capability does not generally account for the effects of machinery which is unavailable due to IRM.
HEMP Hazards and Effects Management Process	A process that provides a structure approach to managing the hazards and potential effects of an activity, There are numerous techniques to carry out HEMP e.g. HAZard IDentification (HAZID), HAZards and OPerability (HAZOP), HAZards ANalysis (HAZAN) , Task Risk Assessment (TRA), Quantitative Risk Analysis (QRS) , Job Safety Plan (JPS), etc. Application of HEMP processes typically involve four steps - identify, assess, control and recover. It is in an iterative process.
IADC	International Association of Drilling Contractors
IRM	Inspection Repair and Maintenance, as discussed in the MTS DP Design Philosophy Document.
Logistic vessel	A generic term used to encompass vessels whose primary mission is to undertake an Industrial mission that is usually part of a supply chain function of delivery of material, goods, supplies, people, equipment and consumables. (e.g.- Platform Supply Vessels, Crew Boats, Offshore Support vessels (OSVs) etc.
MDAT	MTS DP Committee document "Guidelines for Professional Development of DP Operational Personnel using the Mapping Delivery Ability Tool".
MODU	Mobile Offshore Drilling Unit.
OSVDPA	Offshore Service Vessel Dynamic Positioning Authority (OSVDPA): OSVDPA is an alternative Dynamic Positioning Operators (DPO) certification program that is specifically tailored to the unique demands of safe and efficient Offshore Service Vessel operations.
Task Appropriate Mode (TAM)	Task Appropriate Mode is a risk based mode. In this mode the vessel is setup in a defined configuration which strives to offer station keeping integrity and fault tolerance.
WCFDI	Worst Case Failure Design Intent.
WCF	Worst Case Failure, as determined by the FMEA.
WSOG/WSOC/WSOP	WSOG family of terms is generally associated with MODUs. The terms are intended to describe a Well Specific Operating Guideline, Criteria or Plan. Some vessel owners use the first acronym as a strategy document and guideline on use of the document that is second or third acronym.

APPENDICES

APPENDIX A LOGISTIC VESSEL BREAKOUT NOTES

LOGISTIC VESSEL BREAKOUT NOTES

MTS – Critical Activity

Meeting Hosted at IADC on May 1, 2013

Logistics Vessel Group Breakout Discussions:

Discuss Economic Impact Potential for Definitive Regulation on Critical Activity:

1 – Operating expense impact. Heightened regulation of critical activity may drive operating costs, for instance increased manning scales for DPOs beyond what has conventionally been mandated by minimum safe manning standards and industry practices. Another example is the need to run in CAM with all systems operating a light load/off-peak design conditions, increasing wear and tear on equipment and decreasing out of service intervals (More frequent off-line maintenance being required.)

2 – Balance sheet impact – Depending upon the required configuration that may be mandated by critical activity definition and the implementation schedule for compliance, significant re-engineering and cost to upgrade the logistic vessel fleet's DP systems may be required.

Discuss the Human Resource Impact Potential for definitive regulation on Critical Activity:

1 – Depending upon the definition, certain critical activities may drive headcount and competency for DPOs – there are not enough of them now. Too short of a phase in period and too high a standard for ALL DPO's will place significant constraints on the logistics vessel fleet's ability to fill all of the positions that may be required.

2 – There is a significant risk that in driving "body count", the logistics vessel fleet will sacrifice competency. There must be sufficient "cycle time" to allow assimilation within the industry of any changes in head count or competency required by the definition of critical activity within regulation.

Discuss the Process/Community Impacts for definitive regulation on Critical Activity:

1 – On the plus side, definition of critical activity should drive standardization into the segment, and in time, real reductions in unplanned DP events should occur.

2 – On the downside, there is risk that the industry will stratify, with "major" individual logistic vessel fleets that strive for high compliance having to shoulder the heaviest lift and garner all the regulatory oversight, while the smaller individual logistic fleets ("Mom and Pops") coast along in a low compliance, no- compliance environment.

3 – Serious questions remain to be answered as to how the regulations will be assured – the USCG's marine inspection responsibilities are under-manned as it is. Not only do they not have the resources to take on more inspection scope, the inspection of DP operations and audit of compliance is a highly technical field, and one which the USCG personnel will be required to be particularly prepared for.

Logistic Fleet Critical Activity Definition – Observations:

Relying on the MTS guidance that "Critical Activity Mode" is the one configuration that allows a DP vessel to attain its most redundant mode of operation and understanding the real driver in any regulation that may be defining critical activity should be focused for the logistics fleet on the implications that a failure may have on loss of position, our group did not think that it was necessary to operate a DP vessel in CAM all of the time.

Unlike MODU's or some large construction vessels that do operate have due to functional constraints, have "long time to terminate" issues, the logistics fleet usually are not faced with long time to terminate constraints.

The group also recommends that any definition of critical activity be limited to DP activity – that similar activity not done on DP is not deemed to be critical just because it is of similar nature to the work being done on DP. An example would be cargo operations alongside an offshore installation. Conventionally, all cargo work done on logistics vessels was done under manual control or perhaps with the use of a spring line. Those practices, when appropriate, should be allowed to continue without regard to any definition of critical activity complicating things.

Critical Activity for the logistics fleet may be limited to only two scenarios:

1 - Activity wherein short time to terminate is NOT an available plan, such as transfer of persistent liquids or during certain heavy lifting operations, and/or

2 – Physical orientation required by the operation is not fault tolerant due to

a) Congested or contingent "escape routes are constrained due to physical obstructions or other vessels in proximity, or

b) Foul weather, current or other environmental conditions mandate critical activity operations.

Critical Activity should NOT under any circumstances be defined by a geographical boundary, such as "all activity within 500m of an offshore installation shall be deemed critical". Each activity needs to be individually assessed as to its criticality.

Process

The logistics fleet recommends that ALL DP activity be risk assessed and that the Task Appropriate Mode (TAM) be determined. One TAM is indeed CAM.

The use of CAM as the default mode is discouraged by the logistics fleet as it may become "automatic" and thereby defeat the use of proper risk assessment to determine whether it is the most appropriate mode or not for the activity at hand.

APPENDIX B ATTENDANCE LIST (INCOMPLETE) 1 MAY 2013 WORKSHOP

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