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Evaluation of the Suitability of Industry Standards as MMS Requirements

Executive Summary

Review of MMS CFR Title 30, NTLs and Safety Alerts

Review of API RP 16E, 1st edition

Review of API RP 64, 1st edition

Review of API RP 16Q, 1st edition

Review of IADC Deepwater Guidelines

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October 16, 2000

Section 1
Executive Summary
MMS Project # 01-99-PO-17072

Enclosed herein is the research project "Evaluation of the Suitability of Industry Standards as MMS Requirements." Incorporating the valuable work of industry experts into MMS minimum standards results in advances in safety and environmental performance, as well as improved efficiency. The research objectives herein are as follows:

1) Review and compare API RPs (Recommended Practices) and the IADC Deepwater Guidelines against existing MMS requirements for items that relate to safety and environmental performance. Recommend items or entire standards for inclusion into MMS requirements.
2) Survey 20 GOM rig assessments for 20 different rigs to determine compliance with recommended items or standards from 1).

Industry standards are designed to provide consensus minimum requirements. Voluntary compliance with these standards provides one measure of performance and capabilities for equipment and systems that purchasers can use to evaluate different suppliers. At the same time, because these standards are voluntary from a regulatory perspective, coupled with operators' contracting documents not mandating such compliance, there are items in these standards that are consciously not met, particularly among certain groups. Insofar as these standards are, by all counts, minimum standards, failure to comply with them is a failure to take advantage of the significant cumulative experience of industry experts. This may result in needlessly suffering additional safety or environmental incidents.

The enclosed research paper allows the MMS a very cost effective approach for analyzing industry standards, rigs' current compliance with these voluntary standards, and their prospective impact on drilling operations in MMS waters.

I. Summary of Recommendations

- Significant opportunities exist for the MMS to streamline regulations by eliminating redundancy to existing API Recommended Practices.

- API Recommended Practices 16Q, 16E and 64 are all recommended for inclusion into MMS standards by reference to the API standards.

- Some existing MMS regulations relating to BOP control systems are not covered by API RP 16E and should be left as stand-alone MMS regulations.

- IADC Deepwater Guidelines can be sufficiently covered through reference to API Recommended Practices and are therefore not recommended for inclusion into MMS requirements.

II. Rig Selection

Rigs were selected for inclusion in this study based on their capability to operate in "deep water" (>3000 ft). WEST is often called to the rig to help in resolution of a specific problem. In some of these cases, assessments may be confined to a limited area of the drilling equipment. For instance, in an assessment where a BOP control system failure has occurred, it is very likely that WEST will not be asked to assess the riser or diverter systems. Conversely, if a riser or riser system failure has occurred, WEST may perform only a cursory review of the BOP and associated control system. In selection of assessments for this study, we attempted to avoid assessments such as those in these two examples.

III. Assessment Point Selection

Assessment points were selected based on:

- WEST's general Acceptance Testing Procedure (ATP), which contains more than 1100 potential assessment points, was reviewed to identify the assessment points applicable to the MMS defined workscope.

- Points were chosen that were as objective (non subjective) as possible to ensure that the points selected could be clearly assessed to defined criteria.

- You will undoubtedly note that not all well defined assessment points in the reviewed standards are included. Many that are not included were excluded on the basis that, in WEST's experience, "all" rigs comply with these items. A clear example of this is the number of rams and annulars required. Such non-compliances would be glaringly obvious to the knowledgeable surveyors employed by WEST and thus are not included either as a line item on our assessments or in this study.

- WEST ATP's are continuously upgraded documents adding audit points as necessary to reflect current knowledge. Accordingly, some of the older reports may not have assessed each of the selected points and thus have a higher % of "0", or not assessed.

IV. Summary of rig assessments and how they compared to standards:

- In general, the rigs surveyed had a very high level of compliance with MMS and industry standards. Surveyed rigs had a total of 934 compliances with assessment points and 55 that were not in compliance.

- The standard WEST assessment involves identification and resolution of findings, and exception reporting those not completed at the time of the surveyor's departure. Thus, WEST reporting only records status upon departure, it does not offer condition prior to the assessment.

- Both drilling contractors and operators generally desire and work to achieve compliance to industry standards. Many of the rigs were built before these standards were developed, explaining some degree of non-compliance. Other reasons for non-compliances are simply a matter of timing or lack of understanding of the requirement on the part of the rig personnel. For example, MMS NTL (Accidental Riser Disconnect) No. 2000-G07, two rigs did not comply with, but these rigs were both diligently pursuing implementation at the time of the WEST assessment. Another example is the "single point failure" discussed in API RP 16E, section 16E3, General Requirements. Prior to WEST assessments, some drilling contractors had not fully considered the ramifications of a single BOP control hose between a shuttle valve and the BOP. Failure would render the BOP control system inoperative, constituting a "single point failure" and therefore a lack of compliance with this API RP.

V. Technical Summary

The review of each of the standards included in this workscope has been provided in separate sections for ease of reference. Each section contains:

- An overall summary of the review, with comments on the most significant non-compliance items, designated as Section x.1.

- A list of the assessment points and the study's comparisons and recommendations for each point. This list can be used to review points selected from the section's applicable standard for this study. If there are MMS requirements that apply to each point, they are compared and contrasted to the referenced standard. The list then includes the study's recommendation of inclusion or exclusion of the requirement into MMS regulations. Finally, the degree to which assessed rigs complied to each line item is listed. These lists are designated as Section x.2.

- Detailed lists of compliance by individual items, as well as overall compliance rates for each rig is supplied as well. Ease of reading this data mandated separation of this list into two segments (10 rigs/segment), and is designated as section x.3 (a) and section x.3 (b). Compliance is recorded as indicated below:

  X = Out of compliance
  O = Item not assessed for this rig
  NA = Item not applicable to this rig
  C = Item in compliance

- The safety and environmental ramification of each item to which assessed rigs were out of compliance are summarized in the last table, designated as Section x.4.

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October 12, 2000

Section 2.1

WEST Assessment Points

Review of MMS CFR Title 30, NTLs and Safety Alerts

MMS Project # 01-99-PO-17072

Following is the detailed report of MMS CFR Title 30, NTLs and Safety Alerts of assessment points that were used in this study. The format is detailed in Section V. Technical Summary, from the Executive Summary.

Following are the highlights from the review of MMS CFR Title 30, NTLs and Safety Alerts:

- Compliance of included line items was observed upon WEST leaving the rig 84.8% of the time, out of compliance 15.2%.
- Many of the MMS CFR Title 30 OCS Requirements, NTLs and Safety Alerts reviewed in this study are referenced by the API documents included in this study. In some case, the API recommended practices are more stringent than MMS OCS Regulations.
- Some existing MMS CFR Title 30, NTLs and Safety Alerts are not covered by API and are good requirements for enhancing the safety of drilling operations.
- Most of the MMS assessment items are redundant with API Recommended Practices. API Recommended Practices are periodically updated. Including them by reference allows the MMS to take most rapid advantage of industry developments.

WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Perform an accumulator volume test. Verify accumulator system is providing sufficient capacity to supply 1.5 times the volume of fluid necessary to close and hold closed all BOP equipment units with a minimum pressure of 200 psi above the precharge pressure.	See Attachment 1	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.1	17	3	0	100.00%	0.00%
Verify any regulators supplied by rig air and without a secondary source of pneumatic supply are equipped with manual overrides or alternately, other devices provided to ensure capability of hydraulic operations if rig air is lost.	API RP 16E section 3.5.1 exceeds the MMS requirement. Recommendation: Adopt the 16E wording by reference.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.1 and API RP-16E, Section 16E.3.5.1	4	16	0	100.00%	0.00%
Verify that a backup to the primary accumulator-charging system is automatic, supplied by a power source independent from the power source to the primary accumulator-charging system, and possess sufficient capability to close all BOP components and hold them closed.	This item is currently addressed to a higher standard in RP #53, section 13.4.1. Recommendation: Adopt section 13.4.1 by reference.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.2	9	11	0	100.00%	0.00%
Verify that there is at least one operable remote BOP control station in addition to the one on the drilling floor Check to ensure the control station is in a readily accessible location away from the drilling floor.	API RP #53, section 13.5 covers this requirement in more detail & to a higher technical standard, as compared to OCS. Recommendations: Adopt section 13.5 by reference.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.3	5	15	0	100.00%	0.00%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Ensure that manifold equipment subject to well and/or pump pressure, (valves, pipes, flexible steel hoses and other fittings upstream of and including the choke manifold) has a minimum working pressure at least equal to or greater than the rated working pressure of the ram-type BOP's.	API RP # 53, sections 11.3.b and 9.2.1 a adequately address this issue to the same standard. Recommendation: Adopt Section 11.3 by reference.	MMS CFR Title 30 Chapter II, Part 250.406, paragraph d.7.i	14	6	0	100.00%	0.00%
Verify that all components of the Choke manifold system are protected from the danger, if any, of freezing by heating, draining, or filling with proper fluids.	This item is not auditable. API addresses "Retained Fluids" in API Specification 16C, section 9.16.12. RP # 53 section 9.2.1.h addresses freezing and proper fluids. Recommendation: Omit this MMS requirement. Adopt API RP #53 by reference.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.7.ii	9	11	0	100.00%	0.00%
Verify that when buffer tanks are installed downstream of the choke assemblies for the purpose of manifolding the bleed lines together, isolation valves are installed on each line.	API RP #53, figure #9 shows isolation valves. Isolation valves, prior to a buffer tank, are standard. Recommendation: Reference RP 53 section 9. Omit this requirement from OCS documents.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.7.iii	10	10	0	100.00%	0.00%
All low pressure testing will be conducted prior to high pressure testing.	API RP # 53 section 18.3.2.1 addresses the MMS issues. Recommendation: Reference this section of API. Omit from OCS regulations.	MMS CFR Title 30, Chapter II, Section 250.407, paragraph b.1	2	18	0	100.00%	0.00%
Verify that Variable Bore Rams (VBRs) are tested on all sizes of pipe that will be used on the well (excluding drill collars and bottom hole tools).	API RP # 53 does not address this issue. Recommendation: This is a good MMS regulation and should be retained in the OCS documents.	MMS CFR Title 30, Chapter II, Section 250.407, paragraphs b.1 and d.6 and API 16A Section 7.5.8.7.3.	1	17	2	89.47%	10.53%

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WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Verify diverter system is equipped with remote-controlled valves in the flow and vent lines that can be operated from at least one remote-control station in addition to the one on the drilling floor.	API RP # 53, section 5.2.3 addresses sequencing of valves. Recommendation: Omit this OCS regulation. RP #53 does not adequately state the second control panel is recommended. RP 64 is referenced in RP #53. RP 64, section 3.6.10.2 also does not recommend a second panel. Recommendation: Reword this requirement to only include the need for a second panel. Leave in the OCS documents.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c	11	9	0	100.00%	0.00%
Verify no manual or butterfly valve is installed in any part of the diverter system.	API RP #53 addresses this issue in section 5.2.3. Recommendation: Omit this from the OCS documents.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c	11	9	0	100.00%	0.00%
Verify all right-angle and sharp turns are targeted.	API RP # 64, section 3.5.2 addresses this topic well and far surpasses guidance provided by MMS. Recommendation: Reference this section in RP # 64.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c	10	9	0	100.00%	0.00%
Verify the entire diverter system is firmly anchored and supported to prevent whipping and vibration.	API RP # 64, section 3.5.3 addresses this topic well and far surpasses guidance provided by MMS. Recommendation: Reference this section in RP # 64.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c	10	9	1	90.00%	10.00%
Ensure all diverter system components have a rated working pressure of at least 200 psi.	API RP # 64, section 3.1.1 addresses this topic well and far surpasses guidance provided by MMS. Recommendation: Reference this section in RP # 64.	API RP 64 Section 3.1.1 & MMS CFR Title 30, Chapter II, Section 250.409, paragraph f.	12	8	0	100.00%	0.00%

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WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Verify the choke and kill line outlets are above the lower most ram. A kill line below the lower most rams can be approved if requested in the Application to Drill, APD.	API RP # 53, section 11.3e discusses this issue but does not address the MMS concern of a failed kill or choke outlet beneath the lower pipe rams. Recommendation: The APD requesting outlets beneath the LPR should address techniques to avoid washed out ring grooves. These include makeup procedure, face to face contact between the hubs or flanges and the frame inducing a bending moment on the outlet, "Frame Flex Test".	MMS NTL No 99-Go9, dated 10 May 1999.	7	12	1	92.31%	7.69%
To ensure that an accidental release of the LMRP connector does not occur while conducting operations from floating drilling rigs, accomplish all of the following by March 17, 2000:	RP 16 E.3.6.6 discusses transparent safety covers on critical function. Recommendation: Review and combine MMS requirements and guidance on this issue. Please state recommendations in an auditable format.	MMS NTL No. 2000-G07 dated February 22, 2000. (Even if not in MMS waters, this directive should still be considered.)	15	3	2	60.00%	40.00%
1. Implement measures to lock out any LMRP disconnect (hydraulic or electro-hydraulic) that is not part of a sequential disconnect process (i.e., a process that ensures that a well is secured by blind-shear rams before the riser disconnects) before the BOP/LMRP enters the water.	Same as above.	MMS NTL No. 2000-G07 dated February 22, 2000	16	2	2	50.00%	50.00%

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WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
2. Ensure that the sequential LMRP disconnect process (including isolating the wellbore) is designed so that the LMRP can be disconnected only as the result of a deliberate act.	Same as above.	MMS NTL No. 2000-G07 dated February 22, 2000	16	3	1	75.00%	25.00%

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WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
3. Implement human engineering measures such as labeling the LMRP panel button to clearly distinguish it from other functions and using warning labels.	Same as above.	MMS NTL No. 2000-G07 dated February 22, 2000	16	3	1	75.00%	25.00%
MMS Safety Alert No. 186 was issued after MMS NTL No. 2000-G07. The following is now required:	Same as above.	MMS Safety Alert No. 186	17	3	0	100.00%	0.00%
1. A risk and consequence analysis should be performed prior to making any of the changes listed in MMS NTL No. 2000-G07. Further, when instituting these necessary changes, communication of current activities is critical in performing this operation safe.	Same as above.	MMS Safety Alert No. 186	18	2	0	100.00%	0.00%
2. The MMS considers a backup BOP actuation system (such as an ROV) to be an essential component of a deepwater drilling system and, therefore, expects OCS operators to have reliable back-up systems for actuating the BOP in the event that the marine rise.	Same as above.	MMS Safety Alert No. 186	17	3	0	100.00%	0.00%

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WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Perform an accumulator volume test. Verify accumulator system is providing sufficient capacity to supply 1.5 times the volume of fluid necessary to close and hold closed all BOP equipment units with a minimum pressure of 200 psi above the precharge pressure.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.1	0	0	0	0	0	0	0	0	C	C
Verify any regulators supplied by rig air and without a secondary source of pneumatic supply are equipped with manual overrides or alternately, other devices provided to ensure capability of hydraulic operations if rig air is lost.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.1 and API RP-16E, Section 16E.3.5.1	C	C	C	C	0	C	C	0	C	C
Verify that a backup to the primary accumulator-charging system is automatic, supplied by a power source independent from the power source to the primary accumulator-charging system, and possess sufficient capability to close all BOP components and hold them closed.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.2	C	C	C	C	C	0	0	C	0	C
Verify that there is at least one operable remote BOP control station in addition to the one on the drilling floor Check to ensure the control station is in a readily accessible location away from the drilling floor.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.3	C	C	C	C	C	C	C	C	0	0

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WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Ensure that manifold equipment subject to well and/or pump pressure, (valves, pipes, flexible steel hoses and other fittings upstream of and including the choke manifold) has a minimum working pressure at least equal to or greater than the rated working pressure of the ram-type BOP's.	MMS CFR Title 30 Chapter II, Part 250.406, paragraph d.7.i	0	0	0	0	0	C	C	0	C	0
Verify that all components of the Choke manifold system are protected from the danger, if any, of freezing by heating, draining, or filling with proper fluids.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.7.ii	C	C	C	C	0	C	C	0	C	0
Verify that when buffer tanks are installed downstream of the choke assemblies for the purpose of manifolding the bleed lines together, isolation valves are installed on each line.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.7.iii	C	C	C	C	0	C	C	0	C	0
All low pressure testing will be conducted prior to high pressure testing.	MMS CFR Title 30, Chapter II, Section 250.407, paragraph b.1	C	C	C	C	C	C	C	C	C	C
Verify that Variable Bore Rams (VBRs) are tested on all sizes of pipe that will be used on the well (excluding drill collars and bottom hole tools).	MMS CFR Title 30, Chapter II, Section 250.407, paragraphs b.1 and d.6 and API 16A Section 7.5.8.7.3.	C	C	C	C	C	C	C	X	C	C
Verify diverter system is equipped with remote-controlled valves in the flow and vent lines that can be operated from at least one remote-control station in addition to the one on the drilling floor.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c	C	C	C	C	0	0	C	C	0	0

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WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Verify no manual or butterfly valve is installed in any part of the diverter system.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c	C	C	C	C	0	0	C	C	0	0
Verify all right-angle and sharp turns are targeted.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c	C	C	C	N/A	0	0	C	C	0	0
Verify the entire diverter system is firmly anchored and supported to prevent whipping and vibration.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c	C	C	C	C	0	0	C	C	0	0
Ensure all diverter system components have a rated working pressure of at least 200 psi.	API RP 64 Section 3.1.1 & MMS CFR Title 30, Chapter II, Section 250.409, paragraph f.	C	C	0	C	0	0	C	0	0	0
Verify the choke and kill line outlets are above the lower most ram. A kill line below the lower most rams can be approved if requested in the Application to Drill, APD.	MMS NTL No 99-Go9, dated 10 May 1999.	C	C	C	C	X	C	C	C	0	0
To ensure that an accidental release of the LMRP connector does not occur while conducting operations from floating drilling rigs, accomplish all of the following by March 17, 2000:	MMS NTL No. 2000-G07 dated February 22, 2000. (Even if not in MMS waters, this directive should still be considered.)	C	0	X	0	X	0	0	0	0	0
1. Implement measures to lock out any LMRP disconnect (hydraulic or electro-hydraulic) that is not part of a sequential disconnect process (i.e., a process that ensures that a well is secured by blind-shear rams before the riser disconnects) before the BOP/LMRP enters the water.	MMS NTL No. 2000-G07 dated February 22, 2000	C	0	X	0	X	0	0	0	0	0

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WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
2. Ensure that the sequential LMRP disconnect process (including isolating the wellbore) is designed so that the LMRP can be disconnected only as the result of a deliberate act.	MMS NTL No. 2000-G07 dated February 22, 2000	C	0	X	0	C	0	0	0	0	0
3. Implement human engineering measures such as labeling the LMRP panel button to clearly distinguish it from other functions and using warning labels.	MMS NTL No. 2000-G07 dated February 22, 2000	C	0	X	0	C	0	0	0	0	0
MMS Safety Alert No. 186 was issued after MMS NTL No. 2000-G07. The following is now required:	MMS Safety Alert No. 186	C	0	0	0	C	0	0	0	0	0
1. A risk and consequence analysis should be performed prior to making any of the changes listed in MMS NTL No. 2000-G07. Further, when instituting these necessary changes, communication of current activities is critical in performing this operation safe.	MMS Safety Alert No. 186	C	0	0	0	0	0	0	0	0	0
2. The MMS considers a backup BOP actuation system (such as an ROV) to be an essential component of a deepwater drilling system and, therefore, expects OCS operators to have reliable back-up systems for actuating the BOP in the event that the marine rise.	MMS Safety Alert No. 186	C	0	0	0	C	0	0	0	0	0
	C	100.0%	100.0%	75.0%	100.0%	72.7%	100.0%	100.0%	88.9%	100.0%	100.0%

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WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Perform an accumulator volume test. Verify accumulator system is providing sufficient capacity to supply 1.5 times the volume of fluid necessary to close and hold closed all BOP equipment units with a minimum pressure of 200 psi above the precharge pressure.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.1	0	0	0	0	0	0	0	C	0	0
Verify any regulators supplied by rig air and without a secondary source of pneumatic supply are equipped with manual overrides or alternately, other devices provided to ensure capability of hydraulic operations if rig air is lost.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.1 and API RP-16E, Section 16E.3.5.1	C	C	C	C	C	C	C	0	0	C
Verify that a backup to the primary accumulator-charging system is automatic, supplied by a power source independent from the power source to the primary accumulator-charging system, and possess sufficient capability to close all BOP components and hold them closed.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.2	C	C	C	C	0	0	0	0	0	0
Verify that there is at least one operable remote BOP control station in addition to the one on the drilling floor Check to ensure the control station is in a readily accessible location away from the drilling floor.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.3	C	C	C	C	C	C	0	C	0	0

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WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Ensure that manifold equipment subject to well and/or pump pressure, (valves, pipes, flexible steel hoses and other fittings upstream of and including the choke manifold) has a minimum working pressure at least equal to or greater than the rated working pressure of the ram-type BOP's.	MMS CFR Title 30 Chapter II, Part 250.406, paragraph d.7.i	C	0	C	0	0	C	0	0	0	0
Verify that all components of the Choke manifold system are protected from the danger, if any, of freezing by heating, draining, or filling with proper fluids.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.7.ii	C	0	C	C	0	C	0	0	0	0
Verify that when buffer tanks are installed downstream of the choke assemblies for the purpose of manifolding the bleed lines together, isolation valves are installed on each line.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.7.iii	C	0	C	C	0	0	0	0	0	0
All low pressure testing will be conducted prior to high pressure testing.	MMS CFR Title 30, Chapter II, Section 250.407, paragraph b.1	C	C	C	C	C	0	C	C	0	C
Verify that Variable Bore Rams (VBRs) are tested on all sizes of pipe that will be used on the well (excluding drill collars and bottom hole tools).	MMS CFR Title 30, Chapter II, Section 250.407, paragraphs b.1 and d.6 and API 16A Section 7.5.8.7.3.	C	C	C	C	C	C	C	X	0	C
Verify diverter system is equipped with remote-controlled valves in the flow and vent lines that can be operated from at least one remote-control station in addition to the one on the drilling floor.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c	C	0	C	0	0	C	0	0	0	0

Codes: 0 = Not checked
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X = Not in Compliance

WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Verify no manual or butterfly valve is installed in any part of the diverter system.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c	0	0	C	C	0	C	0	0	0	0
Verify all right-angle and sharp turns are targeted.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c	C	0	C	C	0	C	0	0	0	0
Verify the entire diverter system is firmly anchored and supported to prevent whipping and vibration.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c	C	0	C	X	0	C	0	0	0	0
Ensure all diverter system components have a rated working pressure of at least 200 psi.	API RP 64 Section 3.1.1 & MMS CFR Title 30, Chapter II, Section 250.409, paragraph f.	C	0	C	0	0	C	0	C	0	0
Verify the choke and kill line outlets are above the lower most ram. A kill line below the lower most rams can be approved if requested in the Application to Drill, APD.	MMS NTL No 99-Go9, dated 10 May 1999.	C	0	C	C	0	C	C	0	0	0
To ensure that an accidental release of the LMRP connector does not occur while conducting operations from floating drilling rigs, accomplish all of the following by March 17, 2000:	MMS NTL No. 2000-G07 dated February 22, 2000. (Even if not in MMS waters, this directive should still be considered.)	0	C	C	0	0	0	0	0	0	0
1. Implement measures to lock out any LMRP disconnect (hydraulic or electro-hydraulic) that is not part of a sequential disconnect process (i.e., a process that ensures that a well is secured by blind-shear rams before the riser disconnects) before the BOP/LMRP enters the water.	MMS NTL No. 2000-G07 dated February 22, 2000	0	C	0	0	0	0	0	0	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Section 2.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
2. Ensure that the sequential LMRP disconnect process (including isolating the wellbore) is designed so that the LMRP can be disconnected only as the result of a deliberate act.	MMS NTL No. 2000-G07 dated February 22, 2000	0	C	0	0	0	0	0	0	0	0
3. Implement human engineering measures such as labeling the LMRP panel button to clearly distinguish it from other functions and using warning labels.	MMS NTL No. 2000-G07 dated February 22, 2000	0	C	0	0	0	0	0	0	0	0
MMS Safety Alert No. 186 was issued after MMS NTL No. 2000-G07. The following is now required:	MMS Safety Alert No. 186	0	C	0	0	0	0	0	0	0	0
1. A risk and consequence analysis should be performed prior to making any of the changes listed in MMS NTL No. 2000-G07. Further, when instituting these necessary changes, communication of current activities is critical in performing this operation safe.	MMS Safety Alert No. 186	0	C	0	0	0	0	0	0	0	0
2. The MMS considers a backup BOP actuation system (such as an ROV) to be an essential component of a deepwater drilling system and, therefore, expects OCS operators to have reliable back-up systems for actuating the BOP in the event that the marine rise.	MMS Safety Alert No. 186	0.0%	C	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	C	100.0%	100.0%	100.0%	90.9%	100.0%	100.0%	100.0%	80.0%	0.0%	100.0%

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Out of Compliances
Section 2.4

Assessment Points	Reference	830	862	847	796	843	Safety Issue
Verify that Variable Bore Rams (VBRs) are tested on all sizes of pipe that will be used on the well (excluding drill collars and bottom hole tools).	MMS CFR Title 30, Chapter II, Section 250.407, paragraphs b.1 and d.6 and API 16A Section 7.5.8.7.3.	X			X		One level of redundancy is lost as a set of VBR's are not functioning properly. Rigs would be dependent on the other set of rams, the annular and finally the blind shear ram to contain the well.
Verify the choke and kill line outlets are above the lower most ram. A kill line below the lower most rams can be approved if requested in the Application to Drill, APD.	MMS NTL No 99-Go9, dated 10 May 1999.		X				Failure of a choke line installed below the bottom most ram could result in a blowout because this configuration does not provide a backup system for proper well control.
To ensure that an accidental release of the LMRP connector does not occur while conducting operations from floating drilling rigs, accomplish all of the following by March 17, 2000:	MMS NTL No. 2000-G07 dated February 22, 2000. (Even if not in MMS waters, this directive should still be considered.)		X	X			A disconnect will allow the release of drilling mud from the riser and can potentionally result in a well control event caused by a loss of riser hydrostatics.
1. Implement measures to lock out any LMRP disconnect (hydraulic or electro-hydraulic) that is not part of a sequential disconnect process (i.e., a process that ensures that a well is secured by blind-shear rams before the riser disconnects) before the BOP/LMRP enters the water.	MMS NTL No. 2000-G07 dated February 22, 2000		X	X			A disconnect will allow the release of drilling mud from the riser and can potentionally result in a well control event caused by a loss of riser hydrostatics.
2. Ensure that the sequential LMRP disconnect process (including isolating the wellbore) is designed so that the LMRP can be disconnected only as the result of a deliberate act.	MMS NTL No. 2000-G07 dated February 22, 2000			X			A disconnect will allow the release of drilling mud from the riser and can potentionally result in a well control event caused by a loss of riser hydrostatics.

WEST MMS Assessment Points - CFR Title 30, NTLs and Safety Alerts
Out of Compliances
Section 2.4

Assessment Points	Reference	830	862	847	796	843	Safety Issue
3. Implement human engineering measures such as labeling the LMRP panel button to clearly distinguish it from other functions and using warning labels.	MMS NTL No. 2000-G07 dated February 22, 2000			X			A disconnect will allow the release of drilling mud from the riser and can potentionally result in a well control event caused by a loss of riser hydrostatics.
Verify the entire diverter system is firmly anchored and supported to prevent whipping and vibration.	MMS CFR Title 30, Chapter II, Section 250.409, paragraph c					X	High flow rates through a diverter system un-anchored will present a safety hazard as the piping could eventually wash out allowing hydrocarbons in the immediate rig area.

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October 12, 2000

Section 3.1

WEST Assessment Points

Review of API RP 16E, 1st edition – "Recommended Practice for Design of Control Systems for Drilling Well Control Equipment"

MMS Project # 01-99-PO-17072

Following is the detailed report of API RP 16E assessment points that were used in this study. The format is detailed in Section V. Technical Summary from the Executive Summary.

Following are the highlights from the review of API RP 16E:

- Compliance of included line items was observed upon WEST leaving the rig 98.4% of the time, out of compliance 1.6%.
- Current MMS regulations address only a few of the requirements stipulated in API 16E. There are some items currently required by MMS that are not referenced by API RP 16E.
- API RP 16E provides good guidelines for drilling equipment control systems.
- All assessment points included in this study are recommended for inclusion into MMS requirements by reference to API RP 16E.
- Several of the assessment points for API RP 16E are complimentary to MMS NTLs concerning accidental riser disconnect. These items are so noted in the attached information.

Based on this review, it is recommended that MMS requirements be revised to include all of API RP 16E by reference. The additional MMS regulations not covered by API RP 16E should be left as stand-alone requirements for OCS operations.

WEST MMS Assessment Points - API RP 16E
Section 3.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Electrical and/or air supply for powering pumps should be available at all times per API 16E. Check if electric pump is connected to the emergency generator.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API 16E, paragraph 16E 2.3 and 3.3	5	15	0	100.00%	0.00%
Accumulators should have ASME Section VIII Division I code stamp.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E, Section 2.4	17	3	0	100.00%	0.00%
Identify potential single point failures that could cause the loss of redundancy and/or independent systems due to hose and shuttle valve placement. Address if practical to modify or replace hose with hard piping for improved reliability.	This item is not currently included in MMS. WEST recommends this item be included in MMS as a directive. WEST frequently identifies potential single point failures in rig assessments. Given the potential consequences of these failures, inclusion this item by reference is appropriate.	API RP 16E, Section 3 and RP 53, Section 13.1.	9	7	4	63.64%	36.36%
Verify that the control system for a subsea BOP stack is capable of closing each ram BOP in 45 sec. or less and each annular in 60 seconds or less.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E, Section 16E.3.1	10	10	0	100.00%	0.00%
Verify the usable control system fluid reservoir capacity is at least equal to the total accumulator storage capacity as determined in API RP 16E.3.4.1.	This API recommended practice for this item is more stringent than in MMS regulations. WEST recommends this item be included by reference to the API as adequate accumulator capacity is essential to proper BOP operation.	API RP-16E, Section 16E.3.2.1 and 16E.4.2	7	13	0	100.00%	0.00%
Verify that the low fluid level alarm sounds and illuminates at the master, driller's and auxiliary remote panels.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E, Section 16E.3.2.2 and 16E.4.2.	11	9	0	100.00%	0.00%
Verify that the subsea BOP control system has a minimum of two pump systems (primary & secondary)	This item is currently included in MMS regulations and the items are equivalent. Due to duplication, WEST recommends this item be removed from MMS regulation and included by reference to the API.	API RP-16E, Section 16E.3.3 and 16E.4.3.	7	13	0	100.00%	0.00%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Accumulator system should be arranged such that the loss of an individual accumulator and/ bank should not result in more than 25% of accumulator system capacity.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP 16E Section 3.4.	9	11	0	100.00%	0.00%
Verify that the remote control system permits operation of all the surface control functions at least two times after the loss of rig air and/or electric power.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E, Section 16E.3.5.1	15	5	0	100.00%	0.00%
Verify any regulators supplied by rig air and without a secondary source of pneumatic supply are equipped with manual overrides or alternately, other devices provided to ensure capability of hydraulic operations if rig air is lost.	This item is currently included in MMS regulations and the items are equivalent. Due to duplication, WEST recommends this item be removed from MMS regulation and included by reference to the API.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.1 and API RP-16E, Section 16E.3.5.1	4	16	0	100.00%	0.00%
Verify provisions are made so that any rig service failures to the remote controls for the surface regulators should not cause loss of subsea pressure regulator setting or control.	This item is currently included in MMS regulations and the items are equivalent. Due to duplication, WEST recommends this item be removed from MMS regulation and included by reference to the API.	API RP-16E, Section 16E.3.5.1.	9	11	0	100.00%	0.00%
Verify the hydraulic control manifold contains a visible and audible alarm for low accumulator pressure, low rig air pressure and loss of primary electrical power supply. Test system.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E Section 16E.3.5.5	12	7	1	87.50%	12.50%
Verify the following visual and audible alarms are included in the driller's panel and are operational when testing the accumulator unit. These alarms may be included on other panels:	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP 16E, Section 16E.3.6.2.1					
Verify all lamps show green when in the drilling mode and red in the "abnormal" mode.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E Section 16E.3.6.4.2	11	8	1	88.89%	11.11%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Ensure covers are installed over the following functions: riser connector unlatch, riser connector secondary, shear ram close, casing shear if applicable, wellhead connector unlatch, EDS if applicable.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E Section 16E.3.6.6	9	10	1	90.91%	9.09%
Ensure the enable button is connected to all functions. Verify no functions operate without first depressing the enable push-button.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API. This item relates to the recent MMS NTL concerning accidental riser disconnect.	API RP-16E Section 16E.3.6.7	10	10	0	100.00%	0.00%
Verify that any enclosure door with electrical components mounted on it has a ground strap connecting the door to the main enclosure.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API. This item relates to the recent MMS NTL concerning accidental riser disconnect.	API RP-16E, Section 16E.3.6.13	11	9	0	100.00%	0.00%
Verify that if an air purge system is used, a loss of air purge in any junction box or control panel activates an alarm at the affected panel and at the driller's panel.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E, Section 16E.3.6.19	11	7	0	100.00%	0.00%
Verify that the driller has the means to electrically disconnect or totally isolate the Driller's panel or junction box if a hazardous condition occurs.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E, Section 16E.3.6.19	14	4	2	66.67%	33.33%
Verify control panel is protected by circuit breaker in each main power connection.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E Section 16E.3.8.3	18	2	0	100.00%	0.00%
Verify that the electrical control unit is being supplied with electrical power from an uninterruptible power supply.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E, Section 16E.4.5.1	12	8	0	100.00%	0.00%

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C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Verify integrity of control unit memory as follows: 1. To ensure the position indicators do not have a default position perform the following: With the system operational, randomly activate equipment to obtain a function status condition of the system. Record this status as the initial condition. 2. Remove all power sources to the control unit. 3. After a short period of time (5 minutes), restore power to the control unit. 4. Record status as restoration condition. Compare the initial condition to the restoration condition. Upon restoration of power, the system should display the status of all functions as they were prior to the loss of power. The initial and restoration conditions should be identical.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E Section 16E.4.5.3	11	9	0	100.00%	0.00%
Electrical connector testing should be in accordance with connector manufacturer's testing procedures. Verify that all underwater electrical umbilical cable termination's are water blocked to prevent water migration up the cable in the event of connector failure or leakage and to prevent water migration from the cable into the subsea connector termination in the event of water intrusion into the cable.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP 16E Section 16E 4.10.5	15	5	0	100.00%	0.00%

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C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Verify integrity of main power supply and backup power supply (UPS):	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E Sections 16E.4.9 and 16E.3.8.	15	5	0	100.00%	0.00%
Verify that audible and visual alarms are activated upon loss of primary power source of UPS A and UPS B.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E Sections 16E.4.9 and 16E.3.8.	16	4	0	100.00%	0.00%
Verify the backup power source (UPS A) will be maintained for 2 hours allowing full functionality of the control unit.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E Sections 16E.4.9 and 16E.3.8.	17	3	0	100.00%	0.00%
Verify slip ring contact assemblies are of a non-oxidizing material suitable for the surrounding atmosphere.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E Section 16E.4.11.7	15	5	0	100.00%	0.00%
Verify that if the slip rings are located in a hazardous area they are rendered safe by one of the approved means outlined in NEC and ISA specifications.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E Section 16E.4.11.9	14	6	0	100.00%	0.00%
Verify that the primary diverter closing system is capable of operating the vent line and flow line valves and closing the annular packing element on pipe in use within 30 seconds of actuation if the packing element has a nominal bore of 20" or less. For elements of more than 20" nominal bore, the diverter control system should be capable of operating the vent line and flow line valve and closing on pipe in use within 45 seconds.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP 16E Section 5.1 and API RP-64, Section 3.6.3	11	9	0	100.00%	0.00%

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C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Verify the pump system(s) is capable of recharging the primary diverter control system accumulators to full system design pressure within five minutes or less after one complete divert mode operation of the diverter control system.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API 16E Section 16E.5.3.1	14	6	0	100.00%	0.00%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Verify an alternate means is employed to permit sequencing the diverter system should the primary closing system become inoperative. Examples include a separate pump system or separate isolated accumulator capacity.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E, Section 16E.5.3.2	9	11	0	100.00%	0.00%
Verify the diverter control system has sufficient accumulator capacity to provide the usable hydraulic fluid volume (with pumps inoperative) required to operate all of the divert mode functions plus 50% reserve.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16E, Section 16E.5.4	11	9	0	100.00%	0.00%
The diverter system should have an interlock system to prevent insert packer closure unless the insert packer is installed and the insert packer lock down dogs are energized.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP 16E, Section 16E.5.5.1	13	6	0	100.00%	0.00%
Verify that for a Multi-function system, an operating panel is mounted on the BOP stack in an accessible location and clearly labeled for identification by the ROV television cameras.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API. This item relates to the recent MMS NTL concerning accidental riser disconnect.	API RP-16E Section 16E.6.2.4	11	8	1	88.89%	11.11%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Electrical and/or air supply for powering pumps should be available at all times per API 16E. Check if electric pump is connected to the emergency generator.	API 16E, paragraph 16E 2.3 and 3.3	C	C	C	C	C	C	0	C	C	C
Accumulators should have ASME Section VIII Division I code stamp.	API RP-16E, Section 2.4	0	0	0	0	0	C	0	0	0	0
Identify potential single point failures that could cause the loss of redundancy and/or independent systems due to hose and shuttle valve placement. Address if practical to modify or replace hose with hard piping for improved reliability.	API RP 16E, Section 3 and RP 53, Section 13.1.	X	C	C	C	C	X	0	0	0	0
Verify that the control system for a subsea BOP stack is capable of closing each ram BOP in 45 sec. or less and each annular in 60 seconds or less.	API RP-16E, Section 16E.3.1	C	C	C	C	C	C	0	C	0	0
Verify the usable control system fluid reservoir capacity is at least equal to the total accumulator storage capacity as determined in API RP 16E.3.4.1.	API RP-16E, Section 16E.3.2.1 and 16E.4.2	C	C	C	C	0	C	C	C	0	0
Verify that the low fluid level alarm sounds and illuminates at the master, driller's and auxiliary remote panels.	API RP-16E, Section 16E.3.2.2 and 16E.4.2.	C	C	C	C	C	C	0	0	C	0
Verify that the subsea BOP control system has a minimum of two pump systems (primary & secondary).	API RP-16E, Section 16E.3.3 and 16E.4.3.	C	C	C	C	C	C	0	C	0	0
Accumulator system should be arranged such that the loss of an individual accumulator and/ bank should not result in more than 25% of accumulator system capacity.	API RP 16E Section 3.4.	C	C	C	C	C	C	0	C	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Verify that the remote control system permits operation of all the surface control functions at least two times after the loss of rig air and/or electric power.	API RP-16E, Section 16E.3.5.1	C	C	0	C	0	C	0	0	0	0
Verify any regulators supplied by rig air and without a secondary source of pneumatic supply are equipped with manual overrides or alternately, other devices provided to ensure capability of hydraulic operations if rig air is lost.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.1 and API RP-16E, Section 16E.3.5.1	C	C	C	C	0	C	C	0	C	C
Verify provisions are made so that any rig service failures to the remote controls for the surface regulators should not cause loss of subsea pressure regulator setting or control.	API RP-16E, Section 16E.3.5.1.	C	C	C	C	C	C	0	C	0	0
Verify the hydraulic control manifold contains a visible and audible alarm for low accumulator pressure, low rig air pressure and loss of primary electrical power supply. Test system.	API RP-16E Section 16E.3.5.5	C	C	C	C	0	0	0	C	0	0
Verify the following visual and audible alarms are included in the driller's panel and are operational when testing the accumulator unit. These alarms may be included on other panels:	API RP 16E, Section 16E.3.6.2.1	C	C	C	C	C	C	0	C	0	0
Verify all lamps show green when in the drilling mode and red in the "abnormal" mode.	API RP-16E Section 16E.3.6.4.2	C	C	C	C	0	0	0	C	0	0
Ensure covers are installed over the following functions: riser connector unlatch, riser connector secondary, shear ram close, casing shear if applicable, wellhead connector unlatch, EDS if applicable.	API RP-16E Section 16E.3.6.6	C	C	C	C	C	C	0	C	0	0

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C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Ensure the enable button is connected to all functions. Verify no functions operate without first depressing the enable push-button.	API RP-16E Section 16E.3.6.7	C	C	C	C	0	C	0	C	0	0
Verify that any enclosure door with electrical components mounted on it has a ground strap connecting the door to the main enclosure.	API RP-16E, Section 16E.3.6.13	C	C	C	C	0	C	0	C	0	0
Verify that if an air purge system is used, a loss of air purge in any junction box or control panel activates an alarm at the affected panel and at the driller's panel.	API RP-16E, Section 16E.3.6.19	C	C	N/A	C	C	C	0	C	0	0
Verify that the driller has the means to electrically disconnect or totally isolate the Driller's panel or junction box if a hazardous condition occurs.	API RP-16E, Section 16E.3.6.19	C	0	C	0	X	C	0	0	0	0
Verify control panel is protected by circuit breaker in each main power connection.	API RP-16E Section 16E.3.8.3	C	0	0	0	0	0	0	0	0	0
Verify that the electrical control unit is being supplied with electrical power from an uninterruptible power supply.	API RP-16E, Section 16E.4.5.1	0	C	C	C	C	C	0	C	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Verify integrity of control unit memory as follows: 1. To ensure the position indicators do not have a default position perform the following: With the system operational, randomly activate equipment to obtain a function status condition of the system. Record this status as the initial condition. 2. Remove all power sources to the control unit. 3. After a short period of time (5 minutes), restore power to the control unit. 4. Record status as restoration condition. Compare the initial condition to the restoration condition. Upon restoration of power, the system should display the status of all functions as they were prior to the loss of power. The initial and restoration conditions should be identical.	API RP-16E Section 16E.4.5.3	0	C	0	C	0	0	0	0	C	C
Electrical connector testing should be in accordance with connector manufacturer's testing procedures. Verify that all underwater electrical umbilical cable termination's are water blocked to prevent water migration up the cable in the event of connector failure or leakage and to prevent water migration from the cable into the subsea connector termination in the event of water intrusion into the cable.	API RP 16E Section 16E 4.10.5	0	C	C	C	C	0	0	0	0	0
Verify integrity of main power supply and backup power supply (UPS):	API RP-16E Sections 16E.4.9 and 16E.3.8.	0	C	0	C	C	0	0	0	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Verify that audible and visual alarms are activated upon loss of primary power source of UPS A and UPS B.	API RP-16E Sections 16E.4.9 and 16E.3.8.	0	C	0	C	C	0	0	0	0	0
Verify the backup power source (UPS A) will be maintained for 2 hours allowing full functionality of the control unit.	API RP-16E Sections 16E.4.9 and 16E.3.8.	0	C	0	C	0	0	0	0	0	0
Verify slip ring contact assemblies are of a non-oxidizing material suitable for the surrounding atmosphere.	API RP-16E Section 16E.4.11.7	0	C	C	C	0	0	0	0	0	0
Verify that if the slip rings are located in a hazardous area they are rendered safe by one of the approved means outlined in NEC and ISA specifications.	API RP-16E Section 16E.4.11.9	0	C	C	C	C	0	0	0	0	0
Verify that the primary diverter closing system is capable of operating the vent line and flow line valves and closing the annular packing element on pipe in use within 30 seconds of actuation if the packing element has a nominal bore of 20" or less. For elements of more than 20" nominal bore, the diverter control system should be capable of operating the vent line and flow line valve and closing on pipe in use within 45 seconds.	API RP 16E Section 5.1 and API RP-64, Section 3.6.3	C	C	0	C	0	C	C	0	0	0
Verify the pump system(s) is capable of recharging the primary diverter control system accumulators to full system design pressure within five minutes or less after one complete divert mode operation of the diverter control system.	API 16E Section 16E.5.3.1	C	C	0	C	0	C	0	0	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Verify an alternate means is employed to permit sequencing the diverter system should the primary closing system become inoperative. Examples include a separate pump system or separate isolated accumulator capacity.	API RP-16E, Section 16E.5.3.2	C	C	C	C	0	C	0	0	C	0
Verify the diverter control system has sufficient accumulator capacity to provide the usable hydraulic fluid volume (with pumps inoperative) required to operate all of the divert mode functions plus 50% reserve.	API RP-16E, Section 16E.5.4	C	C	0	C	0	C	0	0	C	C
The diverter system should have an interlock system to prevent insert packer closure unless the insert packer is installed and the insert packer lock down dogs are energized.	API RP 16E, Section 16E.5.5.1	C	C	C	C	0	0	0	N/A	0	0
Verify that for a Multi-function system, an operating panel is mounted on the BOP stack in an accessible location and clearly labeled for identification by the ROV television cameras.	API RP-16E Section 16E.6.2.4	C	C	C	0	C	X	0	0	0	0
	C	95.8%	100.0%	100.0%	96.9%	93.8%	90.9%	100.0%	100.0%	100.0%	100.0%

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Electrical and/or air supply for powering pumps should be available at all times per API 16E. Check if electric pump is connected to the emergency generator.	API 16E, paragraph 16E 2.3 and 3.3	0	C	C	C	C	0	0	C	C	0
Accumulators should have ASME Section VIII Division I code stamp.	API RP-16E, Section 2.4	0	0	0	0	C	0	0	C	0	0
Identify potential single point failures that could cause the loss of redundancy and/or independent systems due to hose and shuttle valve placement. Address if practical to modify or replace hose with hard piping for improved reliability.	API RP 16E, Section 3 and RP 53, Section 13.1.	0	C	X	C	0	0	X	C	0	0
Verify that the control system for a subsea BOP stack is capable of closing each ram BOP in 45 sec. or less and each annular in 60 seconds or less.	API RP-16E, Section 16E.3.1	0	C	C	C	0	0	0	0	0	0
Verify the usable control system fluid reservoir capacity is at least equal to the total accumulator storage capacity as determined in API RP 16E.3.4.1.	API RP-16E, Section 16E.3.2.1 and 16E.4.2	C	C	C	C	0	C	0	C	0	0
Verify that the low fluid level alarm sounds and illuminates at the master, driller's and auxiliary remote panels.	API RP-16E, Section 16E.3.2.2 and 16E.4.2.	0	C	C	0	0	0	0	0	0	0
Verify that the subsea BOP control system has a minimum of two pump systems (primary & secondary).	API RP-16E, Section 16E.3.3 and 16E.4.3.	0	C	C	C	C	0	0	C	0	C
Accumulator system should be arranged such that the loss of an individual accumulator and/ bank should not result in more than 25% of accumulator system capacity.	API RP 16E Section 3.4.	0	C	0	C	0	C	0	C	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Verify that the remote control system permits operation of all the surface control functions at least two times after the loss of rig air and/or electric power.	API RP-16E, Section 16E.3.5.1	0	0	C	0	0	0	0	0	0	0
Verify any regulators supplied by rig air and without a secondary source of pneumatic supply are equipped with manual overrides or alternately, other devices provided to ensure capability of hydraulic operations if rig air is lost.	MMS CFR Title 30, Chapter II, Section 250.406, paragraph d.1 and API RP-16E, Section 16E.3.5.1	C	C	C	C	C	C	C	0	0	C
Verify provisions are made so that any rig service failures to the remote controls for the surface regulators should not cause loss of subsea pressure regulator setting or control.	API RP-16E, Section 16E.3.5.1.	0	C	C	C	0	C	0	0	0	0
Verify the hydraulic control manifold contains a visible and audible alarm for low accumulator pressure, low rig air pressure and loss of primary electrical power supply. Test system.	API RP-16E Section 16E.3.5.5	0	C	C	X	0	0	0	0	0	0
Verify the following visual and audible alarms are included in the driller's panel and are operational when testing the accumulator unit. These alarms may be included on other panels:	API RP 16E, Section 16E.3.6.2.1										
Verify all lamps show green when in the drilling mode and red in the "abnormal" mode.	API RP-16E Section 16E.3.6.4.2	0	C	C	X	0	0	0	C	0	0
Ensure covers are installed over the following functions: riser connector unlatch, riser connector secondary, shear ram close, casing shear if applicable, wellhead connector unlatch, EDS if applicable.	API RP-16E Section 16E.3.6.6	0	C	C	X	0	0	0	C	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Ensure the enable button is connected to all functions. Verify no functions operate without first depressing the enable push-button.	API RP-16E Section 16E.3.6.7	0	C	C	C	0	0	0	C	0	0
Verify that any enclosure door with electrical components mounted on it has a ground strap connecting the door to the main enclosure.	API RP-16E, Section 16E.3.6.13	0	C	C	0	0	0	0	C	0	0
Verify that if an air purge system is used, a loss of air purge in any junction box or control panel activates an alarm at the affected panel and at the driller's panel.	API RP-16E, Section 16E.3.6.19	0	0	C	0	0	0	0	NA	0	0
Verify that the driller has the means to electrically disconnect or totally isolate the Driller's panel or junction box if a hazardous condition occurs.	API RP-16E, Section 16E.3.6.19	0	0	C	0	0	0	0	X	0	0
Verify control panel is protected by circuit breaker in each main power connection.	API RP-16E Section 16E.3.8.3	0	0	0	0	0	0	0	C	0	0
Verify that the electrical control unit is being supplied with electrical power from an uninterruptible power supply.	API RP-16E, Section 16E.4.5.1	0	C	0	0	0	0	0	C	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Verify integrity of control unit memory as follows: 1. To ensure the position indicators do not have a default position perform the following: With the system operational, randomly activate equipment to obtain a function status condition of the system. Record this status as the initial condition. 2. Remove all power sources to the control unit. 3. After a short period of time (5 minutes), restore power to the control unit. 4. Record status as restoration condition. Compare the initial condition to the restoration condition. Upon restoration of power, the system should display the status of all functions as they were prior to the loss of power. The initial and restoration conditions should be identical.	API RP-16E Section 16E.4.5.3	C	0	0	0	C	C	C	0	0	C
Electrical connector testing should be in accordance with connector manufacturer's testing procedures. Verify that all underwater electrical umbilical cable termination's are water blocked to prevent water migration up the cable in the event of connector failure or leakage and to prevent water migration from the cable into the subsea connector termination in the event of water intrusion into the cable.	API RP 16E Section 16E 4.10.5	0	0	0	0	C	0	0	0	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Verify integrity of main power supply and backup power supply (UPS):	API RP-16E Sections 16E.4.9 and 16E.3.8.	0	0	C	0	0	0	0	C	0	0
Verify that audible and visual alarms are activated upon loss of primary power source of UPS A and UPS B.	API RP-16E Sections 16E.4.9 and 16E.3.8.	0	0	0	0	0	0	0	C	0	0
Verify the backup power source (UPS A) will be maintained for 2 hours allowing full functionality of the control unit.	API RP-16E Sections 16E.4.9 and 16E.3.8.	0	0	0	0	0	0	0	C	0	0
Verify slip ring contact assemblies are of a non-oxidizing material suitable for the surrounding atmosphere.	API RP-16E Section 16E.4.11.7	0	0	0	0	0	0	0	C	C	0
Verify that if the slip rings are located in a hazardous area they are rendered safe by one of the approved means outlined in NEC and ISA specifications.	API RP-16E Section 16E.4.11.9	0	0	0	0	0	0	0	C	C	0
Verify that the primary diverter closing system is capable of operating the vent line and flow line valves and closing the annular packing element on pipe in use within 30 seconds of actuation if the packing element has a nominal bore of 20" or less. For elements of more than 20" nominal bore, the diverter control system should be capable of operating the vent line and flow line valve and closing on pipe in use within 45 seconds.	API RP 16E Section 5.1 and API RP-64, Section 3.6.3	C	0	C	0	0	C	0	C	0	0
Verify the pump system(s) is capable of recharging the primary diverter control system accumulators to full system design pressure within five minutes or less after one complete divert mode operation of the diverter control system.	API 16E Section 16E.5.3.1	0	0	C	0	0	0	0	C	0	0

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X = Not in Compliance

WEST MMS Assessment Points - API RP 16E
Section 3.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Verify an alternate means is employed to permit sequencing the diverter system should the primary closing system become inoperative. Examples include a separate pump system or separate isolated accumulator capacity.	API RP-16E, Section 16E.5.3.2	0	0	C	0	0	C	C	C	0	C
Verify the diverter control system has sufficient accumulator capacity to provide the usable hydraulic fluid volume (with pumps inoperative) required to operate all of the divert mode functions plus 50% reserve.	API RP-16E, Section 16E.5.4	0	0	C	0	0	0	0	C	0	C
The diverter system should have an interlock system to prevent insert packer closure unless the insert packer is installed and the insert packer lock down dogs are energized.	API RP 16E, Section 16E.5.5.1	0	0	C	0	0	C	0	0	0	0
Verify that for a Multi-function system, an operating panel is mounted on the BOP stack in an accessible location and clearly labeled for identification by the ROV television cameras.	API RP-16E Section 16E.6.2.4	0	C	C	C	0	0	0	C	0	0
	C	100.0%	100.0%	95.7%	76.9%	100.0%	100.0%	75.0%	95.7%	100.0%	100.0%

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16E
Out of Compliances
Section 3.4

Assessment Points	Reference	856	826	862	634	771	761	843	796	Safety Issue
Identify potential single point failures that could cause the loss of redundancy and/or independent systems due to hose and shuttle valve placement. Address if practical to modify or replace hose with hard piping for improved reliability.	API RP 16E, Section 3 and RP 53, Section 13.1.	X	X			X	X			This could result in the loss of critical functions during a well control situation or operational emergency. Common examples of functions often connected in this fashion are shear ram boost, riser connector, wellhead connector and ram locks.
Verify that the driller has the means to electrically disconnect or totally isolate the Driller's panel or junction box if a hazardous condition occurs.	API RP-16E, Section 16E.3.6.19			X					X	Loss of purge air in the drillers panel or junction box coupled with the inability of the driller to electrically isolate the panel or box will result in a potential ignition source for any gas on the drill floor.
The pump diverter pump system should be designed to automatically stop when the accumulator design pressure is reached and a pressure safety valve set to relieve pressure at not more than 110% of the accumulator design pressure should be included.	API RP 16E, Section 16E.5.3				X					Overpressurisation of the diverter control system and accumulators could occur.
Verify that for a Multi-function system, an operating panel is mounted on the BOP stack in an accessible location and clearly labeled for identification by the ROV television cameras.	API RP-16E Section 16E.6.2.4		X							During an emergency, time taken by the ROV to complete the various functions (shear rams, connectors etc.) could prove critical. An operating panel as described will reduce this time significantly.

WEST MMS Assessment Points - API RP 16E
Out of Compliances
Section 3.4

Assessment Points	Reference	856	826	862	634	771	761	843	796	Safety Issue
Verify the hydraulic control manifold contains a visible and audible alarm for low accumulator pressure, low rig air pressure and loss of primary electrical power supply. Test system.	API RP-16E Section 16E.3.5.5							X		Without such alarms these undesirable conditions could occur unnoticed by rig personnel and would result in loss of control of the BOP at a potentially critical time.
Verify all lamps show green when in the drilling mode and red in the "abnormal" mode.	API RP-16E Section 16E.3.6.4.2							X		By having green for normal and red for abnormal, the driller is quickly alerted for possible well control problems, allowing more time for corrective action to avoid a well control event.
Ensure covers are installed over the following functions: riser connector unlatch, riser connector secondary, shear ram close, casing shear if applicable, wellhead connector unlatch, EDS if applicable.	API RP-16E Section 16E.3.6.6							X		A safety cover will cause an individual to think twice before making the conscious decision of performing these functions. By so doing the likelyhood of human error is reduced; in effect a level of redundancy is "created."

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Section 4.1

WEST MMS Assessment Points

Review of API RP 64, 1st edition – "Recommended Practices for Diverter Systems Equipment and Operations"

MMS Project # 01-99-PO-17072

Following is the detailed report of API RP 64 assessment points that were used in this study. The format is detailed in Section V. Technical Summary from the Executive Summary.

Following are the highlights from the review of API RP 64:

- Compliance of included line items was observed upon WEST leaving the rig 98.6% of the time, out of compliance 1.4%.
- Current MMS regulations address a significant portion of the requirements stipulated in API RP 64. There are some items currently required by MMS that are not referenced by API RP 64.
- API RP 64 provides good guidelines for diverter systems.
- All assessment points included in this study are recommended for inclusion into MMS requirements by reference to API RP 64.

Based on this review, it is recommended that MMS requirements be revised to include all of API RP 64 by reference. The additional MMS regulations not covered by API RP 64 should be left as stand-alone requirements for OCS operations.

WEST MMS Assessment Points - API RP 64
Section 4.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Ensure all diverter system components have a rated working pressure of at least 200 psi.	API RP 64, section 3.1.1 is equivalent to the OCS statement. Recommendation: Omit from OCS documents and reference RP 64.	API RP 64 Section 3.1.1 & MMS CFR Title 30, Chapter II, Section 250.409, Paragraph f.	12	8	0	100.00%	0.00%
Verify diverter valves used in the diverter vent line(s) or in the flow line to the shale shaker are full-opening, have at least the same opening as the line in which they are installed, and are capable of opening with maximum anticipated pressure across the valve(s).	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-64, Section 3.4.1	13	7	0	100.00%	0.00%
Where non-integral diverter vent valves and flow line valves are located below the diverter packer, verify that remote actuators capable of operations from the rig floor are installed.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-64, Section 3.4.1	12	8	0	100.00%	0.00%
Verify that actuators fitted to diverter valves are sized to open the valve with the rated working pressure of the diverter system applied across the valve.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-64, Section 3.4.2	13	6	0	100.00%	0.00%
Verify the diverter piping has minimal bends, is as large in diameter as practical, and is internally flush. Deviations from the "ideal" tend to increase wellbore back pressure and create conditions which can increase sand blast and erosion during divert.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-64, Section 3.5	11	9	0	100.00%	0.00%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 64
Section 4.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Verify that the fill and/or kill lines positioned below the diverter unit are valved with an independent actuated valve or check valve near the wellhead and have a rated working pressure equivalent to the system exposed to well fluid.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-64, Section 3.5.4.1	12	8	0	100.00%	0.00%
Verify that the primary diverter closing system is capable of operating the vent line and flow line valves and closing the annular packing element on pipe in use within 30 seconds of actuation if the packing element has a nominal bore of 20" or less. For elements of more than 20" nominal bore, the diverter control system should be capable of operating the vent line and flow line valve and closing on pipe in use within 45 seconds.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP 16E Section 5.1 and API RP-64, Section 3.6.3	11	9	0	100.00%	0.00%
The diverter control system shall be operated such that the well will not be shut in with the diverter system. At least one vent valve should remain open at all times to prevent a complete shut in of the well if there is a partial failure of the control system and/or vent controls.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP 64, Section 3.7.1	11	9	0	100.00%	0.00%
Verify that sufficient tension will be available to lift the lower marine riser package clear of the structural pipe or BOP stack in the event of an emergency disconnect.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-64 Section 6.2.1	12	7	1	87.50%	12.50%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 64
Section 4.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Ensure all diverter system components have a rated working pressure of at least 200 psi.	API RP 64 Section 3.1.1 & MMS CFR Title 30, Chapter II, Section 250.409, Paragraph f.	C	C	0	C	0	0	C	0	0	0
Verify diverter valves used in the diverter vent line(s) or in the flow line to the shale shaker are full-opening, have at least the same opening as the line in which they are installed, and are capable of opening with maximum anticipated pressure across the valve(s).	API RP-64, Section 3.4.1	C	C	C	0	0	C	0	0	0	0
Where non-integral diverter vent valves and flow line valves are located below the diverter packer, verify that remote actuators capable of operations from the rig floor are installed.	API RP-64, Section 3.4.1	C	C	C	C	0	C	0	0	0	0
Verify that actuators fitted to diverter valves are sized to open the valve with the rated working pressure of the diverter system applied across the valve.	API RP-64, Section 3.4.2	C	C	C	N/A	0	C	0	0	0	0
Verify the diverter piping has minimal bends, is as large in diameter as practical, and is internally flush. Deviations from the "ideal" tend to increase wellbore back pressure and create conditions which can increase sand blast and erosion during divert.	API RP-64, Section 3.5	C	C	C	C	0	C	C	0	0	0

Codes: 0 = Not Checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 64
Section 4.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Verify that the fill and/or kill lines positioned below the diverter unit are valved with an independent actuated valve or check valve near the wellhead and have a rated working pressure equivalent to the system exposed to well fluid.	API RP-64, Section 3.5.4.1	C	C	C	C	0	C	0	C	0	0
Verify that the primary diverter closing system is capable of operating the vent line and flow line valves and closing the annular packing element on pipe in use within 30 seconds of actuation if the packing element has a nominal bore of 20" or less. For elements of more than 20" nominal bore, the diverter control system should be capable of operating the vent line and flow line valve and closing on pipe in use within 45 seconds.	API RP 16E Section 5.1 and API RP-64, Section 3.6.3	C	C	0	C	0	C	C	0	0	0
The diverter control system shall be operated such that the well will not be shut in with the diverter system. At least one vent valve should remain open at all times to prevent a complete shut in of the well if there is a partial failure of the control system and/or vent controls.	API RP 64, Section 3.7.1	C	C	C	C	0	C	0	0	0	0
Verify that sufficient tension will be available to lift the lower marine riser package clear of the structural pipe or BOP stack in the event of an emergency disconnect.	API RP-64 Section 6.2.1	C	C	C	X	C	C	0	0	0	0

Codes: 0 = Not Checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 64
Section 4.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
	C	100.0%	100.0%	100.0%	85.7%	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%

Codes: 0 = Not Checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 64
Section 4.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Ensure all diverter system components have a rated working pressure of at least 200 psi.	API RP 64 Section 3.1.1 & MMS CFR Title 30, Chapter II, Section 250.409, Paragraph f.	C	0	C	0	0	C	0	C	0	0
Verify diverter valves used in the diverter vent line(s) or in the flow line to the shale shaker are full-opening, have at least the same opening as the line in which they are installed, and are capable of opening with maximum anticipated pressure across the valve(s).	API RP-64, Section 3.4.1	0	0	C	0	C	0	0	0	0	C
Where non-integral diverter vent valves and flow line valves are located below the diverter packer, verify that remote actuators capable of operations from the rig floor are installed.	API RP-64, Section 3.4.1	0	0	C	0	0	C	0	C	0	0
Verify that actuators fitted to diverter valves are sized to open the valve with the rated working pressure of the diverter system applied across the valve.	API RP-64, Section 3.4.2	0	0	C	0	0	0	0	C	0	0
Verify the diverter piping has minimal bends, is as large in diameter as practical, and is internally flush. Deviations from the "ideal" tend to increase wellbore back pressure and create conditions which can increase sand blast and erosion during divert.	API RP-64, Section 3.5	0	0	C	C	0	0	0	C	0	0

Codes: 0 = Not Checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 64
Section 4.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Verify that the fill and/or kill lines positioned below the diverter unit are valved with an independent actuated valve or check valve near the wellhead and have a rated working pressure equivalent to the system exposed to well fluid.	API RP-64, Section 3.5.4.1	0	0	C	0	0	0	0	C	0	0
Verify that the primary diverter closing system is capable of operating the vent line and flow line valves and closing the annular packing element on pipe in use within 30 seconds of actuation if the packing element has a nominal bore of 20" or less. For elements of more than 20" nominal bore, the diverter control system should be capable of operating the vent line and flow line valve and closing on pipe in use within 45 seconds.	API RP 16E Section 5.1 and API RP-64, Section 3.6.3	C	0	C	0	0	C	0	C	0	0
The diverter control system shall be operated such that the well will not be shut in with the diverter system. At least one vent valve should remain open at all times to prevent a complete shut in of the well if there is a partial failure of the control system and/or vent controls.	API RP 64, Section 3.7.1	0	0	C	0	0	C	0	C	0	C
Verify that sufficient tension will be available to lift the lower marine riser package clear of the structural pipe or BOP stack in the event of an emergency disconnect.	API RP-64 Section 6.2.1	0	0	C	0	0	0	0	C	0	0

Codes: 0 = Not Checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 64
Section 4.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
	C	100.0%	0.0%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%

Codes: 0 = Not Checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 64
Out of Compliances
Section 4.4

Assessment Point	Reference	634	Safety Issue
Verify that sufficient tension will be available to lift the lower marine riser package clear of the structural pipe or BOP stack in the event of an emergency disconnect.	API RP-64 Section 6.2.1	X	Failure to terminate LMRP in timely manner during drift off jeopardizes the connector's ability to stay connected because of bending moment.

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October 12, 2000

Section 5.1

WEST MMS Assessment Points

Review of API RP 16Q, 1st edition – "Recommended Practice for Design, Selection, Operation and Maintenance of Marine Drilling Riser Systems"

MMS Project # 01-99-PO-17072

Following is the detailed report of API RP 16E assessment points that were used in this study. The format is detailed in Section V. Technical Summary from the Executive Summary.

Following are the highlights from the review of API RP 16Q:

- Compliance of included line items was observed upon WEST leaving the rig 90.4% of the time, out of compliance 9.6%.
- Current MMS regulations do not address any requirements in API 16Q.
- API RP 16Q provides good guidelines for marine riser systems.
- All assessment points included in this study are recommended for inclusion into MMS requirements by reference to API RP 16Q.

Based on this review, it is recommended that MMS requirements be revised to include all of API RP 16Q by reference.

WEST MMS Assessment Points - API RP 16Q
Section 5.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Verify that a list of hydraulic fluids compatible with the tensioner units and specified by the tensioner manufacturer is available.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.4.3 (d)	14	6	0	100.00%	0.00%
Verify that the tensioner system is designed to permit one unit to be out of service for maintenance or repair without jeopardizing the ability of the remaining tensioner units to provide the required tension to the marine drilling riser. Note: A unit may be either a single tensioner or a pair of tensioners, depending on specific design.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.4.3 (f)	13	7	0	100.00%	0.00%
Verify flow control device is located in the line between the fluid port on each tensioner and its respective air/oil interface bottle. Verify its ability to sense abnormally high flow rates and immediately stop or greatly reduce the flow.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.4.3 (h)	13	7	0	100.00%	0.00%
If the telescopic joint is extended during the BOP stack handling procedure, verify its load limit and record. Compare with expected BOP landing weights.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.6.3 (a)	12	3	0	100.00%	0.00%
Verify that the tensioner ring is rated for the maximum load capacity of the telescopic joint.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.6.3 (c)	12	8	0	100.00%	0.00%
Verify that if threaded end fittings are used on choke and kill connections, they contain a sealing means other than the threads.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.10.2	13	6	0	100.00%	0.00%
Verify that if the diverter handling tool is used to support the entire riser and BOP stack it meets the same standards as the riser handling tool.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.11.2.1	13	3	0	100.00%	0.00%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Ensure that proper galvanic protection is provided between the steel components of the riser joints and the hydraulic supply lines if corrosion-resistant material (e.g. stainless steel) is used.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.12.3 (a)	12	7	1	87.50%	12.50%
Verify that for hydraulic supply lines, working pressure rating is compatible with the working pressure rating of the BOP control system.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.12.3 (b1)	8	12	0	100.00%	0.00%
Verify that for mud boost lines, pressure rating is suitable for the intended service. Review previous wall thickness inspections and verify suitable for maximum pump pressure.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.12.3 (b2)	8	12	0	100.00%	0.00%
Verify that for choke/kill lines, pressure rating is the same as the BOP stack. Compare the last wall thickness survey to minimum wall thickness calculations to determine this.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.12.3 (b3)	9	11	0	100.00%	0.00%
Verify that adequate gap is provided between the support bracket and the coupling. Note: relative motion of the couplings may cause fatigue cracking of the support bracket.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.12.3 (b3)	12	7	1	87.50%	12.50%
To prevent accidental mismatching of the choke/kill and auxiliary lines when the riser is deployed, verify that the coupling is oriented asymmetrically around the riser support ring.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.12.3 (e)	13	7	0	100.00%	0.00%
Verify material selection for choke and kill lines meets NACE MR0175 for H2S Service.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.12.3 (g)	15	5	0	100.00%	0.00%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Verify material selection for fastener avoids galvanic corrosion.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 2.13.2 (a)	12	8	0	100.00%	0.00%
Verify the riser tension analysis is reviewed according to API RP 16Q, Section 3, "Riser Response Analysis". The results of the analysis should be appended to the Riser Operating Manual.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP 16Q, Section 3	12	7	1	87.50%	12.50%
Verify a linear graph is posted on the rig that clearly identifies the amount of riser tension required for various mud weights.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP 16Q Section 3.2.4	10	9	1	90.00%	10.00%
Verify that operating personnel on floating drilling vessel are properly trained and equipped with a written procedure for care and use of the marine riser. Verify the training records. The procedures are to include:	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 4.1	9	10	1	90.91%	9.09%
Verify that the riser operating manual is located on the vessel and is current. As a minimum, verify that the manual contains the following information concerning the riser system and is maintained:	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 4.2	9	10	1	90.91%	9.09%
a. manufacturer's drawings of the riser system components outlining the critical dimensions, weights, and part numbers of the various components		API RP-16Q Section 4.2	9	10	1	90.91%	9.09%
b. manufacturer's load ratings for the critical components of the riser system		API RP-16Q Section 4.2	9	9	2	81.82%	18.18%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
c. internal and collapse pressure ratings of the riser and integral auxiliary lines		API RP-16Q Section 4.2	9	9	2	81.82%	18.18%
d. inspection and maintenance procedures for each component		API RP-16Q Section 4.2	9	10	1	90.91%	9.09%
e. procedure for running and retrieving the riser		API RP-16Q Section 4.2	9	10	1	90.91%	9.09%
f. procedure for establishing maximum and minimum tension settings		API RP-16Q Section 4.2	10	9	1	90.00%	10.00%
g. operating limits and emergency procedures		API RP-16Q Section 4.2	10	9	1	90.00%	10.00%
h. an accurate log of operating history		API RP-16Q Section 4.2	12	7	1	87.50%	12.50%
i. recommended spare parts inventory list		API RP-16Q Section 4.2	10	9	1	90.00%	10.00%
j. criteria and procedures for cutting and slipping tensioner lines		API RP-16Q Section 4.2	11	8	1	88.89%	11.11%
k. scheduled inspection and maintenance on all riser system components		API RP-16Q Section 4.8	12	7	1	87.50%	12.50%
If there are any special instructions called out in the Marine Riser Manufacturer's Care and Use Instructions, verify that they are being followed.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 4.3.2 (d)	11	8	1	88.89%	11.11%
Verify that the marine riser system is suitably instrumented and monitored to ensure safe and reliable performance.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 4.4.2	13	7	0	100.00%	0.00%
In the event of a hydraulic tensioner failure, verify that a procedure outlining the required steps to correct the problem is incorporated in the operating manual.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 4.4.3.1	14	5	1	83.33%	16.67%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Verify the rig is equipped with written emergency disconnect procedures which account for various tubulars being in the BOP bore, peculiarities in the BOP and control equipment, and characteristics of position keeping or mooring equipment.	This item is currently not included in MMS regulations. In WEST's opinion, emergency disconnect procedures for various tubulars are critical for safe operations. We therefore recommend this item be included in MMS regulations as a directive.	API RP-16Q Section 4.4.4.2	8	9	3	75.00%	25.00%
Extend tensioners and pressure to MWP. Inspect surface finish of rods and verify seals are leak tight.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 4.6.1	12	7	1	87.50%	12.50%
Verify telescopic joint is inspected and serviced in accordance with manufacturer's recommendations.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 4.6.2	14	5	1	83.33%	16.67%
Verify that the flex/ball joints have a protective cover at the upper neck to prevent the entry of cuttings and debris into the mechanism.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 4.6.3	13	7	0	100.00%	0.00%
Review the riser handling technique and verify it complies with good oilfield practices and the manufactures recommendations.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 4.7.1	7	13	0	100.00%	0.00%
Verify that protectors are provided for the pin end (and box end if specified by the manufacturer) couplings of each riser joint. Visually inspect the box and pin protectors to ensure they properly protect the sealing surfaces. Ensure that the protectors are installed, as applicable, when riser is being handled.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 4.7.1	4	15	1	93.75%	6.25%
Verify that the rig has storage racks and cradles and these are being used to restrain and support the riser joints during stored periods.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 4.7.2	5	12	3	80.00%	20.00%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.2

Assessment Points	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Verify that the rig storage racks do not hinder access to the pin and/or box protectors or covers for maintenance and inspection.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 4.7.2 (d)	6	13	0	100.00%	0.00%
Verify if the riser tensioner system is equipped with an anti-recoil system in the event that an emergency release of the riser from the BOP stack is required.	This item is not currently included in MMS. WEST recommends this item be included by reference to the API.	API RP-16Q Section 5.1.3	14	4	0	100.00%	0.00%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Verify that a list of hydraulic fluids compatible with the tensioner units and specified by the tensioner manufacturer is available.	API RP-16Q Section 2.4.3 (d)	C	C	0	C	0	C	0	0	0	0
Verify that the tensioner system is designed to permit one unit to be out of service for maintenance or repair without jeopardizing the ability of the remaining tensioner units to provide the required tension to the marine drilling riser. Note: A unit may be either a single tensioner or a pair of tensioners, depending on specific design.	API RP-16Q Section 2.4.3 (f)	C	C	C	C	0	C	0	0	0	0
Verify flow control device is located in the line between the fluid port on each tensioner and its respective air/oil interface bottle. Verify its ability to sense abnormally high flow rates and immediately stop or greatly reduce the flow.	API RP-16Q Section 2.4.3 (h)	C	C	0	C	C	C	0	0	0	0
If the telescopic joint is extended during the BOP stack handling procedure, verify its load limit and record. Compare with expected BOP landing weights.	API RP-16Q Section 2.6.3 (a)	C	N/A	N/A	C	0	N/A	0	0	0	0
Verify that the tensioner ring is rated for the maximum load capacity of the telescopic joint.	API RP-16Q Section 2.6.3 (c)	C	C	C	C	0	C	0	0	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Verify that if threaded end fittings are used on choke and kill connections, they contain a sealing means other than the threads.	API RP-16Q Section 2.10.2	C	C	C	C	0	C	0	0	0	0
Verify that if the diverter handling tool is used to support the entire riser and BOP stack it meets the same standards as the riser handling tool.	API RP-16Q Section 2.11.2.1	C	N/A	N/A	C	0	N/A	0	0	0	0
Ensure that proper galvanic protection is provided between the steel components of the riser joints and the hydraulic supply lines if corrosion-resistant material (e.g. stainless steel) is used.	API RP-16Q Section 2.12.3 (a)	C	C	C	C	0	C	0	0	0	0
Verify that for hydraulic supply lines, working pressure rating is compatible with the working pressure rating of the BOP control system.	API RP-16Q Section 2.12.3 (b1)	C	C	C	C	C	C	0	0	C	0
Verify that for mud boost lines, pressure rating is suitable for the intended service. Review previous wall thickness inspections and verify suitable for maximum pump pressure.	API RP-16Q Section 2.12.3 (b2)	C	C	C	C	C	C	0	0	C	0
Verify that for choke/kill lines, pressure rating is the same as the BOP stack. Compare the last wall thickness survey to minimum wall thickness calculations to determine this.	API RP-16Q Section 2.12.3 (b3)	C	C	0	C	C	C	C	0	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Verify that adequate gap is provided between the support bracket and the coupling. Note: relative motion of the couplings may cause fatigue cracking of the support bracket.	API RP-16Q Section 2.12.3 (b3)	C	C	C	C	0	C	0	0	0	0
To prevent accidental mismatching of the choke/kill and auxiliary lines when the riser is deployed, verify that the coupling is oriented asymmetrically around the riser support ring.	API RP-16Q Section 2.12.3 (e)	C	C	C	C	C	0	0	0	0	0
Verify material selection for choke and kill lines meets NACE MR0175 for H2S Service.	API RP-16Q Section 2.12.3 (g)	C	C	0	0	C	C	0	0	0	0
Verify material selection for fastener avoids galvanic corrosion.	API RP-16Q Section 2.13.2 (a)	C	C	C	C	0	C	0	0	0	0
Verify the riser tension analysis is reviewed according to API RP 16Q, Section 3, “Riser Response Analysis”. The results of the analysis should be appended to the Riser Operating Manual.	API RP 16Q, Section 3	C	C	0	0	C	C	0	0	X	0
Verify a linear graph is posted on the rig that clearly identifies the amount of riser tension required for various mud weights.	API RP 16Q Section 3.2.4	C	C	0	C	0	C	X	0	C	0
Verify that operating personnel on floating drilling vessel are properly trained and equipped with a written procedure for care and use of the marine riser. Verify the training records. The procedures are to include:	API RP-16Q Section 4.1	C	C	C	X	0	C	C	0	0	C

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Verify that the riser operating manual is located on the vessel and is current. As a minimum, verify that the manual contains the following information concerning the riser system and is maintained:	API RP-16Q Section 4.2	C	C	C	X	0	C	C	0	C	0
a. manufacturer's drawings of the riser system components outlining the critical dimensions, weights, and part numbers of the various components.	API RP-16Q Section 4.2	C	C	C	X	0	C	C	0	C	0
b. manufacturer's load ratings for the critical components of the riser system	API RP-16Q Section 4.2	C	C	C	X	0	C	C	0	C	0
c. internal and collapse pressure ratings of the riser and integral auxiliary lines	API RP-16Q Section 4.2	C	C	C	X	0	C	C	0	C	0
d. inspection and maintenance procedures for each component	API RP-16Q Section 4.2	C	C	C	X	0	C	C	0	C	0
e. procedure for running and retrieving the riser	API RP-16Q Section 4.2	C	C	C	X	0	C	C	0	C	0
f. procedure for establishing maximum and minimum tension settings	API RP-16Q Section 4.2	C	C	C	X	0	C	C	0	C	0
g. operating limits and emergency procedures	API RP-16Q Section 4.2	C	C	C	X	0	C	C	0	C	0
h. an accurate log of operating history	API RP-16Q Section 4.2	0	C	C	X	0	C	C	0	C	0
i. recommended spare parts inventory list	API RP-16Q Section 4.2	C	C	C	X	0	C	C	0	C	0
j. criteria and procedures for cutting and slipping tensioner lines	API RP-16Q Section 4.2	C	C	C	X	0	C	0	0	C	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
k. scheduled inspection and maintenance on all riser system components	API RP-16Q Section 4.8	C	C	C	X	0	C	0	0	0	0
If there are any special instructions called out in the Marine Riser Manufacturer's Care and Use Instructions, verify that they are being followed.	API RP-16Q Section 4.3.2 (d)	C	C	C	X	0	C	0	0	0	0
Verify that the marine riser system is suitably instrumented and monitored to ensure safe and reliable performance.	API RP-16Q Section 4.4.2	C	C	C	C	0	C	0	0	0	0
In the event of a hydraulic tensioner failure, verify that a procedure outlining the required steps to correct the problem is incorporated in the operating manual.	API RP-16Q Section 4.4.3.1	C	C	0	X	0	C	0	0	0	0
Verify the rig is equipped with written emergency disconnect procedures which account for various tubulars being in the BOP bore, peculiarities in the BOP and control equipment, and characteristics of position keeping or mooring equipment.	API RP-16Q Section 4.4.4.2	C	C	X	X	0	C	C	X	0	0
Extend tensioners and pressure to MWP. Inspect surface finish of rods and verify seals are leak tight.	API RP-16Q Section 4.6.1	C	C	0	C	0	C	0	0	C	0
Verify telescopic joint is inspected and serviced in accordance with manufacturer's recommendations.	API RP-16Q Section 4.6.2	C	C	C	X	0	0	0	0	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.3 (a)

Assessment Points	Reference	856	838	847	634	862	826	696	830	714	717
Verify that the flex/ball joints have a protective cover at the upper neck to prevent the entry of cuttings and debris into the mechanism.	API RP-16Q Section 4.6.3	C	C	0	C	0	C	0	0	0	0
Review the riser handling technique and verify it complies with good oilfield practices and the manufactures recommendations.	API RP-16Q Section 4.7.1	C	C	0	C	C	C	C	0	0	C
Verify that protectors are provided for the pin end (and box end if specified by the manufacturer) couplings of each riser joint. Visually inspect the box and pin protectors to ensure they properly protect the sealing surfaces. Ensure that the protectors are installed, as applicable, when riser is being handled.	API RP-16Q Section 4.7.1	C	C	C	C	C	C	C	0	C	C
Verify that the rig has storage racks and cradles and these are being used to restrain and support the riser joints during stored periods.	API RP-16Q Section 4.7.2	C	C	X	C	X	C	C	C	C	0
Verify that the rig storage racks do not hinder access to the pin and/or box protectors or covers for maintenance and inspection.	API RP-16Q Section 4.7.2 (d)	C	C	C	C	N/A	C	C	C	0	0
Verify if the riser tensioner system is equipped with an anti-recoil system in the event that an emergency release of the riser from the BOP stack is required.	API RP-16Q Section 5.1.3	0	C	0	C	N/A	C	0	0	0	0
	C	100.0%	100.0%	93.1%	57.5%	90.0%	100.0%	94.4%	66.7%	94.4%	100.0%

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Verify that a list of hydraulic fluids compatible with the tensioner units and specified by the tensioner manufacturer is available.	API RP-16Q Section 2.4.3 (d)	0	0	C	0	0	0	0	C	0	0
Verify that the tensioner system is designed to permit one unit to be out of service for maintenance or repair without jeopardizing the ability of the remaining tensioner units to provide the required tension to the marine drilling riser. Note: A unit may be either a single tensioner or a pair of tensioners, depending on specific design.	API RP-16Q Section 2.4.3 (f)	0	0	C	0	0	0	0	C	0	0
Verify flow control device is located in the line between the fluid port on each tensioner and its respective air/oil interface bottle. Verify its ability to sense abnormally high flow rates and immediately stop or greatly reduce the flow.	API RP-16Q Section 2.4.3 (h)	0	0	C	0	0	0	0	C	0	0
If the telescopic joint is extended during the BOP stack handling procedure, verify its load limit and record. Compare with expected BOP landing weights.	API RP-16Q Section 2.6.3 (a)	0	0	NA	NA	0	0	0	C	0	0
Verify that the tensioner ring is rated for the maximum load capacity of the telescopic joint.	API RP-16Q Section 2.6.3 (c)	0	0	C	C	0	0	0	C	0	0

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Verify that if threaded end fittings are used on choke and kill connections, they contain a sealing means other than the threads.	API RP-16Q Section 2.10.2	0	0	0	NA	0	0	0	C	0	0
Verify that if the diverter handling tool is used to support the entire riser and BOP stack it meets the same standards as the riser handling tool.	API RP-16Q Section 2.11.2.1	0	0	C	NA	0	0	0	0	0	0
Ensure that proper galvanic protection is provided between the steel components of the riser joints and the hydraulic supply lines if corrosion-resistant material (e.g. stainless steel) is used.	API RP-16Q Section 2.12.3 (a)	0	0	C	X	0	0	0	C	0	0
Verify that for hydraulic supply lines, working pressure rating is compatible with the working pressure rating of the BOP control system.	API RP-16Q Section 2.12.3 (b1)	C	0	C	C	0	C	0	C	0	0
Verify that for mud boost lines, pressure rating is suitable for the intended service. Review previous wall thickness inspections and verify suitable for maximum pump pressure.	API RP-16Q Section 2.12.3 (b2)	C	0	C	C	0	C	0	C	0	0
Verify that for choke/kill lines, pressure rating is the same as the BOP stack. Compare the last wall thickness survey to minimum wall thickness calculations to determine this.	API RP-16Q Section 2.12.3 (b3)	C	0	C	C	0	C	0	C	0	0

Codes: 0 = Not checked
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X = Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Verify that adequate gap is provided between the support bracket and the coupling. Note: relative motion of the couplings may cause fatigue cracking of the support bracket.	API RP-16Q Section 2.12.3 (b3)	0	0	C	X	0	0	0	C	0	0
To prevent accidental mismatching of the choke/kill and auxiliary lines when the riser is deployed, verify that the coupling is oriented asymmetrically around the riser support ring.	API RP-16Q Section 2.12.3 (e)	0	0	C	C	0	0	0	0	0	0
Verify material selection for choke and kill lines meets NACE MR0175 for H2S Service.	API RP-16Q Section 2.12.3 (g)	0	0	C	0	0	0	0	0	0	0
Verify material selection for fastener avoids galvanic corrosion.	API RP-16Q Section 2.13.2 (a)	0	0	C	C	0	0	0	C	0	0
Verify the riser tension analysis is reviewed according to API RP 16Q, Section 3, “Riser Response Analysis”. The results of the analysis should be appended to the Riser Operating Manual.	API RP 16Q, Section 3	0	0	C	0	C	0	0	C	0	0
Verify a linear graph is posted on the rig that clearly identifies the amount of riser tension required for various mud weights.	API RP 16Q Section 3.2.4	0	0	C	0	0	C	0	C	0	C
Verify that operating personnel on floating drilling vessel are properly trained and equipped with a written procedure for care and use of the marine riser. Verify the training records. The procedures are to include:	API RP-16Q Section 4.1	0	0	C	0	C	0	0	C	0	C

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C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Verify that the riser operating manual is located on the vessel and is current. As a minimum, verify that the manual contains the following information concerning the riser system and is maintained:	API RP-16Q Section 4.2	0	0	C	C	C	0	0	C	0	0
a. manufacturer's drawings of the riser system components outlining the critical dimensions, weights, and part numbers of the various components	API RP-16Q Section 4.2	0	0	C	C	C	0	0	C	0	0
b. manufacturer's load ratings for the critical components of the riser system	API RP-16Q Section 4.2	0	0	C	X	C	0	0	C	0	0
c. internal and collapse pressure ratings of the riser and integral auxiliary lines	API RP-16Q Section 4.2	0	0	C	X	C	0	0	C	0	0
d. inspection and maintenance procedures for each component	API RP-16Q Section 4.2	0	0	C	C	C	0	0	C	0	0
e. procedure for running and retrieving the riser	API RP-16Q Section 4.2	0	0	C	C	C	0	0	C	0	0
f. procedure for establishing maximum and minimum tension settings	API RP-16Q Section 4.2	0	0	C	0	C	0	0	C	0	0
g. operating limits and emergency procedures	API RP-16Q Section 4.2	0	0	C	0	C	0	0	C	0	0
h. an accurate log of operating history	API RP-16Q Section 4.2	0	0	C	0	0	0	0	C	0	0
i. recommended spare parts inventory list	API RP-16Q Section 4.2	0	0	C	C	0	0	0	C	0	0
j. criteria and procedures for cutting and slipping tensioner lines	API RP-16Q Section 4.2	0	0	C	0	C	0	0	C	0	0

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X = Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
k. scheduled inspection and maintenance on all riser system components	API RP-16Q Section 4.8	0	0	C	C	0	0	0	C	0	0
If there are any special instructions called out in the Marine Riser Manufacturer's Care and Use Instructions, verify that they are being followed.	API RP-16Q Section 4.3.2 (d)	0	0	C	0	C	0	0	C	0	C
Verify that the marine riser system is suitably instrumented and monitored to ensure safe and reliable performance.	API RP-16Q Section 4.4.2	0	0	C	C	0	0	0	0	0	0
In the event of a hydraulic tensioner failure, verify that a procedure outlining the required steps to correct the problem is incorporated in the operating manual.	API RP-16Q Section 4.4.3.1	0	0	C	0	0	0	0	C	0	0
Verify the rig is equipped with written emergency disconnect procedures which account for various tubulars being in the BOP bore, peculiarities in the BOP and control equipment, and characteristics of position keeping or mooring equipment.	API RP-16Q Section 4.4.4.2	0	C	C	C	0	0	0	C	0	C
Extend tensioners and pressure to MWP. Inspect surface finish of rods and verify seals are leak tight.	API RP-16Q Section 4.6.1	0	0	0	X	0	C	0	C	0	0
Verify telescopic joint is inspected and serviced in accordance with manufacturer's recommendations.	API RP-16Q Section 4.6.2	0	0	C	0	0	0	0	C	0	0

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C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Section 5.3 (b)

Assessment Points	Reference	754	869	771	843	760	758	761	796	600	623
Verify that the flex/ball joints have a protective cover at the upper neck to prevent the entry of cuttings and debris into the mechanism.	API RP-16Q Section 4.6.3	0	0	C	C	0	0	0	C	0	0
Review the riser handling technique and verify it complies with good oilfield practices and the manufactures recommendations.	API RP-16Q Section 4.7.1	0	0	C	C	C	C	0	C	0	C
Verify that protectors are provided for the pin end (and box end if specified by the manufacturer) couplings of each riser joint. Visually inspect the box and pin protectors to ensure they properly protect the sealing surfaces. Ensure that the protectors are installed, as applicable, when riser is being handled.	API RP-16Q Section 4.7.1	C	0	C	X	C	C	C	C	0	0
Verify that the rig has storage racks and cradles and these are being used to restrain and support the riser joints during stored periods.	API RP-16Q Section 4.7.2	0	0	C	X	C	C	0	C	0	C
Verify that the rig storage racks do not hinder access to the pin and/or box protectors or covers for maintenance and inspection.	API RP-16Q Section 4.7.2 (d)	0	0	C	C	C	C	0	C	0	C
Verify if the riser tensioner system is equipped with an anti-recoil system in the event that an emergency release of the riser from the BOP stack is required.	API RP-16Q Section 5.1.3	0	0	NA	0	0	0	0	C	0	0
	C	100.0%	100.0%	100.0%	70.8%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%

Codes: 0 = Not checked
C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - API RP 16Q
Out of Compliances
Section 5.4

Assessment Points	Reference	714	696	634	830	862	847	843	Safety Issue
Verify the riser tension analysis is reviewed according to API RP 16Q, Section 3, "Riser Response Analysis". The results of the analysis should be appended to the Riser Operating Manual.	API RP 16Q, Section 3	X							Over-pull is necessary on riser to ensure that the riser never goes to compression. Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
Verify a linear graph is posted on the rig that clearly identifies the amount of riser tension required for various mud weights.	API RP 16Q Section 3.2.4		X						Over-pull is necessary on riser to ensure that the riser never goes to compression. Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
Verify that operating personnel on floating drilling vessel are properly trained and equipped with a written procedure for care and use of the marine riser. Verify the training records.	API RP-16Q Section 4.1			X					Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
Verify that the riser operating manual is located on the vessel and is current. As a minimum, verify that the manual contains the following information concerning the riser system and is maintained:	API RP-16Q Section 4.2			X					Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
a. manufacturer's drawings of the riser system components outlining the critical dimensions, weights, and part numbers of the various components.	API RP-16Q Section 4.2			X					Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
b. manufacturer's load ratings for the critical components of the riser system	API RP-16Q Section 4.2			X				X	Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).

WEST MMS Assessment Points - API RP 16Q
Out of Compliances
Section 5.4

Assessment Points	Reference	714	696	634	830	862	847	843	Safety Issue
c. internal and collapse pressure ratings of the riser and integral auxiliary lines	API RP-16Q Section 4.2			X				X	Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
d. inspection and maintenance procedures for each component	API RP-16Q Section 4.2			X					Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
e. procedure for running and retrieving the riser	API RP-16Q Section 4.2			X					Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
f. procedure for establishing maximum and minimum tension settings	API RP-16Q Section 4.2			X					Over-pull is necessary on riser to ensure that the riser never goes to compression. Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
g. operating limits and emergency procedures	API RP-16Q Section 4.2			X					Over-pull is necessary on riser to ensure that the riser never goes to compression. Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
h. an accurate log of operating history	API RP-16Q Section 4.2			X					Over-pull is necessary on riser to ensure that the riser never goes to compression. Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
i. recommended spare parts inventory list	API RP-16Q Section 4.2			X					Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).

WEST MMS Assessment Points - API RP 16Q
Out of Compliances
Section 5.4

Assessment Points	Reference	714	696	634	830	862	847	843	Safety Issue
j. criteria and procedures for cutting and slipping tensioner lines	API RP-16Q Section 4.2			X					Over-pull is necessary on riser to ensure that the riser never goes to compression. Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
k. scheduled inspection and maintenance on all riser system components	API RP-16Q Section 4.8			X					Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
If there are any special instructions called out in the Marine Riser Manufacturer's Care and Use Instructions, verify that they are being followed.	API RP-16Q Section 4.3.2 (d)			X					Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
In the event of a hydraulic tensioner failure, verify that a procedure outlining the required steps to correct the problem is incorporated in the operating manual.	API RP-16Q Section 4.4.3.1			X					Over-pull is necessary on riser to ensure that the riser never goes to compression. Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
Verify the rig is equipped with written emergency disconnect procedures which account for various tubulars being in the BOP bore, peculiarities in the BOP and control equipment, and characteristics of position keeping or mooring equipment.	API RP-16Q Section 4.4.4.2			X	X		X		Procedures are required to ensure that there is no unnecessary delay in unlatching the LMRP in a well control or operational emergency.
Verify telescopic joint is inspected and serviced in accordance with manufacturer's recommendations.	API RP-16Q Section 4.6.2			X					Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).

WEST MMS Assessment Points - API RP 16Q
Out of Compliances
Section 5.4

Assessment Points	Reference	714	696	634	830	862	847	843	Safety Issue
Verify that the rig has storage racks and cradles and these are being used to restrain and support the riser joints during stored periods.	API RP-16Q Section 4.7.2					X	X	X	Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
Ensure that proper galvanic protection is provided between the steel components of the riser joints and the hydraulic supply lines if corrosion-resistant material (e.g. stainless steel) is used.	API RP-16Q Section 2.12.3 (a)							X	Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
Verify that adequate gap is provided between the support bracket and the coupling. Note: relative motion of the couplings may cause fatigue cracking of the support bracket.	API RP-16Q Section 2.12.3 (b3)							X	Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
Extend tensioners and pressure to MWP. Inspect surface finish of rods and verify seals are leak tight.	API RP-16Q Section 4.6.1							X	Over-pull is necessary on riser to ensure that the riser never goes to compression. Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).
Verify that protectors are provided for the pin end (and box end if specified by the manufacturer) couplings of each riser joint. Visually inspect the box and pin protectors to ensure they properly protect the sealing surfaces. Ensure that the protectors are installed, as applicable, when riser is being handled.	API RP-16Q Section 4.7.1							X	Failure of the riser compromises the ability to control a well physically and through controls (mux or umbilical cable).

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Section 6.1

WEST MMS Assessment Points

Review of IADC Deepwater Guidelines

MMS Project # 01-99-PO-17072

Following is the detailed report of IADC Deepwater Guidelines assessment points that were used in this study. The format is detailed in Section V. Technical Summary from the Executive Summary.

Following are the highlights from the review of IADC Deepwater Guidelines:

- Compliance of included line items was observed upon WEST leaving the rig 97.8% of the time, out of compliance 2.2%.
- A limited number of IADC Deepwater Guidelines were reviewed in this study.
- The IADC Deepwater Guidelines concerning ram cavity inspections is recommended for direct inclusion into MMS regulations as stated.
- The requirements in other IADC Deepwater Guidelines can be covered by reference to appropriate API documents.

Accordingly, WEST does not recommend inclusion of IADC Deepwater Guidelines into MMS requirements.

WEST MMS Assessment Points - IADC Well Control Guidelines
Section 6.2

Assessment Point	WEST Comparison and Recommendation	Reference	# of 0	# of C	# of X	% in C	% out of C
Every 3-5 years, the stack components should be disassembled, dimensions recorded, repair performed as needed and all rubber goods renewed based on manufacturer's recommended specifications. Review, record, and comment on the last major survey dates. List equipment due for a major survey with a three to five year frequency.	This item is not included by either MMS or the API documents reviewed in this study. However, this item is covered in API RP 53, Section 18. Inclusion of API RP 53 into MMS regulations by reference is the recommended way of addressing this item.	IADC Deepwater Well Control Guidelines, p. 3-27 Section 3.7.2.1	8	8	0	100.00%	0.00%
The annular element shall be visually inspected and shall be in good condition. Drift test the annular as per API Spec. 16A in order to ensure ability to pass full bore tool. It must return to full bore within 30 minutes after piston has been opened.	This item is not included in either MMS or the API documents reviewed in this study. We recommend this item be included in MMS by reference to API Specification 16A.	IADC Deepwater Well Control Guidelines, p. 3-27, Sec. 3.7.2.1	2	18	0	100.00%	0.00%
Check general condition of ram cavities. Visually inspect each cavity upper sealing area for damage or any scratches. Note: A poor surface finish at the top of the cavity reduces its effective life. At least annually, check and record ram cavity dimensions. Compare ram cavity wear measurements to OEM's recommended maximum tolerance.	This item is not included in either MMS or the API documents reviewed in this study. In WEST's opinion, annual inspection and measurement of ram cavities are critical to ensuring continued BOP reliability. We therefore recommend this item be directly included in MMS regulations.	IADC Deepwater Well control Guidelines, Section 3.7.2.1	1	18	1	94.74%	5.26%

Codes: 0=Not Checked
C=In Compliance
X=Not in Compliance

WEST MMS Assessment Points - IADC Well Control Guidelines
Section 6.2 (a)

Assessment Point	Reference	856	838	847	634	862	826	696	830	714	717
Every 3-5 years, the stack components should be disassembled, dimensions recorded, repair performed as needed and all rubber goods renewed based on manufacturer's recommended specifications. Review, record, and comment on the last major survey dates. List equipment due for a major survey with a three to five year frequency.	IADC Deepwater Well Control Guidelines, p. 3-27 Section 3.7.2.1	C	0	C	N/A	0	C	0	N/A	C	C
The annular element shall be visually inspected and shall be in good condition. Drift test the annular as per API Spec. 16A in order to ensure ability to pass full bore tool. It must return to full bore within 30 minutes after piston has been opened.	IADC Deepwater Well Control Guidelines, p. 3-27, Sec. 3.7.2.1	C	C	C	0	C	C	C	0	C	C
Check general condition of ram cavities. Visually inspect each cavity upper sealing area for damage or any scratches. Note: A poor surface finish at the top of the cavity reduces its effective life. At least annually, check and record ram cavity dimensions. Compare ram cavity wear measurements to OEM's recommended maximum tolerance.	IADC Deepwater Well control Guidelines, Section 3.7.2.1	C	C	C	X	C	C	0	C	C	C
	C	100.0%	100.0%	100.0%	0.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

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C = In Compliance
X = Not in Compliance

WEST MMS Assessment Points - IADC Well Control Guidelines
Section 6.3 (b)

Assessment Point	Reference	754	869	771	843	760	758	761	796	600	623
Every 3-5 years, the stack components should be disassembled, dimensions recorded, repair performed as needed and all rubber goods renewed based on manufacturer's recommended specifications. Review, record, and comment on the last major survey dates. List equipment due for a major survey with a three to five year frequency.	IADC Deepwater Well Control Guidelines, p. 3-27 Section 3.7.2.1	0	N/A	C	0	0	C	0	NA	0	C
The annular element shall be visually inspected and shall be in good condition. Drift test the annular as per API Spec. 16A in order to ensure ability to pass full bore tool. It must return to full bore within 30 minutes after piston has been opened.	IADC Deepwater Well Control Guidelines, p. 3-27, Sec. 3.7.2.1	C	C	C	C	C	C	C	C	C	C
Check general condition of ram cavities. Visually inspect each cavity upper sealing area for damage or any scratches. Note: A poor surface finish at the top of the cavity reduces its effective life. At least annually, check and record ram cavity dimensions. Compare ram cavity wear measurements to OEM's recommended maximum tolerance.	IADC Deepwater Well control Guidelines, Section 3.7.2.1	C	C	C	C	C	C	C	C	C	C
	C	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

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