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Jack-up MODUs

Assessment Checksheet for Hurricane Season

BACKGROUND REPORT

Based on Outcomes of Hurricanes Andrew, Lili, Ivan, Katrina & Rita

Prepared for:

Minerals Management Service

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MINERALS MANAGEMENT SERVICE CONTRACT

Jack-up Assessment During Hurricanes- Background : March 2009

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Preface

This Report which accompanies the Checksheet is intended to provide sufficient background to understand the history and evolution of the requirements incorporated into the Checksheet and background to the various documents produced by MMS and industry to advance safety of jack-up Mobile Offshore Drilling Units (MODUs). The reader should refer to the references provided which elaborate on the issues.

1. Background

In 2004 and 2005 Hurricanes Katrina and Rita moved through the Gulf of Mexico with extreme winds and waves, causing a number of jack-ups in their paths to fail. Failures have occurred in previous hurricanes, including Hurricanes Andrew, Lili and Ivan. While these were of some concern, the number of jack-up failures in previous hurricanes was sufficiently small that the method used for jack-up site assessment for hurricane season was considered adequate.

All the jack-ups that failed and drifted (in all hurricanes) did not cause any major damage, although in one case damage was alleged to a fixed platform. Mostly the jack-ups have drifted in a northerly direction either grounding on the beach or sinking. The exception was the Ensco 64 in 2004 during hurricane Ivan which drifted in a southerly direction (Ref 4). The direction of drift is determined by the location of the rig in relation to the storm track and the time during the storm that the failure occurs.

All failures in Lili, Ivan, Katrina and Rita were in challenging situations i.e. more than the rig was designed to survive structurally. Thus the emphasis going forward is not so much on structural strength of the jack-up but on ensuring that the foundation is adequate to prevent the airgap being lost, and the jack-up leaning which decreases the airgap and substantially increases the leg loading. When the jack-up is near to critical infrastructure, structural criteria and foundation capacity are critical. Structural limits are also important at lower storm levels while the jack-up is manned (i.e. a sudden TRS which develops within a 48 hr period: the extreme maximum timeframe considered to de-man jack-ups).

Since current guidance/regulation was put into place, Hurricane Ike came through the Gulf of Mexico in 2008 with the result that 3 jack-ups were lost. These jack-ups include the mat-supported jack-up the Pride Wyoming, the independent leg Rowan Anchorage, and the independent leg Ensco 74. Detailed reasons for the failures are under investigation by the jack-up owners and final determination for the losses has not yet been chronicled.

1.1 Hurricane Andrew

- Marlin 3 mat-supported jack-up failed in the legs, and drifted NE. Most likely structural cracks in the legs, which could have been a chronic problem, may have been one of the contributing factors to its collapse at lower than expected loads (Ref 1).

1.2 Hurricane Lili

- Rowan Houston was an older jack-up which toppled and travelled a few hundred yards before sinking. An in-field pipeline was damaged by the toppled jack-up's drill package substructure which fell on top of the pipeline. The storm exceeded the design capability of the jack-up. The failure was probably not a soil failure but initiated in the jackhouse structure (Ref. 2, 3).

- Dolphin 105 failed with insufficient airgap for the shallow water and breaking wave. The airgap required would be close to the limit even by today's standards. The rig sank on location, and separated from the mat which drifted 1500 yards (Ref 2, 3).

1.3 Hurricane Ivan

- Ensco 64 was toppled by the hurricane because of insufficient airgap and after collapsing drifted SW 40 miles (Ref 4).

- THE 200, a mat-supported rig moved 100 ft off location by sliding but no damage to the well (Ref 4) resulted. The mat was later discovered damaged, bent up at the forward end sufficient to produce a buckle 2/3rds of the way up on one side. It is not clear if this was old damage or whether it occurred in Hurricane Ivan.

1.4 Hurricane Katrina

- Ocean Warwick collapsed and drifted 66 miles NE and ended up on the beach (Ref 7).

- Rowan New Orleans collapsed and sank near the original location (Ref 7).

1.5 Hurricane Rita

- Rowan Halifax collapsed and sank near the original location (Ref 7).

- Rowan New Orleans collapsed and sank close by the original location (Ref 7).

- Rowan Odessa collapsed and drifted 6 miles NW before sinking (Ref 7).

- GSF Adriatic VII collapsed and drifted 118 miles NW before sinking (Ref 7).

- GSF High Island III collapsed and drifted 108 miles NW before sinking (Ref 7).

- Rowan Ft Worth was never found and is presumed sunk (Ref 7).

- Rowan Louisiana collapsed and drifted 103 miles NW before sinking (Ref 7).

- Pride Florida, a mat supported jack-up, moved 40 ft off location with no reported damage to the well (Ref 7).

- Pride Utah a mat supported jack-up moved off location 50-60 ft, bow heading turned 90 degrees with no reported damage to the well (Ref 7).

- Pride Wyoming, a mat supported jack-up, moved off location 137 feet, bow heading changed 2 degrees with no reported damage to the well (Ref 7). (Note: The Pride Wyoming was later lost in Hurricane Ike (2008)).

The risk of jack-ups floating off location after the storm and colliding with a deepwater production platform is small, because the more productive production platforms are in deeper water and to the south, a less likely projected trajectory for the jack-ups since most drift NW: The Ensco 64, however, travelled south rather than following the traditional path north: this is probably because it broke free earlier in the storm, which passed to the east of the location. There is certainly some risk to the hub platforms located in shallow jack up water-depths. There is also some very small risk to the pipelines.

Although the risk to pipelines is considered very small three incidents are noted: one unusual liftboat incident, one recent Hurricane Ike incident and occasionally objects falling as in Hurricane Lili, on in-field pipelines after a jack-up had become afloat.

In Hurricane Ivan a liftboat (smaller and lighter than a jack-up rig) which had been disposed of (scrapped) by sinking on the seabed was propelled by the storm and ended up on top of a pipeline at some considerable distance from the location where it was originally scrapped. The forces of a barge hull protruding on the seabed in comparatively shallow water are quite high in hurricane conditions (wave and current). No movement has been noted in other cases of submerged jack-up independent leg rigs. In the case of the liftboat or possibly a jack-up that has failed and sank, the vessel can still be propelled some considerable distance unless held by penetrating the legs in the seabed.

Liftboat being removed from a pipeline after Hurricane Ivan (Ref 8)

Damage by a jack-up to pipelines in Hurricane Ike is noted later.

1.6 Stationkeeping Issues for Jack-up Rigs

From the historical record, for jack-ups adrift there have been:

- No lives lost & no serious injuries offshore
- No significant pollution, and
- Minimal, if any, production losses / pipeline damage

Hurricanes Katrina and Rita impact on the jack-up fleet was important because of the number of rigs lost and damaged: about 12% of the jack-up fleet with some jack-ups drifting off location. Some of these jack-ups were lost by sinking. Other jack-ups, including one which did not leave location were unsalvageable, declared total constructive losses, and sold for scrap.

The magnitude of the storms experienced exceeded the design criteria for all of the jack-ups that were damaged.

Some of the primary causes of damage were wave slam (wave impingement on the hull), wind and current forces greater than 100 year conditions, and foundations that were unable to support the jack-ups for the additional load level experienced from the increased metocean conditions beyond the industry accepted standard for survival.

The consequences of loss of stationkeeping differ from moored vessels, which have been of concern to industry. Jack-ups are limited to shallow water, as their legs /mat need to touch the bottom. Many of the rigs which drifted off location ended up on the shoreline with minimal environmental impact: one jack-up was never located.

The most significant learning that came out of these later hurricanes was that the peak wave heights and winds were higher than any anticipated storms. The wind and wave estimates of 100-year conditions increased significantly when incorporating the historical records of these storms in the databases from which predictions were made. Other factors were rethought at the same time which resulted in revised metocean criteria by region (zone) for the Gulf of Mexico (Ref 12). The maximum wave heights in these hurricanes were also generated for periods longer then anticipated (Ref 10). Further information from Hurricane Ike also presents a new perspective as winds were comparatively low (possibly equivalent to a 30-year return period, while waves were said to be high (possibly equivalent to or greater than the 100-year return period) and maximum waves were experienced for much longer than had been anticipated.

Several documents, both regulation and guidance, have provided on the site specific assessment of jack-up MODUs since the advent of these new experiences:

- API RP 95J has been issued

- The GOM Annex to SNAME T&R Bulletin 5-5A (Ref 29) has been completed.

- The MMS issued NGL 2008-G10 (Ref 15) which tightened the submittal requirements and NGL 2008-G-05 provided guidance on shallow seismic surveys

These documents are available to form the basis of the "Checksheet for Jack-ups Assessment during Hurricanes" (Checksheet).

2. Reason for a Jack-up Checksheet:

The MMS has commissioned development of an initial jack-up Checksheet as part of the Post-Mortem studies on Hurricanes Katrina and Rita (Ref 7).

The MMS currently has a Checksheet for moored semi-submersibles and there has been discussion of a Checksheet for dynamically positioned vessels. A Checksheet for jack-ups will rationalize the oversight process and help MMS to ensure appropriate due diligence in relation to jack-ups.

The importance in the Gulf of Mexico for even small production jackets has increased with the energy shortage and thus it is of interest to identify critical infrastructure and ensure that the risk is minimized for jack-ups working near any critical infrastructure. One example is ensuring strict and perhaps enhanced criteria for a jack-up working within a short distance of a major hub platform which has significant throughput of oil. For these structures it may be appropriate and expected to be subjected to additional scrutiny. Currently there are limited "tools" and guidance available to the MMS to make such review. The Jack-up Checksheet can facilitate explanations and key points to be considered for these situations.

Another benefit is, with the number of changes of personnel in the industry and the regulatory teams, historical issues can sometimes be overlooked. The jack-up Checksheet will be an important part of a quality system to capture experience in a form for ensuring the important issues are not overlooked.

The risk to semisubmersibles was presented in a paper in OTC 2007: OTC 18988 "Transition to Risk Based MODU codes for the Gulf of Mexico". A Mooring Checksheet that evolved from a comprehensive Joint Industry Study is described in API RP2SK Appendix K for mooring semisubmersibles, and is available for use by MMS in their deliberations over semi-submersible approvals. It was thus suggested that a simplified Checksheet could be produced for jack-ups allowing MMS to ensure that hub platforms and high consequence infrastructures were properly protected. Such a Checksheet may enhance jack-up survivability and stationkeeping during hurricane season in the Gulf of Mexico during drilling, workover, and while stacked (idled) at a non-sheltered location.

The limited effort in producing a jack-up Checksheet may provide a needed tool. Clearly this Checksheet is likely to evolve to a better product after it is in circulation for some time. It is hoped that one of the voluntary Committees (IADC, API or other industry group) will take this work forward in the future.

The primary goals of this jack-up Checksheet are to follow the requirements of the regulations and guidance of the industry. The secondary, but equally important, goal is to follow good engineering practice.

Under current Regulation, there is a requirement to follow 30 CFR 250.417 which ensures provision of:

- "information and data to demonstrate the drilling unit's capability to perform at the proposed drilling location. This information must include the maximum environmental and operational conditions that the unit is designed to withstand, including the minimum air gap necessary for both hurricane and non-hurricane seasons."

- "information to show that site-specific soil and oceanographic conditions are capable of supporting the proposed drilling unit. "

MMS's concern about the loss of jack-ups as well as the potential for catastrophic damage to key infrastructure and the resultant pollution in future storms has caused them to issue Notices to Lessees:

- NTL 2008-G10 June 1, 2008- Dec 1, 2013 Guidelines for Jack-up Drilling Rig Fitness Requirements for Hurricane Season (Ref 15).

- NTL 2008-G06 April 1, 2008 - March 31, 2013 Shallow Hazards Program (Ref 39). Section VI B refers to MODUs.

These documents as well as the industry guidance documents are summarized in Section 4.

It is important to recognize that structural integrity is an overall concept comprising models for describing loads, structural analyses, design conditions, site conditions, workmanship, flag state and often classification requirements all of which are mutually dependent.

Site Specific Assessment is normally carried out when an existing jack-up unit is to be installed at a specific site. The Checksheet is not intended to provide a full evaluation of the jack-up; it assumes that aspects not addressed herein have been addressed using industry standard practices and standards.

The purpose of this Checksheet is to demonstrate the adequacy of the jack-up and its foundations for permitting examination purposes only, taking into account the consequences of failure may result in damage to the GoM infrastructure. The results of any site assessment carried out backing up the answers to this Checksheet should be appropriately recorded and communicated to those persons required to know or act on the conclusions and recommendations.

The Checksheet does not address transportation to and from site or installation and removal from site. However it is recommended that the assumptions used in the site assessment supporting this Checksheet be checked against the as-installed condition.

3. Information from Documents to be Incorporated into the Checksheet.

3.1 Comparison of Jack-up Requirements to Fixed Platform Requirements (pre-API Bulletin 2 Int-Met.

The following diagram compares airgap for jack-ups from API 95J (Ref 9) to fixed platforms in the Gulf of Mexico from the API deck clearance curve in API RP2A WSD – Fig 2.3.4-8. December 2000 (Ref 19). The API deck clearance curve precedes the 2004 and 2005 hurricane seasons and demonstrates increased safety in jack-ups.

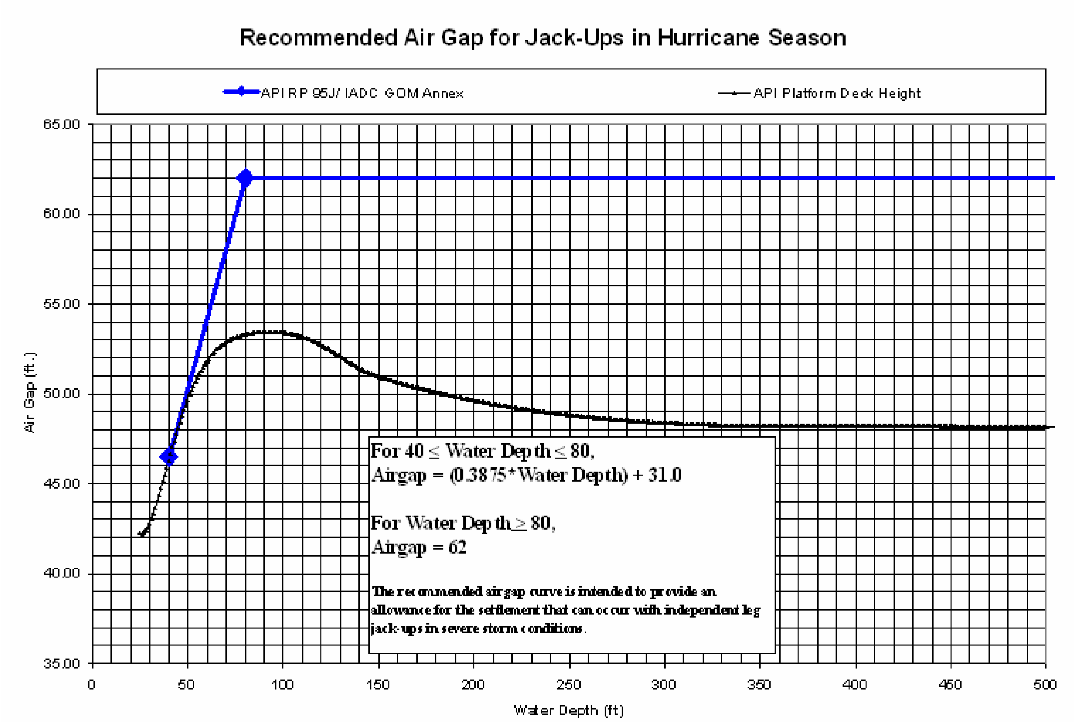


Figure 1: Comparison of the API RP2A (Ref 19) clearance curve to jack-up airgap

3.2 API RP 95J Airgap Curve

The justification of the API RP 95J curve of airgap has been detailed in Ref 7. The curve shows itself to be above all the wave crests hindcast after any of the storms Ivan, Katrina or Rita. With the addition of the contingency allowance provided, the airgap would correspond to a storm above the 100-year return period as it is anticipated to be above every location in the Gulf of Mexico in a specified waterdepth.

The results of the Oceanweather data maxima (Ref 21, Ref 22, Ref 23) for every location with data have been plotted in Figs. 2, 3 and 4 against the recommended Airgap as given in API RP 95J (Ref 9). The points plotted include:

- Crest Elevation
- Max. Surge Ht
- Tide value of 2 ft.

Every point from the jack-up data provided for the hurricane of interest (Ivan, Katrina or Rita) has been plotted. When reviewing the data presented it should be kept in mind that each of these hurricanes were in excess of a 100-year storm, and thus the resulting airgap selected, if above the maxima from the hurricanes –will be greater than 100-year airgap, and for some points may be greater than 1000 year air gap. For each hurricane, the points in green depict the airgap required for this storm at the location of the maximum wave height from the Oceanweather study (without contingencies). The recommended airgap from API 95J is given (the dark blue line) as are the jack-up rig positions that were in the designated hurricane (the red squares). The jack-up rig at the 300 ft point depicted in the Hurricane Ivan chart (Figure 2) is the Ensco 64 which was toppled. The other jack-ups in Hurricane Ivan survived.

One caution in reading the graphs is that just because the jack-up's red square is within the Oceanweather data and not above it, does not mean that there were crest elevations at the location of the jack-up which exceeded the airgap, but merely there were some same waterdepths affected by the hurricane where the crest elevation would have exceeded the value to which the jack-up was sited. Jack-up airgaps (red squares or triangles) above the API 95J (blue) line are expected to be above the crest elevations affecting the hull of the rig at any location in the Gulf of Mexico in that waterdepth. Those jack-ups were possibly elevated at an appropriate location for working over a platform.

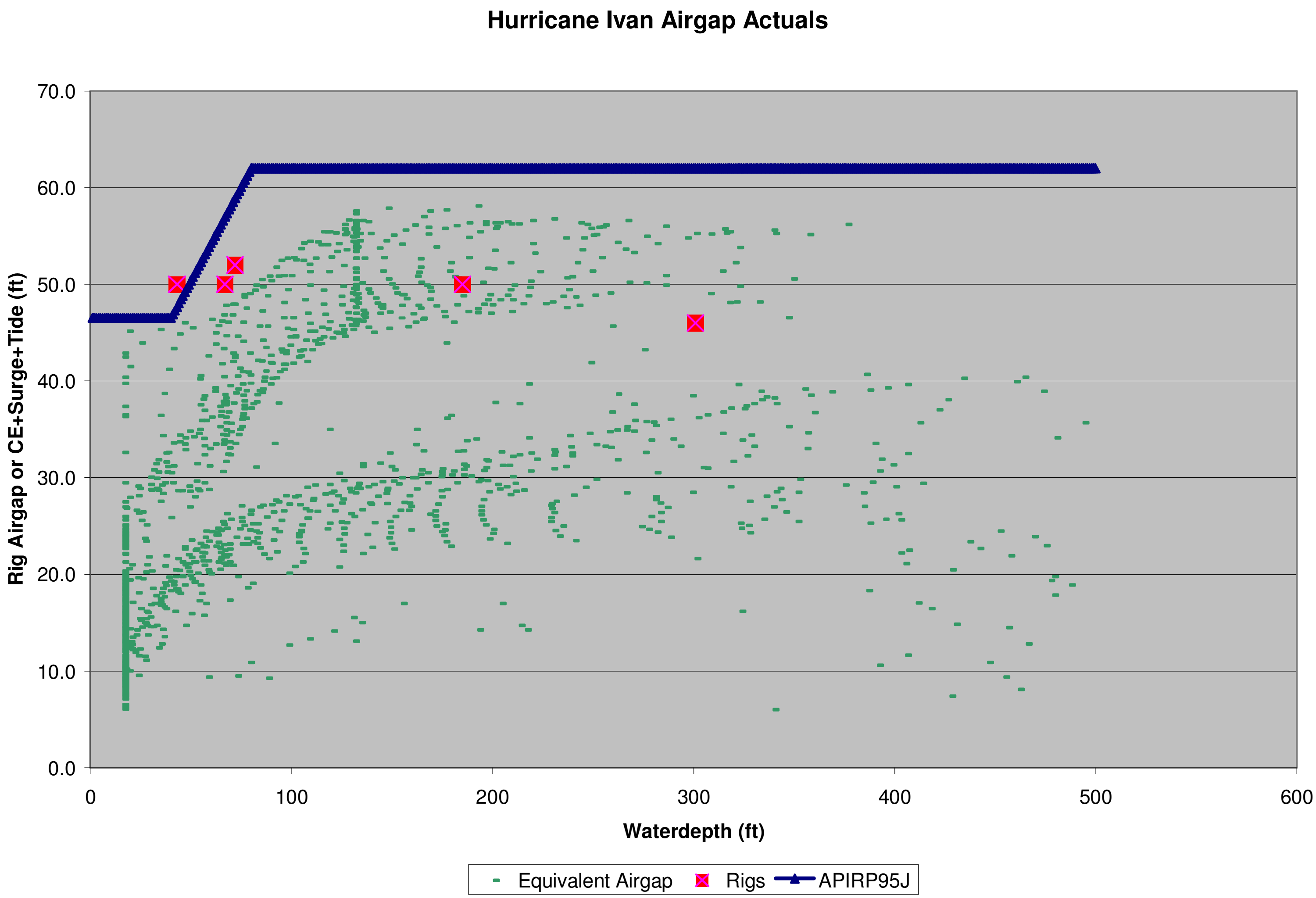


Figure 2: Hurricane Ivan hindcast required airgap, API RP 95J criteria and actual jack-up airgaps

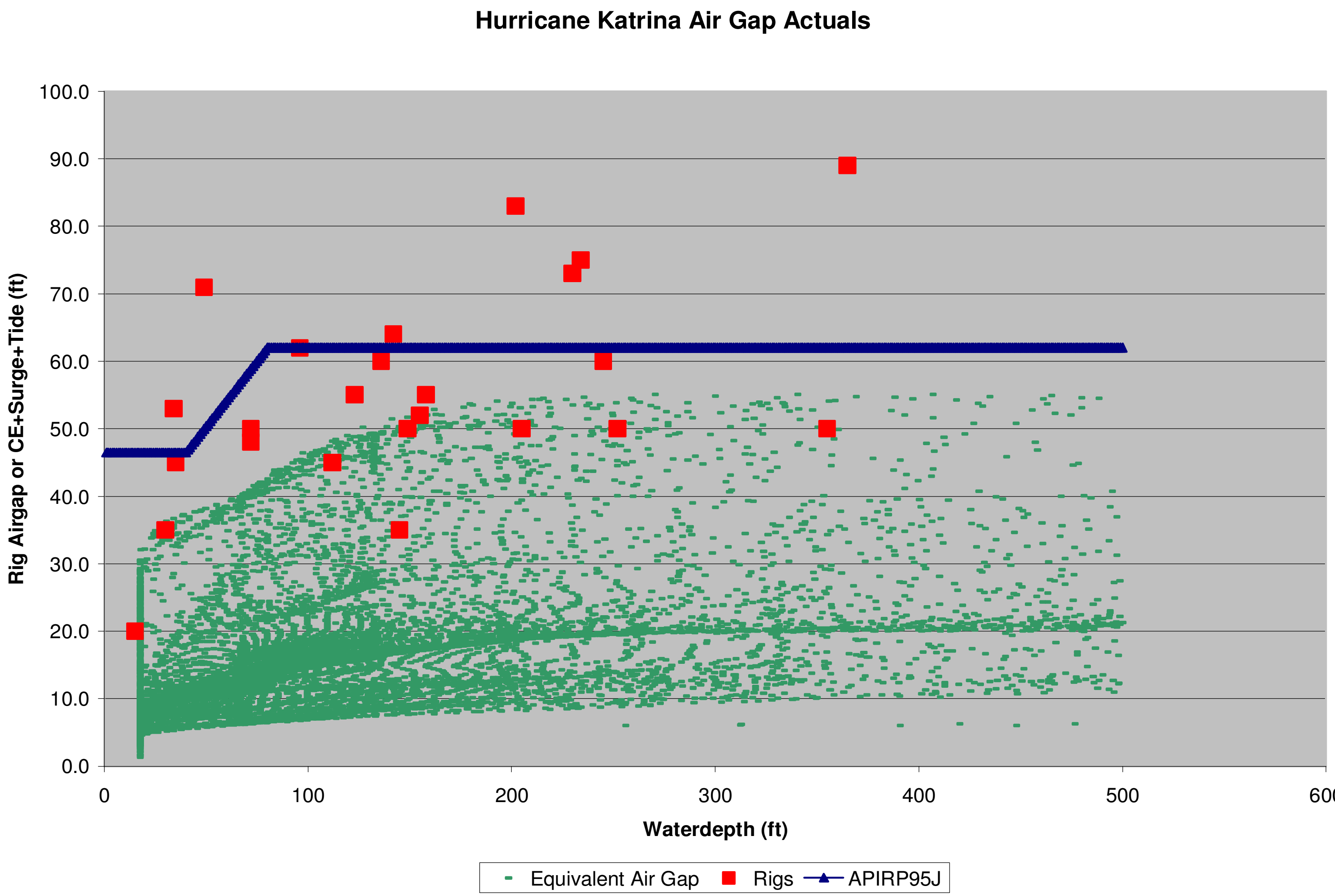


Figure 3: Hurricane Katrina hindcast required airgap, API 95J criteria and jack-up actual airgaps

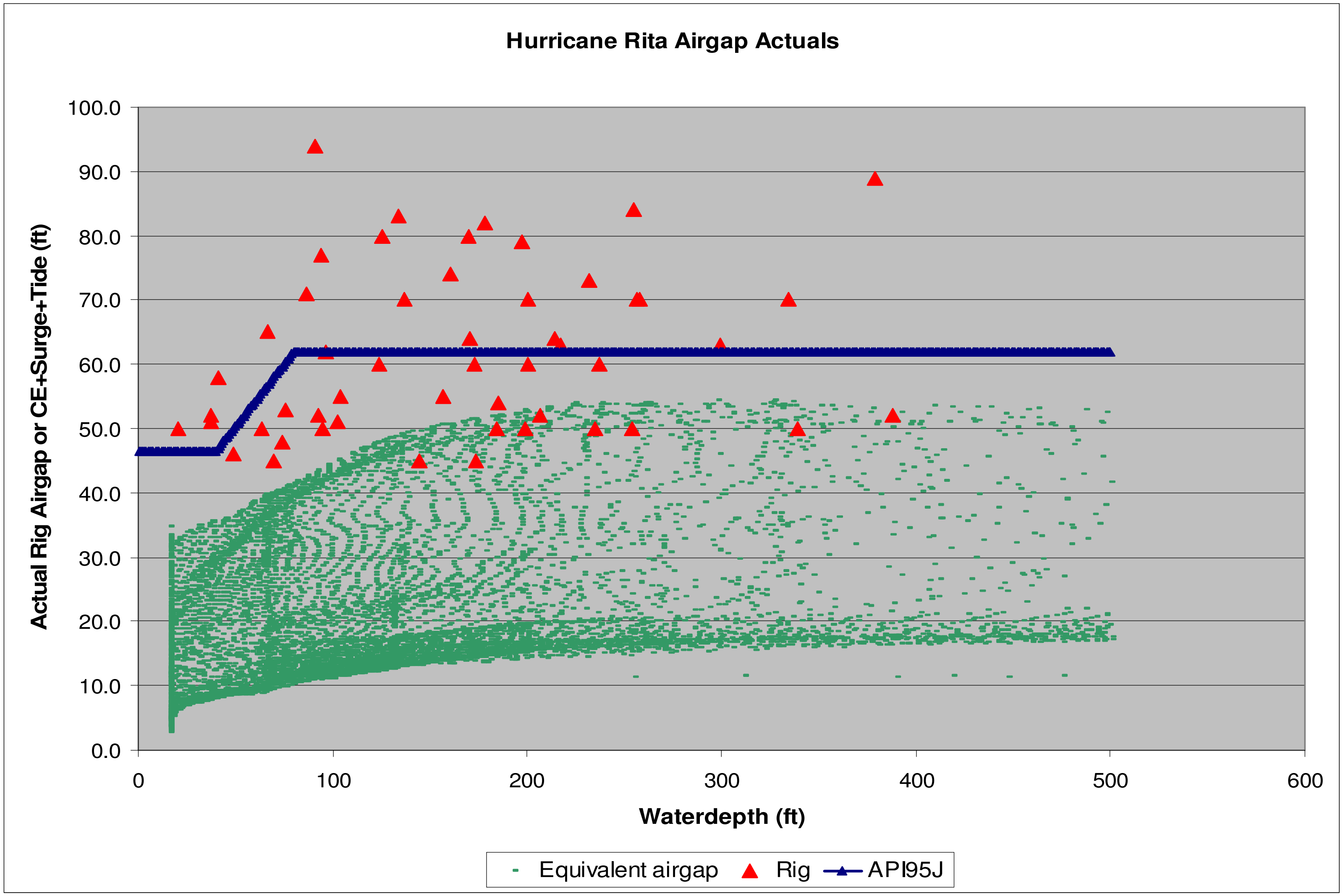


Figure 4: Hurricane Rita hindcast required airgap, API RP95J criteria and jack-up actual airgaps

From review of the above, it is clear that the API RP95J recommended line for airgap is well above any of the crest elevations + maximum surge + tide (assuming that each maximum occurs simultaneously), that occurred in any of the hurricanes at any waterdepth. The recommended line also includes an allowance for settlement, nominally 4 ft, and a reserve to ensure no run-up, or damage from not knowing the precise peak of the wave (wave crest uncertainty) of 3-5%.

Although only 3 storms have been used to validate this API RP95J line, since these storms each were greater than 100-year storms (though not perhaps at every location in the data presented), it seems likely that this is a very conservative airgap. Based on past experience in the Gulf of Mexico, the 50 ft "rule-of-thumb" for airgap may be acceptable depending on the zone (primarily if other than Central) and risk profile of the company operating the jack-up, and accounting for any close-by infrastructure that may suffer should the jack-up drift off location. Prior to the recent hurricanes this airgap had been used in the industry for many years without incidents related to any shortfall in airgap.

Since the ability of the jack-up to resist forces decreases as the required airgap increases, it may be prudent to do further work on the 100-year required airgap for the specific site. This work can weigh that value against the decrease in strength of the jack-up for the increase in airgap as part of the decision-making process for approval. Studies have been carried out on several jack-ups to chronicle the decrease in capability with the increase in airgap (Ref 24). While increased airgap may benefit when evaluating the potential problems due to hull-wave interaction, there are good safety reasons to keep the airgap at no more than a safe minimum.

Conversely, in shallow water, when breaking waves are likely, the recommended practice for API RP 95J, may not always be conservative. This should be included in determining the appropriate airgap when siting a jack-up.

3.3 Current Status of API 95J

Quote from API 95J "This RP is of an interim nature. IADC's Jack-up Rig Committee and others continue to develop technical methodologies and solutions for jack-up rig operations in the Gulf of Mexico. Once these efforts conclude, and a comprehensive document is developed and published, it is intended that this Interim RP will be withdrawn by API. Current studies are underway, including a study by the IADC Jack-up Rig Committee to improve understanding of Jack-up loads and response effects, spudcan fixity, and wave spreading. Other industry studies are ongoing to assess meteorological and oceanographic conditions during hurricanes in the Gulf of Mexico. The outcome of these efforts may require revisions to the information contained herein. Additionally, this RP will be reviewed, revised, or reaffirmed in accordance with API Standards Procedures."

3.4 Comparison on API RP 95 J and API Int-Met Airgap

The following Figure 5 uses the API Bulletin 2 Int–Met (Ref 12) data to compare to the recommended air gap in API RP95J (Ref 9). The data used included values of surge and tide as well as crest elevation. As can be seen when comparing API Bulletin 2 Int-Met curve to Figure 1 above (light blue line), and other documents, the requirements for deck elevations have increased in the Central zone but decreased from the previous guidance in other than the Central zone. In waterdepths less than about 80 ft the margin between the API INT-MET data in the Central zone and the jack-up recommendation is much smaller than in the region above 100 ft. The two different approaches to determine deck elevation do not appear to be harmonized on the same values of reserve for shallower water depths in the Central zone.

In reviewing the figure below, the API Bulletin 2 Int-Met has no (4 ft) settlement allowance or provision for 3-5% contingency factor on the airgap which API RP 95J includes. As can be seen in the figure the contingency factor in API 95J appears to be less in shallower waterdepths than in deeper waterdepths. The contingency factors in regions other than the Central zone may be overly conservative, and in the Central zone below 100 ft may be overly liberal. The API Bulletin 2 Int-Met, however, is under current scrutiny as a result of reported wave heights in Hurricane Ike (September 2008), and this will, no doubt, be taken into account in due course by industry recommended metocean values. The status of API RP 95J is given in Section 3.3.

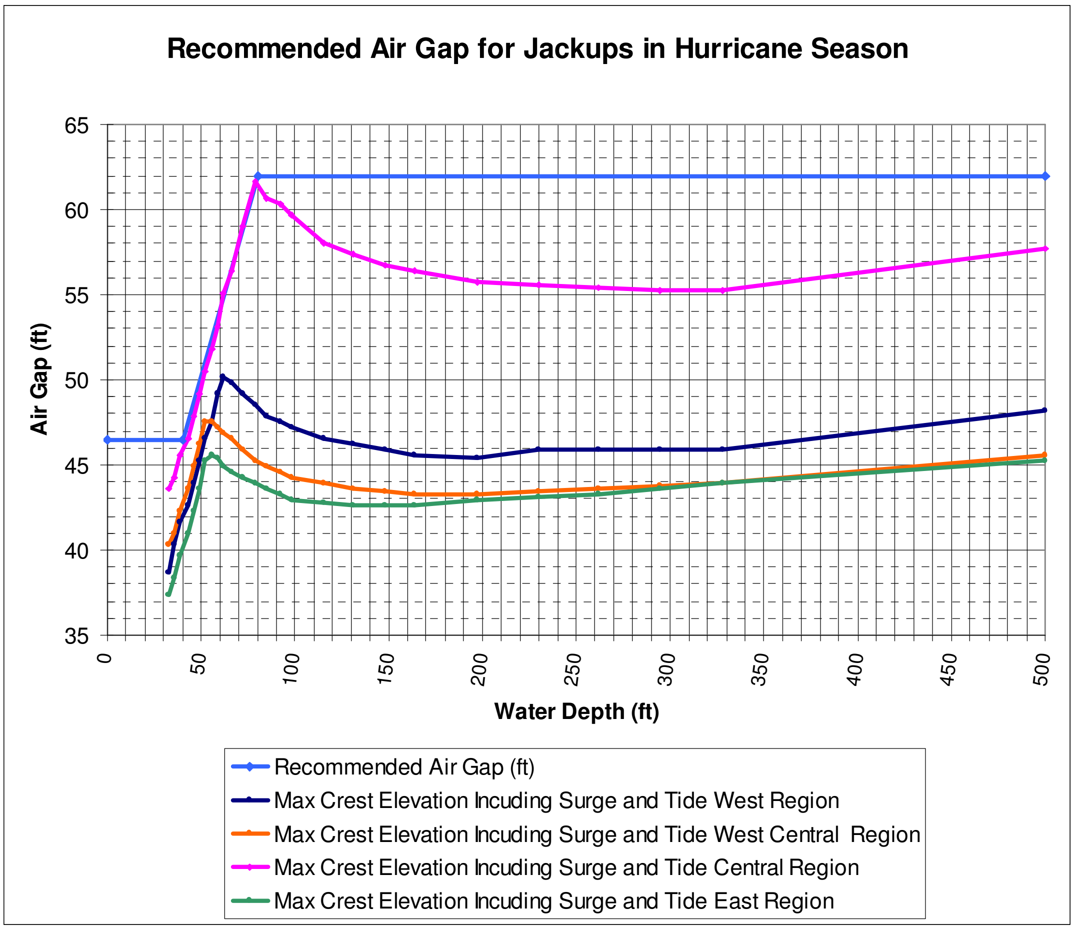


Figure 5 Comparison of Jack-up API RP 95J and API Bulletin 2 Int-Met Airgap in the guidance documents.

3.5 API Int-Met Comparison to (GoM Annex)

The GoM Annex (Ref 29) is an annex to the Recommended Practice of SNAME T&R Bulletin 5-5A and is currently voluntary industry guidance. The Gulf of Mexico Annex is agreed by the IADC Jack-up Committee as Rev 0 and has been submitted to SNAME OC7 Revisions Committee for consideration for inclusion as an appendix to SNAME T&R Bulletin 5-5A, hence its name. There has only been limited comment by drilling contractors based on the document's use. For these reasons it has not yet been widely promulgated or incorporated into regulatory requirements.

The industry priority is prevention of loss of life by evacuation of jack-ups sufficiently ahead of hurricanes to ensure a safe operation. Since the need to schedule evacuation equipment and the intensity of the hurricane at the specific location can often not be predicted with sufficient accuracy to prevent safe abandonment prior to the storm arrival, evacuation criteria is needed. The criterion upon which safe evacuation may be based was described in two OTC papers (Ref 13 and Ref 14).

Three levels are specified: for evacuation with and without contingency and for survivability.

Assessment Case: represents the worst expected weather based on 50-year sudden Tropical Revolving Storm (TRS) using independent extreme metocean criteria that will affect the location with less than a 48-hour warning. A standard "design" level analysis is used for this case since it is possible it may be manned up to 48 hrs after the potential event is declared.

Contingency Case: represents the worst expected weather based on 50-year sudden Tropical Revolving Storm (TRS) using independent extreme metocean criteria that will affect the location with less than 72-hour warning. The storm is more intense than that implied in the "Assessment Case", reflecting storm strengthening during the time between intended evacuation and impact. The "Contingency Case" has more severe metocean criteria than the "Assessment Case" but the load factors used in the assessment are reduced. This is a case when downmanning is predicted to be completed.

Survivability Case: represents protection against, primarily, an economic and/or contractor specific risk, and thus it requires the setting of a criteria based upon the stakeholders appetite for risk for an evacuated jack-up which makes it subject to all hurricanes rather than just sudden hurricanes. Stakeholders may be the Operator, Drilling Contractor, insurance company or others. This case is with an unmanned rig.

The levels of criteria for the Assessment case and Contingency case (sudden hurricane cases) are represented in Figure 6. Also plotted on the same graph are the 10-year return period extremes (full population hurricane) based on the new API criteria (Ref 12). It had been previous practice to assume that the jack-up was capable of 10-year return period hurricane, and assessments by some insurance warranty surveyors had been performed based on this criterion (Ref 16).

The current position for the Contingency curve tracks very closely the 10-year return period extremes everywhere except the Central region of the Gulf of Mexico. Even though the 50-year sudden hurricane upon which this is based is subject to independent modelling parameters, it would be recommended to remain extra-cautious about ensuring evacuation from the Central region and perhaps this region should be on a greater alert than in other regions, where the 10-year extremes are more in line with the Contingency criteria.

While the generic airgap in API RP 95J covers most situations it can be misleading in shallower waters and may be over conservative both in deeper waters and in areas other than the Central Zone. The requirement specified in Appendix D of API 95 J can be used but is conservative (it may be > 1000 year return period airgap at some locations). In shallow water in comparison between API Int-Met and RP 95J it may be that there is no allowance for wave crest uncertainty or settlement. For mat jack-ups a settlement allowance in waterdepths over 100 ft may be overconservative – and may place the unit unnecessarily at modestly higher risk of forces due to wind, and marginally higher risk from personnel/cargo transfer/ lifeboat launching etc. which may be worthy of consideration. At very shallow waterdepths the API RP 95J curve may be too optimistic. One of the jack-ups in Hurricane Lili had an airgap that had not accounted for the possibility of breaking waves, so this subject needs attention when evaluating the site (Ref 2). The estimated required airgap in 35 ft waterdepth to avoid the breaking wave was 51.5 ft whereas extrapolating current guidance would indicate an appropriate airgap of approximately 45-47 ft and that was without accounting for any settlement.

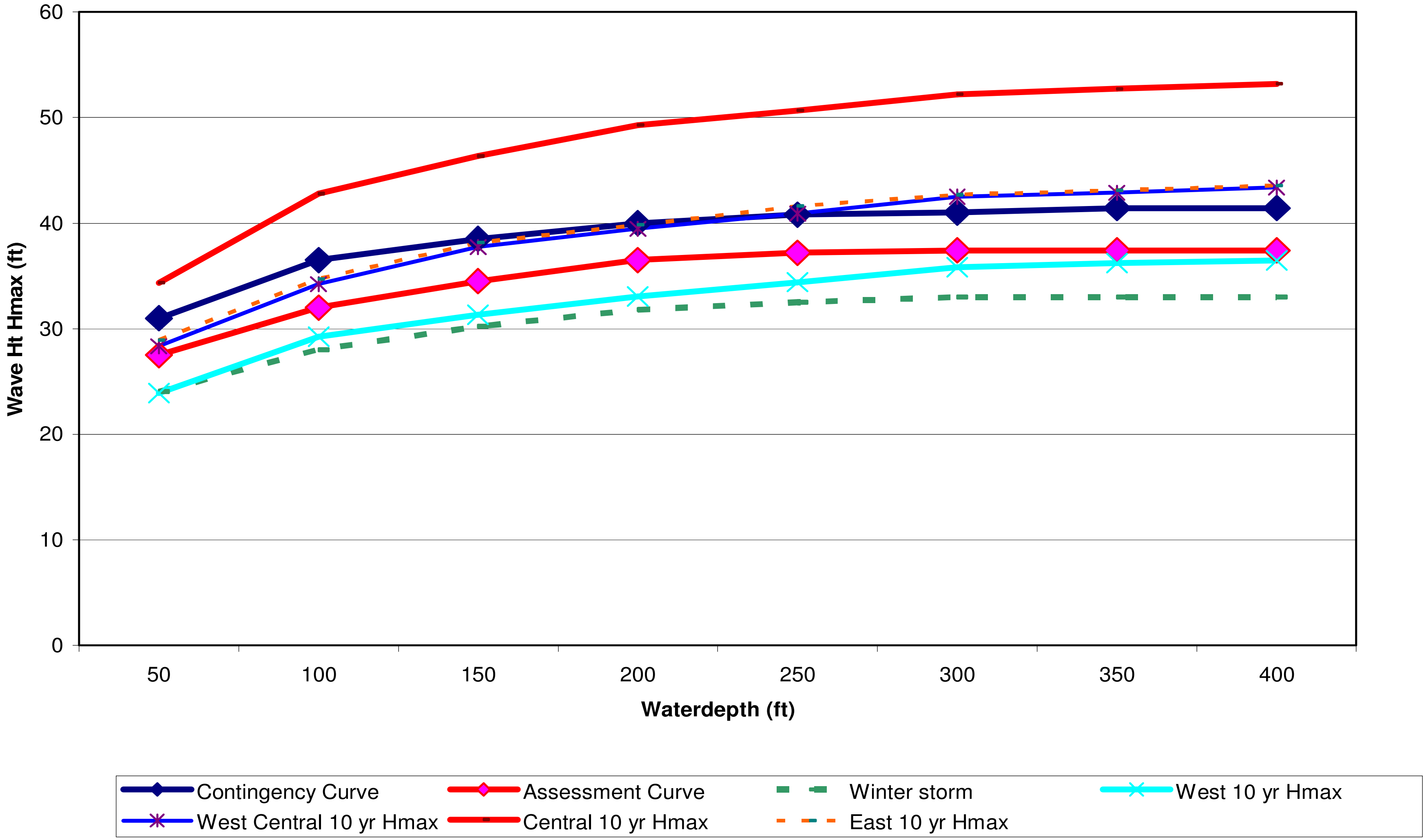
A less conservative airgap may be accepted by use of API Bulletin 2 INT- MET (Ref 12). Thus 100-year hurricane wave crest elevation plus a wave crest uncertainty allowance of 3% to 5% plus an appropriate settling allowance applicable to the soil conditions at the location (the settlement factor should be calculated based on the site-specific geotechnical assessment). Note surge and tide are included in the figures.

The requirements are silent on the potential storm settlement calculations that should be used although, since the airgap specified is 100-year return period, it may be assumed that the 100-year loads on the foundation give a good indication of the likely outcome if there is a direct hit by a major storm on the jack-up being evaluated. This does not mean that it is not acceptable to have a lower return period – the Checksheet just creates an awareness for all parties to evaluate. There is a requirement to state how the airgap was determined.

Another comparison that is possible is to compare the Assessment and Contingency (downmanning) Curves from the GoM Annex developed from "sudden hurricane" data and the "sudden hurricane" curves as defined by API-Bulletin 2 Int-Met. The definitions are somewhat different. For the API 2 Int-Met the definition for a sudden hurricane is a sudden 100 year return-period that crosses 26^0 N. within 60 hours of being a named storm. The result would be expected to be higher but not enormously different than the downmanning Contingency case which represents a 50-year return storm at a specific location (several were chosen throughout the Gulf of Mexico in territory appropriate to jack-ups, thus shallower than the >1000 ft chosen by API Int-Met). The following table makes the comparison: this helps validate the numbers that were derived from the models used for the GoM Annex.

Item	Assessment Case Worst in 50-years at a jack-up location 48 hrs after becoming a named storm.	Contingency Case Worst in 50-years at a jack-up location 72 hrs after becoming a named storm.	Sudden Hurr. API Int-Met 100-years/ deep water/ crossing 26^0N within 60 hrs of being a named storm (Ref 12)
Wind: 1 min mean (kts)	60.5	66	69.3
Max Wave Ht. (ft)	37.2	40.8	45.9
Max C.E. (ft)	-	-	32.1
Current (kts)	1.2	1.3	2.1

Figure 4 10-Yr API Int-Met Compared to Assessment & Contingency Curves



4. Summation of the Guidance/ Requirements for the Practical Siting of Jack-ups in the Gulf of Mexico:

4.1 MMS: 30 CFR250.417

Requires submission of information such as to confirm:

- Suitability for the location: maximum environmental & operating conditions
- Information to show that site specific soil & oceanographic conditions showing it is capable of supporting the jack-up.

The details are quoted below:

Under current requirements, you must provide:

- *"information and data to demonstrate the drilling unit's capability to perform at the proposed drilling location. This information must include the maximum environmental and operational conditions that the unit is designed to withstand, including the minimum air gap necessary for both hurricane and non-hurricane seasons."*
- *"information to show that site-specific soil and oceanographic conditions are capable of supporting the proposed drilling unit.*

4.2 MMS: NTL 2008-G10 – Guidelines for Jack-up Drilling Rigs Fitness Requirements for the Hurricane Season

MMS GOMR will use API RP 95J to review and evaluate the information submitted with each APD or APM. The requirements include:

- Provide shallow hazards survey or Mesotech for jack-up optimal siting
- Geotechnical (Soil) Information prior to going on location
- Site specific metocean or using Appendix D of API RP95J
- Preloading procedures and holding times
- Air Gap Information including 3-5% wave crest uncertainty and settling allowance
- Well securing procedures.

The detailed requirements are quoted below:

1. *A statement documenting that you have provided or will provide appropriate bottom survey data (shallow hazards survey and/or bottom Mesotech scan) to the rig contractor to allow the best location for the rig to be established prior to moving on location.*

2. *A statement documenting that you have provided or will provide appropriate geotechnical data (sufficient to determine soil characteristics over depth and foundation strength of the proposed location) to the rig contractor prior to moving on location to facilitate adequate assessment of the foundation prior to preloading operations*

Author's Note: There are no guidelines on distance from the location of the geotechnical data to the proposed jack-up location; linking with sidescan; or age of soil boring (and thus accuracy, if old). There are no stipulations as to the extent of calculations to be carried out. In the case of mat rigs, it may be important to evaluate the propensity of the unit to slide and potential consequences if it does. The propensity to scour in shallow water should be evaluated primarily for mat rigs but may be a consideration for independent leg jack-ups; however it is noted that calculations are not well developed to make such an evaluation, but an "awareness" is important. Calculations for sliding should take into account the force in the mat particularly in shallower waters <150 ft, as the forces are substantial (Ref 26).

3. *A statement documenting that you have provided or will provide site-specific metocean data using the criteria in Appendix C of API RP 95J, including winds, waves, currents, storm surge, and tides to the rig contractor prior to moving the rig on location to facilitate proper positioning of the rig on location and determine the appropriate air gap. In lieu of site specific data, the MMS GOMR will also accept the use of the more conservative generic data depicted in Appendix D of API RP95J.*

(Note: Appendix D gives 100-year airgap incl 3%-5% uncertainty allowance and omits backup information such as winds waves and currents that can be obtained from API Bulletin 2 Int-Met).

4. *The rig contractor's anticipated preloading procedures and holding times that are proposed to minimize the potential for further settlement from potential hurricane loading*

Author's Note: There is no minimum requirement for preload to a specified return period. There is an implied requirement to have an airgap sufficient to hold a 100-year storm and thus maintain a 100-year airgap.

5. *The rig contractor's information on how the air gap determination was made for the site specific location. The MMS GOMR will accept a site-specific 100-year hurricane wave crest elevation (using available metocean data from 1950 to the present) with the addition of (a) a wave crest uncertainty allowance of 3 to 5 percent and (b) a settling allowance for the given rig type and soil characteristics and expected hurricane loading (see item no. 3 above relative to metocean data). As an alternative, the MMS GOMR will accept the more conservative air gap curve depicted in Appendix "A" of API RP95J.*

6. *Your plans for supporting and securing the well prior to evacuation. In addition to complying with the MMS requirement for all drilling wells to be properly secured prior to evacuation (30 CFR 250.402), set the storm packer at a depth sufficiently below the mudline to ensure that well bore integrity is not compromised should failure of the drive pipe/conductor pipe occur.*

7. *Any additional information that would mitigate or otherwise alter these jack-up rig fitness requirements during the hurricane season.*

THE MMS GOMR encourages you to:

1. *Provide the United States Coast Guard with read-only access to the Emergency Position Indication Radio Beacon (EPIRB) data for your jack-up rig fleet before hurricane season begins; and*

2. *Review and update your Coast Guard Marine Operations Manual to minimize the possibility of adverse consequences of any tropical system.*

4.3 API RP 95J

The following summarizes the requirements of API RP 95J.

1. **Site Data**
   - Coordinates, Topography, Waterdepth (CD or LAT)
   - Previous rigs on location
   - Soil disturbance from previous jack-up activity
   - Pipelines and Debris

: Geotechnical Data
   - Provided by the Operator
   - Suitable for shallow depth assessment (to a minimum of 1 spudcan diameter beyond likely leg penetration)
   - Leg Penetration Prediction determined
   - Sand lenses or layered soil identified
   - Mud slide area

: Metocean Data
   - Provided by the operator
   - Site Specific wind, wave, currents, storm surge, and tide.
   - Crest elevation
   - Or generic airgap information

2. **Preloading Process**
   – Maximum possible leg reaction; appropriate preload holding time. (typically 1-2 hours from last occurrence of settling with full preload on board).

3. **Airgap**
   - 100 year crest elevation plus uncertainty allowance of 3-5%, plus settling allowance. Or use Appendix A which includes a 4 ft settlement allowance for most cases

4. **Preparations and Evacuation**
   – Marine Operating manual Procedures, leg position optimization; time to secure the well and safely evacuation

5. **Post Storm Recovery**
   – Satellite tracking system for 7 days after primary power shutdown

6. Post Storm Inspections
– Form provided for collecting information

Author's Note: There is no explicit requirement for any Structural Calculations; Calculations are necessary, however, to determine settlement and thus air gap. The airgap return period is specified as 100-year or greater; the return period for settlement for jack-up preload evaluation and capability limit is not stated.

Representatives on the Committee that developed API RP 95J are as follows (Ref 10):

MMS	Newfield	Pride
USCG	Shell	Rowan
Chevron	Ensco	Todco
Devon	Global Santa Fe (now Transocean)	API Staff
Energy Partners	Noble	IADC Staff
Lewis Engineering Group		DNV

4.4 RECOMMENDED PRACTICE FOR SITE SPECIFIC ASSESSMENT OF MOBILE JACK-UP UNITS: GULF OF MEXICO ANNEX Rev 0, September 2007. (also known as the GoM Annex).

Below is a summary of the requirements of the Gulf of Mexico Annex to the Recommended Practice of SNAME T&R Bulletin 5-5A.

This is the only guidance document that requires a structural evaluation be undertaken. Loads have to be generated to develop the penetration figures to determine that the airgap is not compromised by four (4) feet settlement allowed for in API RP95J.

The annex "assumes a 48-hour evacuation period prior to a Tropical Rotating Storm exceeding the jack-up's site assessment criteria". This is a voluntary standard at the time of writing of this Report.

Unlike the API RP 95J, and the NTL there is a specific requirement of a return period for the jack-up to survive (the 50 year sudden hurricane is for manned/demanning operations) considering structure allowables and settlement aspects.

There are 3 "gates" that a jack-up assessment has to pass to comply with this GOM Annex:

Assessment Case – within "design loads" – for the unit to be manned at the location at the end of a 48 hour period after declaration of a tropical revolving storm which is likely to pass near or over the jack-up. Standard load factors and resistance factors are used with this case

Contingency Case – a 50 year return period of a sudden tropical revolving storm, with 72 hrs or less notice that the jack-up should survive. The Contingency case is to provide some reserve in case normal evacuation was delayed for some unforseen reason i.e. a downmanning case. No load factors are used but resistance factors still apply (0.85).

Survivability Case - an event anticipated to allow the rig to survive however structural damage may occur. The environmental criteria are based on agreement between stake holders. This is a case when the jack up is unmanned. There are no load factors or resistance factors in this calculation.

The requirement for securing of the conductor to be included in the assessment is stipulated.

The more precise details are quoted below:

Assessment Case: The curves and tables define the wave height, wind speed, and current speed curves that represent a sudden TRS condition for manned operations. The data are based on 50-year sudden TRS independent extreme metocean criteria that will affect the location with less than 48-hour warning (see OTC17879). A standard 5-5A analysis, as modified by this Annex, will be used to evaluate the site with standard load and resistance factors applied.

Contingency Case: These curves and tables define wave height, wind speed, and current speed curves that represent a special case of sudden TRS. The data are based on 50-year sudden TRS independent extreme metocean criteria that will affect the location with less than 72-hour warning (see OTC17879). The storm is more intense than that implied in the "Assessment Case", reflecting storm strengthening during the time between intended evacuation and impact. The "Contingency Case" has more severe metocean criteria than the "Assessment Case" but the load factors used in the assessment are reduced.

Survivability: The Survivability assessment is for a demanned event only and evaluates the risk of damage to the global structural system due to a severe event that exceeds the environmental conditions for manned operation. In a survivability assessment the objective is for the rig to survive the event, however structural damage may occur. The environmental criteria shall be based on agreement between stake holders.

Other conditions:

Conductor Support: Conductor support requirements shall not impede the placing of the jack-up into survival mode as prescribed by the Marine Operations Manual (MOM) or other site-specific requirements.

If a conductor is to be supported during a storm, the resulting loads are to be considered in the assessment.

Representatives on the Committee that developed the GOM Annex:

Ensco – Richard Roper- Chair Jim Pittman – Consultant Global Maritime – Alberto Morandi Lewis Engineering – David Lewis ABS Consulting – John Stiff Transocean – Andrew Westlake Global Santee (now Transocean) –Charles Keaston, Pharr Smith, Jim Brekke	Noble – Piedra Prasad, Jim Gormanston, - Harold Keys Offshore: Risk & Technology Consulting -Malcolm Sharples Rowan Companies – Mike Marcom Ensco – Paul Wildberger, Richard Roper Pride – Pierre Ferran, Crane Zumwalt Diamond - Yi Li

4.5 API INT-MET

Regional Metocean Information:

- West, between 97° W and 95° W
- West Central, between 94° W and 90.5° W
- Central, between 89.5° W and 86.5° W
- East, between 85.5° W and 82.5° W

Areas that Int-Met is not applicable and requires site specific data are:

- *less than 10 m*
- *Area around the Mississippi Delta*
- *The steep bathymetry transition region of the Central Zone between 70 m and 500 m which occurs with coordinates between 86° and 89.5°*

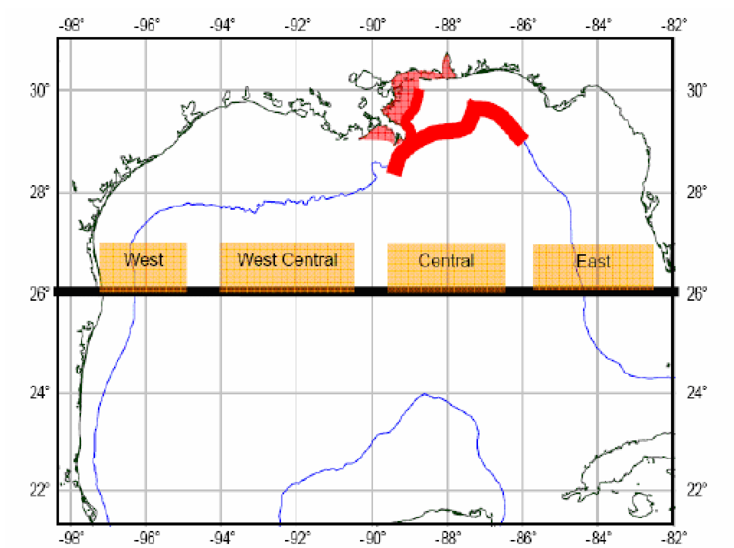


Fig. 5 Areas of non-Applicability of API 2 Int-Met are shown in Red

4.6 MMS: NTL 2008-G06 Shallow Hazards Program

This NTL is established to ensure that industry conducts exploration, development etc according to sound practice and thus includes jack-ups. *"This NTL describes the surveys, reports, analyses, and mitigation that will ensure that the objectives of the shallow hazards program are met".* Additionally Section VI part B lists the information required: *"Before you conduct any OCS operations using MODUs, jack-up or liftboats ….or any other bottom founded or supported vessels".*

4.7 Current Structure of Guidance/ Requirements

Since there are several documents which interact to provide the appropriate guidance these have been detailed in diagrammatic form for clarity in Figure 6. Not all documents provide the same requirements and it is important to be able to locate the origin of the requirements for input to the Checksheet for a review of the proposed location.

Currently an international standard (ISO 19905) is under development which specifically addresses site assessment of jack-up drilling units. This document has not reached the FDIS (Final Draft International Standard) and for this reason is only referenced in this report where appropriate. When issued, the relevant sections of this standard will need to be incorporated into the Checksheet. Many of the recommendations in the Gulf of Mexico Annex which is already included in the Checksheet will be retained in ISO 19905.

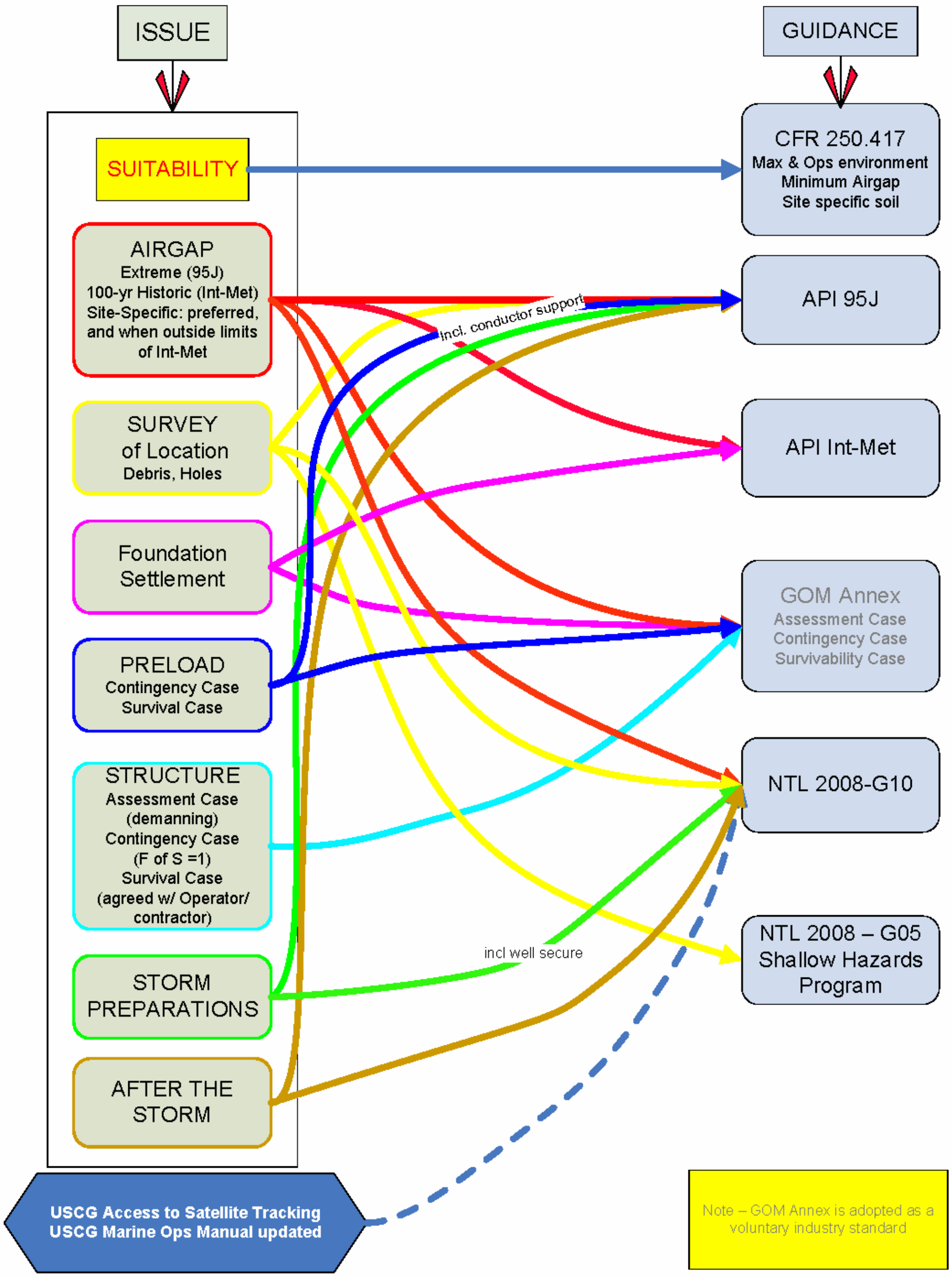


Fig. 6: Current Structure of Guidance/ Requirements.

5. Risks

The risks discussed herein are the risks for MMS and the exposure that MMS has, rather than that of the Operator or Drilling contractor which have the right and duty to set their risk levels according to their own criteria. Thus the Survivability criteria set by those stakeholders may be different than those which MMS may think appropriate when it is one of the stakeholders.

Damage to the jack-up or facility where it does not cause shutdown of production may be less important to the MMS than a situation where the damage experienced is such as to cause shut-in for a long period of time. However it has also been noted in meetings with MMS there was concern about any infrastructure destruction and the fact that a drilling rig is destroyed is important because it may delay well drilling and oil/gas coming on line for the nation.

While the individual risk to a jack-up may be less in the West-Central region than the Central region, the likely population in the West-Central region has traditionally been greater and thus MMS "exposure" may be more than that of an individual drilling contractor. Multiple jack-ups failing has an impact to MMS in that destroyed rigs are not available to drill wells. This multiple rig loss has not been considered in the existing Checksheet.

The jack-up risks after collapse can be categorized as follows:

- Close by Infrastructure - surface
- Pipelines

The evaluation issues can be categorized as shown in Figure 6.

- Airgap is handled by API RP 95J, or by API Bulletin 2 Int-Met, or by site specific metocean data in combination with a recognized approach (e.g. API RP 2A, SNAME Bulletin 5-5A)

- Structural issues are handled with the GoM Annex requirements. The Survivability Case, once criteria are agreed with the stakeholders, can take into account the High and Medium proximity consequences. (Ref 12, Ref 13).

- Foundation risks are handled in a variety of ways
  - Site Survey (sidescan or Mesotech) – e.g. spud can holes, debris
  - Geotech information (CFR 250.417 and NTL 2008-G10)- e.g. additional penetration, scour, sliding on location or soil failure (mat rigs)

- Preload sufficiency – from the capability to preload (often as a result of year-of-build).

- Storm Preparations (NTL 2008-G10)

- Mudslides location (Ref 20)

References 25, 26 and 27 provide useful guidance on soils risks. Reference 28 gives an international viewpoint on guidance in the UK North Sea.

The known mudslide area is depicted in the following diagram:- (may need updating):

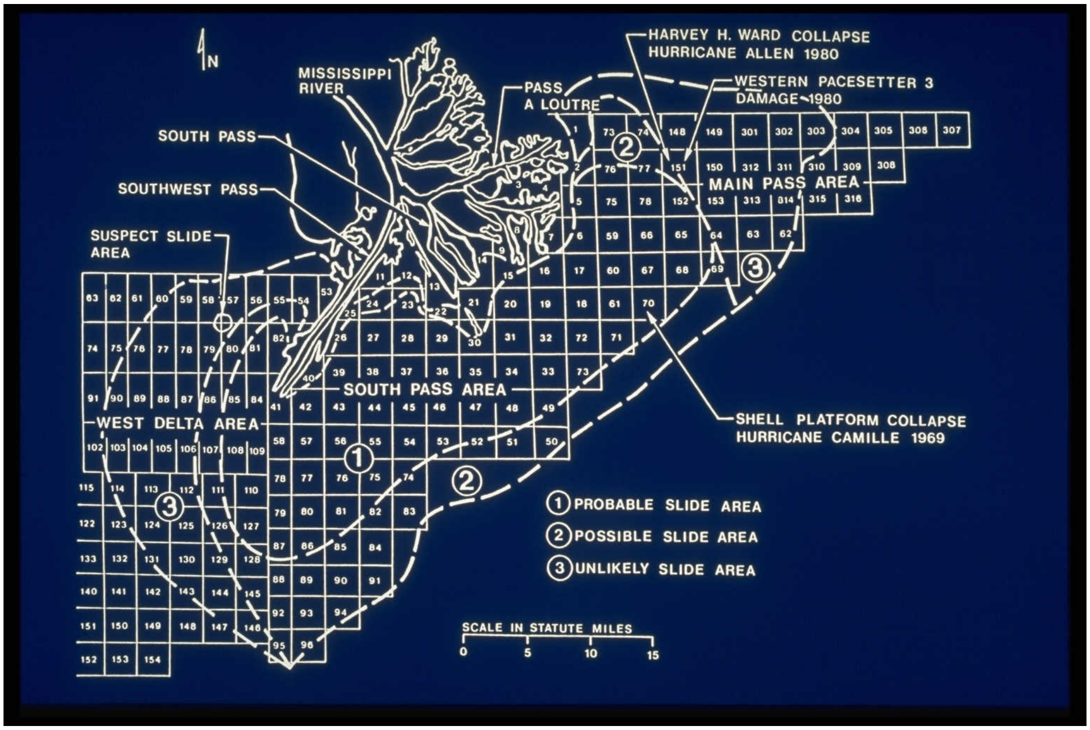


Figure 7: Mudslide Zone Map

5.1 How do Risk Questions affect acceptance: Examples

1. If you were going to locate in a mudslide zone, would you want to know it? Would you want to commission a study from a mudslide expert to tell you what level of risk you were taking as a function of the location?
2. If you were going to be south of the West Delta 143 (hub platform with very high throughput) by less than 1 mile – would you wish to know it and take some extra precautions? – i.e. only use a rig which had full preload capability to a 50-year or greater return period storm, and that was unlikely to move (i.e. if it was a mat rig, that it had been checked against horizontal load for sliding), and/or get recent borehole information within a few hundred feet of the location (i.e. independent leg rig), to check on the effect on the jack-up of additional load/penetration.
3. Many of the current new jack-up designs being produced are going to be more susceptible to rack phase difference (RPD) issues than typical GOM rigs of the past – would you want to know the list of rigs on the site before and the penetrations if you were going to be on a location close by (say) the 20th highest producer in the GOM?

The point of the above examples are to indicate that, based on knowing the location and the proximity information on hand - you can gain confidence in being able to select an appropriate criteria to contrast with the ability of the jack-up to survive and/or not damage critical infrastructure. Given a hurricane passing near to any structure, even those designed to 100 year storm level, there is some possibility of the assessment loads being exceeded and for those situations it may be appropriate to use engineering judgment to see if the timing of the work on any particular location can be adjusted to maintain the risk as low as reasonably practical (ALARP).

While the current guidance/ regulation is absent on the storm for which the jack-up must survive, it is assumed that in applying the Survivability criteria outlined in the GoM Annex an appropriate return period event will be selected as a function of the proximity risk to critical infrastructure and economic consequence to the drilling contractor and leaseholder. (Note: currently no consensus exists on the Survivability Analysis return period values. The Survivability Analysis approaches were discussed at the GoM Annex meeting in October 2008. The recent Hurricane Ike experiences resulted in a belief that the methods will be reviewed after completion of the post-hurricane Ike studies with a resulting tweaking of the current methods).

5.2 Risk To Mat Rigs

Prior to recent events, it has always been thought that mat rigs did not pose much of an issue in that they tend to slide off location in hurricanes, although there have been some examples of failures e.g. Ranger 1 with loss of life, primarily due to an error in structural calculation during design. There are examples of damage to conductors from sliding, but none that resulted in a catastrophic incident. Recently the Pride Wyoming was lost in Hurricane Ike, and although details are not public at this time it was known to have been knocked off location, and broken up by Hurricane Ike. Previously the Harvey Ward (mat-supported jack-up) was lost in a mudslide incident and became a total loss. As the databases do not report incidents with winter storms there has been even less concern with any mat rig being damaged in these events. It is possible, however, that there have been movements that were not reported if there were no associated major issues, and thus the lack of information in the public domain.

The events of the Usuamcinta, mat-supported jack-up in October 2007 (Ref 17) in Mexican waters has raised some questions that are of note. Several factors contributed to the casualties resulting. The Usumacinta underwent a severe winter storm, probably in excess of 100-year resulting in it sliding off location. Soil data was available for the location but it was said to be “old data”. Existing footprints of other jack-up designs that previously worked at this location may have influenced the sliding. The rig was perhaps not positioned in an optimal fashion to avoid a pipeline in the vicinity. It is also unclear from public information as to whether the well was shut-in properly for the storm or whether the SSSV was working. The cantilever was extended, and upon the mat sliding off location the cantilever impacted a valve and this allegedly set off a gas stream which ignited. It is said that H_2S gas was also present. The crew abandoned the vessel, and subsequently many died in the recovery efforts after evacuation.

News Report:
"Rig tragedy investigation is expanded by Tom Darin Liskey, Houston
Mexico has expanded the scope of a probe into the devastating collision between the 200-foot mat cantilevered rig Usumacinta and an offshore light oil platform that left 21 dead late last month. ……."
"The rig that crashed into the platform during a cold snap, setting off the devastating series events that caused the deaths of the workers and an oil spill….."
"In late October, gale-force winds drove the jack-up rig into the offshore well protector platform Sea Pony. Oil spilled from the damaged well, which produces 3500 barrels per day, into the choppy waves."

While it may be unlikely that such an incident would happen in the US Gulf of Mexico, even though this was a major winter storm, it may be prudent to carry out evaluation of the potential sliding at particular site-specific locations to create an awareness and cautionary procedures if sliding is likely in an extreme event. Prior to this event damage of this kind, and subsequent loss of life, would have been thought extremely remote.

API 95J states: "Historically, mat supported Jack-ups have responded differently to wave impingement than independent leg units. Generally, mat-supported jack-ups have not experienced catastrophic failure. Rather, they have tended to slide for limited distances along the seabed during repeated wave impingement. Accordingly, only certain elements of this RP, such as the optimization recommendations set forth in Sections 3 below, storm preparations and setting an air gap for storm survival (unmanned) (Section 5), may apply to such units."

SNAME 5-5A applies primarily to independent leg jack-ups. Many of the principles remain the same for mat supported units. (Ref 18, Ref 29).

The Checksheet has taken items appropriate to mat jack-ups and incorporated them.

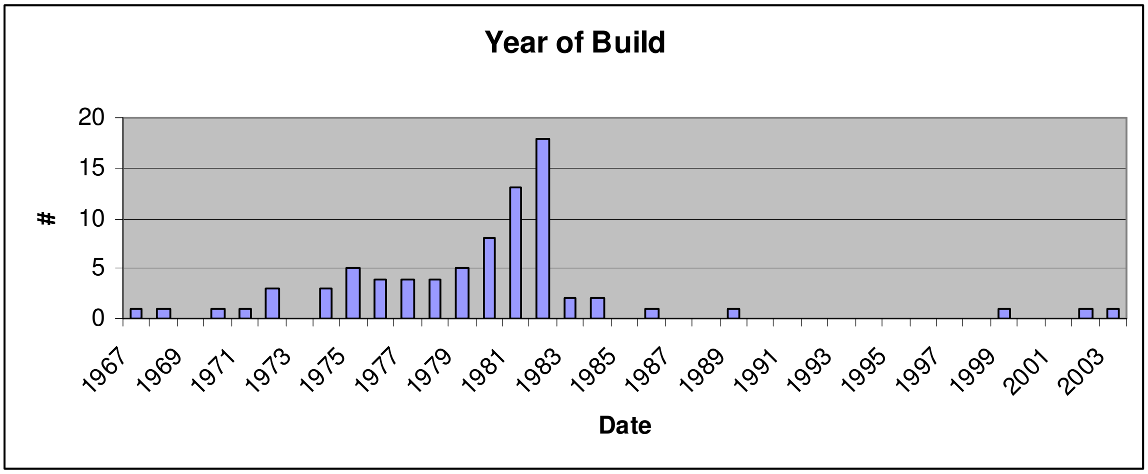
Because of the record of mat rigs not moving very far off location as a result of hurricanes, it was deemed appropriate to only require a check on mat jack-ups when at high or medium consequence locations. The results from Hurricane Ike studies may lead to changes in the Checksheet in this regard when these facts are known.

5.3 Historical information on sunk and drifting Jack-ups.

Date YYMMDD	Unit Name	Design	Consequence
800811	HARVEY H WARD	Beth -M	Lost in mudslide: traveled a mile or so
800813	DIXILYN FIELD 81	Let150	Hull on bottom several miles away. No reported damage to pipelines.
851027	PENROD 61	Let 53	Traveled about a mile and hit Penrod 60. Drifted a further 9 miles and sank.
920827	MARLIN 3 (SS263 Prod)	Beth265M	Traveled 45 miles to coast; Mat was piled onto seabed as this was for production.
021003	Rowan Houston	Let 52-S	Derrick collapsed and landed on 4 pipelines from SS-207 about 800 ft away and the hull sank about 1600 ft NW from the original location.
021003	Dolphin 106	Penn Mat	Main hull sank on location; mat drifted 1500 yards to the NNE and was still partially floating
030915	Ensco 64	LeT 64 –CE	Drifted 40 mi SW
050828	Ocean Warwick	Lev 111-C	Drifted 66 miles- no debris
050828	Rowan New Orleans	LeT 52-S	Sank at location
050923	GSF Adriatic VII	LeT116-C	Helicopter deck fell 20 miles away from original location, then the rig Drifted to 118 Mi
050923	GSF High Island III	Let 82 SDC	Drifted still floating 108 miles
050923	Rowan Halifax	LeT116-C	Sank at location
050923	Rowan Louisiana	LeT084-S	Drifted to Shore 103 miles
050923	Rowan Odessa	LeT 116S	On bottom 6 miles NW
091308	ENSCO 74	Let Super 116	No information
091308	Pride Wyoming	Beth 250	Drilling in SS 283 - part ended up 30 miles away in SS 157, and SS 156 resting on pipelines owned by Tennessee Gas and part 70 miles away in 30 ft w.d. in EI 107 resting on a pipeline owned by Williams Gas.
091308	Rowan Anchorage	LeT 52-S	Found on seabed 5000 ft from original location.
091308	Ocean Tower	Lev 111-C	Derrick lost –but did not land on any infrastructure

As can be determined from the historical record, there has been very minimal damage to pipeline infrastructure in regards to jack-up rigs breaking loose, and drifting/sinking.

5.4 Typical Age Distribution of Jack-ups in GOM as of November 2008



Most jack-ups in the fleet are classed. There appear to be a handful of rigs that are either not classed or that class may have lapsed. This may not be relevant to the Checksheet process because one would need to confirm that in both cases, of classed or not-classed jack-ups, there are no outstanding matters that would affect the structural strength on location.

5.5 Proposed Infrastructure to be avoided: thus Higher Survivability Requirements

While the top 15-20 producing assets in the Gulf of Mexico are deepwater structures and probably not likely to be affected by a jack-up location (except outliers such as Ensco 64), the next 80 producing assets are mainly jackets and many of these in waterdepths suitable for jack-ups. The top producers of the 80% of the total 100 producing assets, produce up to 400,000 BoE per month or a little better than 10,000 bpd. The 100^{th} highest producer one is probably down to less than 2000 bpd.

Some of the assets in the GoM are quite important for other reasons than production, particularly if they represent hub platforms which transmit production, or other significant assets. The following are proposed to be those of more serious consequence:

- LOOP Facility
- Major Hub Platforms e.g. WD 143
- Major producers (within the top 100) – probably only 50 within jack-up "territory" i.e. < 40 miles south of them, or to the northern and western 90 degrees.

It is possible to determine an array of platforms within striking distance of the jack-up proposed location, however, the industry does not currently have an easily accessible list of all those platforms from which critical ones can be picked. The only known archive was developed and is being kept current by Delmar for the use of their clients and was primarily developed for deepwater issues with moorings of semi-submersibles. In the Checksheet the leaseholder is responsible for disclosing the assets of interest close by that qualify the location as high consequence, medium consequence, or low consequence.

One proposal would be to limit considerations as follows:

- **High Consequence**
  - Platforms: ***> 50,000*** bopd or gas equivalent throughput
  - where H_2S gas is potential outcome of a collision, within 2 miles.
  - Pipelines: Those equal to or great than 12" being straddled or within 200 yards of the outboard profile and transmitting ***> 50,000 bopd*** or gas equivalent.
  - Infrastructure: Offshore Terminal or wind farm (future) within 2 miles (future consideration).
- **Medium Consequence**
  - Platforms: ***> 10,000*** bopd or gas equivalent throughput
  - Pipelines: Those equal to or greater than 10" being straddled or within 200 yards of the outboard profile and transmitting ***> 10,000 bopd*** or gas equivalent.
- Low Consequence – anything else

Note: there has been some discussion of the critical hub platforms being those that produce and transmit more than 50,000 bopd or equivalent and it would raise some concerns if jack-ups that are located near these facilities should leave location. As a minimum it has been suggested to double-check the assessment when a jack-up is within 2 miles of these platforms. Alternatively higher criteria for survival (unmanned) in a full population hurricane may be considered.

It is proposed that the stakeholders would consider minimum Survivability criteria, in unmanned conditions, as follows for High and Medium proximity consequence situations pending industry guidance being developed:

- High: 50-year return full population hurricane without additional (> 4 ft) penetration and with a 1.0 safety factor
- Medium: Contingency level in other Regions, but 10-year return period full population hurricane in the Central region without additional penetration (> 4 ft)..

For High or Medium consequences the appropriate action would be to perform a facilitated HAZID with oil company, drilling contractor, and other stakeholders present to examine the results of determining the close-by infrastructure and available mitigating factors in order to determine the Survival Criteria for the site– and to confirm the classification of the High, Medium or Low proximity consequence.

A comparison of the risk issues follows taken from API standards, ISO for jack-ups etc.

	FIXED PLATFORMS		
LIFE SAFETY	**L-1**	**L-2**	**L-3**
	Manned, Non-Evacuated	Manned Evacuated	Unmanned
	100-Year Winds (+wave & current) 100-Year Waves (+wind & current) New platforms use API Int-Met Guidance	Planned evacuation before the environmental event	
	- living onboard, no planned evac		
	Incl Earthquake events		
	JACK-UPS		
	S-1	***S-2***	***S-3***
	Identical definition to fixed platforms L-1	*Identical definition to fixed platforms L-2. Adds caution that the evacuation must be planned and executable*	*Identical definition to fixed platforms L-3*
	Use the most Severe classification from either Life Safety or Consequence		
	FIXED PLATFORMS		
CONSEQUENCE	**L-1**	**L-2**	**L-3**
	Major Platforms - potential for well Iflow of either oil or sour gas in the event of platform failiure. Supports major oil transport lines and/or storage facilities for intermittent oil shipment..	Shut in during the design event. Contains fully functional subsurface safety valves. Oil storage limited to process inventory and "surge" tanks for pipeline transfer.	Minimal platforms includes caissons and small well protectors. Waterdepths not exceeding 100 ft.
	Platforms that support major oil lines (size and throughput not defined)		For new: No more than 5 well completions and no more than 2 pieces of process equipment.
	Oil storage platforms		
	All new platforms in > 400 ft		
	Under previous definition 400 ft w.d.: 68 ft/100-yr: now 20-yr (Design Level)	Thought to be 100-yr design at time they were installed	
	JACK-UPS		
	C-1	***C-2***	***C-3***
	Refers to category where the failure of the jack-up has the potential to cause high risk to emergency response personnel and/or high consequences in terms of damage and/or economic loss	*Refers to jackups where production of hydrocarbons on both jackup and any adjacent facility will be shut in during the extreme storm event.*	*Refers to jackups in open water locations with no surface or subsea infrastructure (distance not specified), workover mode or production mode with low production rates;*
	Does not include all situations working over an L-1 high consequence platform since it may not be applicable to the jackup operation itself alongside the platform i.e. if it is unlikely to damage it.	*i.e. SSSVs; oil storage limited to process inventory; pipelines protected by check valves or inventory/pressure; and failure on top of facility will only cause medium or low consequence*	*i.e. SSSVs; oil storage limited to process inventory; pipelines protected by check valves or inventory/pressure; and failure on top of facility will only cause low consequence event*
	High consequences include significant unintended release of hydrocarbons from the wells or from adjacent major transport lines or storage facilities. *Where the shut-in of hydrocarbon production is not planned or not practical prior to the occurrence of an extreme storm event.*		
	A manned or C1 jack up shall be assessed for either the 50 year independent extremes with partial action factor = 1.15 or for the 100 year joint probability metocean data with partial action factor = 1.25.	*A lower consequence manned-evacuated jack up shall be assessed for the 50 year independent extremes or 100 year joint probability metocean data that could be reached at the site prior to evacuation being effected (e.g. 48 hour sudden hurricane in Gulf of Mexico). The assessment shall use the partial factors applicable to L1.*	*The unmanned, low-consequence (survivability) criteria, to be agreed between the stakeholders which would normally include the jack up owner, operator, regulator.*
	Note: Existing platforms may have changed condition, or environmental loads may have increased. Environmental Values of wind, wave, current and tide change for different levels of L-1, L-2, and L-3. presumably based on some decided return period for earlier platforms, and Now, based on Bulletin Int-Ex, considering a lower reserve strength ratio (RSR 1.2) for Ultimate with all safety factors removed.		
	FIXED PLATFORMS - EXISTING PLATFORMS		
CONSEQUENCE FOR EXISTING PLATFORMS	**A-1**	**A-2**	**A-3**
	Definitions same as L-1 Consequence above	Definitions same as L-2 Consequence above	Definitions same as L-3 Consequence above
	100 year Metocean Int-Met data	Sudden Hurricanes and Winter storm	Winter storm
	RSR > or = 1.2	RSR >or = 0.8	RSR > or = 0.6
	Under previous definition 400 ft w.d.: 57 ft/30-yr: now 9-yr (Design Level) 74 ft /200-yr: now 20-yr (Ultimate Level)	Under previous definition 400 ft w.d.: 48 ft/15-yr: now 5-yr (Design Level) 62 ft /45-yr: now 9-yr (Ultimate Level)	Under previous definition 400 ft w.d.: 38 ft/10-yr: now 2-yr (Design Level) 48 ft/15 yr: now 5-yr (Ultimate Level)
	JACK-UPS NOT SUBJECT TO GRANDFATHERING- Proposed MMS Site Assessment Criteria		
PROPOSED DEFINITION FOR MMS CHECKSHEET	High Consequence Platform > 50,000 bopd or gas equivalent throughput or where H2S gas is potential outcome of a collision, within 2 miles. High Consequence Pipelines: Those equal to or great than 12" being straddled or within 200 yards of the outboard profile and transmitting > 50,000 bopd or gas equivalent. High Consequence Infrastructure: Offshore Terminal e.g. LOOP or wind farm (future) within 2 miles (future consideration).	Medium Consequence Platforms: > 10,000 bopd or gas equivalent throughput or where H2S gas is potential outcome of a collision, within 2 miles Medium Consequence Pipelines: those equal to or greater than 10" being straddled or within 200 yards of the outboard profile and transmitting > 10000 bopd or gas equivalent.	Anything else

5.7 ISO Standard Info (Ref 30)

The ISO 19905 standard is being developed to provide a method for site assessment of jack-up MODUs. Currently the standard addresses the site assessment of independent leg jack-ups although mat supported jack-ups are part of the remit. This standard calls for the following information in Clause 6.5

Geophysical and geotechnical data

Site-specific geotechnical information applicable to the anticipated range of penetrations shall be obtained. The type and amount of geotechnical data required depends on the particular circumstances such as the type of jack-up and previous experience at the location, locations within the site, or nearby sites. Such information can include shallow seismic survey (sub-bottom profiler) data; boring/coring data; in-situ and laboratory test data; side-scan sonar data; magnetometer survey data; and diver's survey data.

The site shall be evaluated for the presence of geohazards as described in Table A.6.5-1. For sites where previous operations have been performed by jack-ups of the same basic design, it may be sufficient to identify the location of, and hazards associated with, existing footprints and refer to previous site data and preloading or penetration records; however, it is recommended that the accuracy of such information should be verified.

At sites where there is any uncertainty, borings/corings and/or piezocone penetrometer tests (PCPT) data are recommended at the planned location. Alternatively, the site may be tied-in to such data at another site by means of shallow seismic data. If data are not available prior to the arrival of the jack-up, it may be possible to take boring(s)/coring(s), etc., from the jack-up before preloading and jacking to full hull elevation. Suitable precautions should be taken to ensure the safety of the jack-up during this initial period on location and during subsequent preloading.

The site shall be evaluated for potential scour problems. These are most likely to occur at sites with a firm seabed composed of non-cohesive soils and where the penetration is low. Certain sites prone to mudslides can involve additional risks. Such risks should be assessed by carrying out specialist studies.

This document (Ref 30) contains sufficient information for evaluating foundations for independent leg jack-ups. For mat-supported jack-ups Ref 26 and Ref 31 to Ref 35 are more appropriate.

6. The FLOWCHART

The flowchart which follows gives an overview of the roadmap to items addressed in the jack-up Checksheet. In the Checksheet a Leaseholder page is presented to have information available that is unlikely to be in the hands of the jack-up owner e.g. production platform throughput and soils information which the NTL requires the leaseholder provide. The leaseholder in the GoM Annex criteria is to agree the Survival case criteria. A few explanations follow – the main checksheet pages are shown in brackets:

Page 1 – (Leaseholder & Location worksheets)

The flowchart assumes the jack-up is operating in hurricane season, and checks if it is at the peak of hurricane season asking whether the drilling program can easily be changed to avoid the peak metocean period. This is particularly important in the Central zone (most severe), or in the West Central zone (where there are often a larger population of jack-ups).

The proximity consequence is established as HIGH for fixed platforms either producing or transporting up to 50,000 bopd, or those having exposure to H_2S within 2 miles of the jack-up site. Additionally any 12” pipeline within a distance of less than about 200 yards is tagged as High Consequence.

The proximity consequence is established as MEDIUM for fixed platforms either producing or transporting greater than 10,000 bopd. Additionally any 10” pipeline within a distance of less than about 200 yards is tagged as Medium Consequence.

Note: Consequences may be downgraded if the equipment is producing or transmitting a flow at a lesser level thus mitigating the risk.

All other locations are deemed as low consequence.

Any of these numbers can be changed as MMS explores the appropriate risk for their organization to the various assets affected by nearby jack-ups.

A risk not currently addressed but which may be important in the future as high risk to MMS is when multiple jack-ups are in the same zone, such as the Central and/or West-Central zone, at any one time during the peak season. Although the West-Central zone has less severe hurricanes, it still has a similar number of hurricanes as the Central zone. There is, however, a higher probability of multiple jack-ups getting caught in the West-Central zone during a hurricane (e.g. Rita). Therefore while the risk to any one jack-up may be acceptable in the West-Central zone, the risk to multiple jack-ups may be another consideration. Since MMS may be more concerned with multiple jack-ups failing, as opposed to one failing, then it may be important to take into account the number of jack-ups that might be exposed at the same time in any region. The option is not currently available in the Checksheet but could be included in future enhancements.

If the location is subject to punchthrough when going on location AND is High or Medium consequence an explanation is requested. This is only the case when the punchthrough can cause damage to a major structure or pipeline. A potential punchthough during a storm while on location: that is handled in the Geotech section of the flowchart.

The (unmanned) Survival Criteria is selected after consideration of whether the location is High or Medium consequence. The selection is determined by the stakeholders as set out in the GOM Annex. The Survival criteria considers a full population hurricane, not the sudden hurricane used for demanning (i.e. GoM Annex Assessment and Contingency cases).

Page 2 – NTL (Leaseholder, & Metocean worksheets (incl. Airgap))

There are a number of requirements listed in the 30 CFR 250.417 and the NTL-2008-G10 which have been explained in section 4 of this report. If these conditions are not met, the Checksheet asks for an explanation of why the CFR or NTL requirements cannot be met. They call for the Operator to provide information on the soil, and a survey of the seabed, and information on what jack-ups have operated there before. The Operator and jack-up owner also need to confirm that the well securing procedures are agreed and the storm packer location is decided.

The Location worksheet asks whether the soil data is sufficient (as noted by the CFR/NTL). If the soil data was produced to design and install a jacket, one might also check that the soil data for the top layers of soil are appropriate and accurate enough for siting a jack-up, particularly the surface soils if the jack-up is mat-supported. Surface soils are subject to change and older surface soil samples taken for a different purpose than shallow foundation assessment may not be appropriate for siting a mat-supported jack-up. The Checksheet does not demand application of any criteria for evaluating the residual strength of mat location where spud can holes are present/or potential issues with independent leg units where spud can holes are present. This evaluation may be appropriate and performed by a geotechnical engineer from a soils perspective and the rig owner from the mat strength/leg strength perspective. For an independent leg unit, if the available soil information was developed for other purposes i.e. pile driving records, then appropriate caution should be exercised to ensure the data applies to the site-specific assessment. For example, if the boring is some distance away it may be able to be tied in to the jack-up location with a shallow seismic survey. Reference 28 gives the approach used by the UK HSE which is useful guidance. Good soils information is important for jack-up locations: if insufficient soils information is available, the Checksheet requests an explanation which justifies continuing evaluating the site with existing soil data. While the Location worksheet asks what airgap method is selected the further explanation is given in the Metocean checksheet

The Location worksheet requires entry of Block numbers, waterdepths etc. A check is made on the Metocean page for a waterdepth less than 40 ft is included because API 95J does not apply below this level, and the API Int-Met excludes areas less than 10 meters. If the actual jack-up location is in these excluded areas the flag is given for accepting only site-specific information. API 95J arguably should not need as much settlement allowance for mat jack-ups as independent leg jack-ups, however from the curves of Int-Met in shallow water where many of them operate the difference between API 2 Int-Met for the Central Region and 95J indicates there is minimal allowance for any additional penetration.

The Airgap determination for the Checksheet is based on a possibility of passing through one of 3 “gates”. If the airgap is higher than API 95J, there is no need to check further. If it less than API 95J, the required airgap can be determined from API Bulletin 2 Int-Met which may give a lower value based on the location in the Gulf of Mexico (4 regions and 3 transition zones). It may turn out that the jack-up does not need to account for the additional 4 ft of settlement prescribed by API 95J (e.g. if a mat jack-up or independent leg jack-up located on sand), so the values based on these various options are given once the waterdepth and longitude is known. If site-specific meteorological data are obtained, a check to compare the difference from the API Bulletin 2 Int-Met data equivalent air gap is provided. The approximate API Bulletin 2 Int-Met data is provided by the Checksheet based on the waterdepth and longitude of the location.

The Metocean section lays out the airgap options and requires numbers be filled in for the appropriate selected values if site-specific data is chosen. The Metocean worksheet automatically generates the API Bulletin 2 Int-Met data and the GoM Annex data, which may be used to calculate the airgap or may be used for comparison purposes if site specific data is used. Since the site specific wave heights are used on the Structural worksheet it seems appropriate to enter the data there. 100-year data is included in the Metocean worksheet because that is the basis of the prescribed airgap if API 95J is not used.

Page 3 Leg Length (Structure worksheet)

Data submitted in the Location worksheet includes dimensions of the jack-up, airgap, and penetration is tabulated to ensure that the jack-up has sufficient leg for the location. The useable leg length is considered for this purpose as 6 ft less than the total leg length. Six feet is a very liberal value: normally drilling contractors plan on any location to only jack to the second highest jacking position to leave additional length for future settlement. For example, on mat rigs, where the pin hole spacing is 6 feet this number would be accurate but for an independent leg rig the reserve is normally one leg bay, which can be 12 feet or more for the larger rigs. The single value of less than 6 ft is only meant to highlight issues that would be clearly detrimental: however, it may also not be sufficient in some cases. Alternately, it may be that the leg can be used up to the top of the lower guide, and indeed for occasional locations when there has been sufficient fixity and loads are low enough it has been shown that a negative leg length has been acceptable for independent leg jack-ups. Thus if the leg length is shorter than what is termed here “usable” leg length, an explanation is required.

If insufficient leg length is available for the chosen airgap jack-up geometry, waterdepth and penetration an option to reconsider the various parameters leading to the conclusion of inadequate leg length may be explored. If the API 95J airgap has been chosen, it may be that, depending on the zone, a lesser airgap may be permitted without compromising safety; alternatively site-specific metocean or site specific soils data may show a benefit to confirm that the leg length is sufficient. Finally lowering the airgap may be an option if the risk levels are sufficiently low and with approval of the stakeholders, which may include MMS.

There is no requirement for the jack-up to be “in class", however, class provides for regular inspections and a measure of minimum structural competency. Thus a question is included on this point. Since the jack-ups that are not classed are expected to be those built a significant number of years ago it may be relevant to explain further details of structural maintenance particularly if this is a High or Medium Consequence location. It is noted that for a rig to maintain class the IACS society holding the class certificate maintains a log of inspections, required repairs and when repairs are made. While such items are the purview of class (for those classed rigs), such items may have been deferred until a later time, so this should be confirmed. Additionally non-classed jackups are subject to USCG inspections and this then covers the structural adequacy question.

The primary purpose of the GoM Annex is the demonstration of structural competence for a manned condition (Ref 29). The Checksheet asks the question about whether there is compliance with the Assessment condition since this is the metocean condition expected for normal manning and copes with ensuring that full safety factors are met for a sudden tropical revolving storm developing and reaching the location within 48 hrs. It is noted that the expectation is that the rig will be evacuated before this metocean condition reaches the rig. If this condition cannot be not met it presents a potential concern about safety of life and may require special plans for forecasting and early evacuation response. The check to the Contingency case represents a reduced safety factor but confirms that the jack-up is anticipated to survive 72 hrs after a declared sudden tropical revolving storm: again a manned condition but one that should only be relevant in some unusual circumstance. The GoM Annex assumes that jack-up's manned site assessment criteria assumes the rig can be evacuated within a period of time, typically 48-hrs prior to the arrival of a tropical revolving storm.

The Survivability of the rig is then left very much to the agreed criteria between the "stakeholders". The criteria for Survivability is currently selected by stakeholders and not industry standard. There may be circumstances when for High Consequence or Medium Consequence situations where it may be prudent to designate a higher return period storm to suit the situation. For the time being the Checksheet calls to identify the return-period or criteria used for this storm, and to allow each of the stakeholders to judge the explanation on its own merits, taking account of the High, Medium or Low Consequence situation.

30 CFR 250.417 calls for providing the maximum environmental criteria for the rig. If site-specific location calculations have been carried out, the listing of the key parameters from these is sufficient. Marine Operating Manual (MOM) data may be sufficient for some locations. The key here, from a structural point of view, is to use this information to determine the likely factors of safety in the selected and stated Survivability storm. The results of previous hurricane data shows that for independent leg jack-ups a structural factor of safety of less than 0.5 (for independent leg units only) may result in a damaged but repairable jack-up, provided sufficient foundation strength is available to ensure settlement does not take place. Mat units historically have moved when the storm forces exceed the Marine Operating Manual (MOM) limits, however, if held in place there is no clear information that mat units should be able to take any more structural load than provided by the guidance in the MOM.

The table on the Structure worksheet provides a comparison of the Assessment and Contingency Cases metocean data with that of the selected Survival Case information. The Checksheet calls for site specific data to be filled in for the Survival Case when appropriate or the selected Int-Met storm data which is provided for the location can be used. Also recorded is the information on either the estimated safety factor or the actual from calculations. For Medium and High consequence a calculated safety factor is required. Estimated values may only be used for Low consequence sites. When "calculated" safety factors are required, a rigorous analysis should be carried out, however the method of analysis (which may include pushover analysis) is not specified but left to the owner's judgement.

The following diagram tabulates the results of a “guesstimate” of overload of jack-ups in Hurricanes Katrina and Rita (Ref 7).

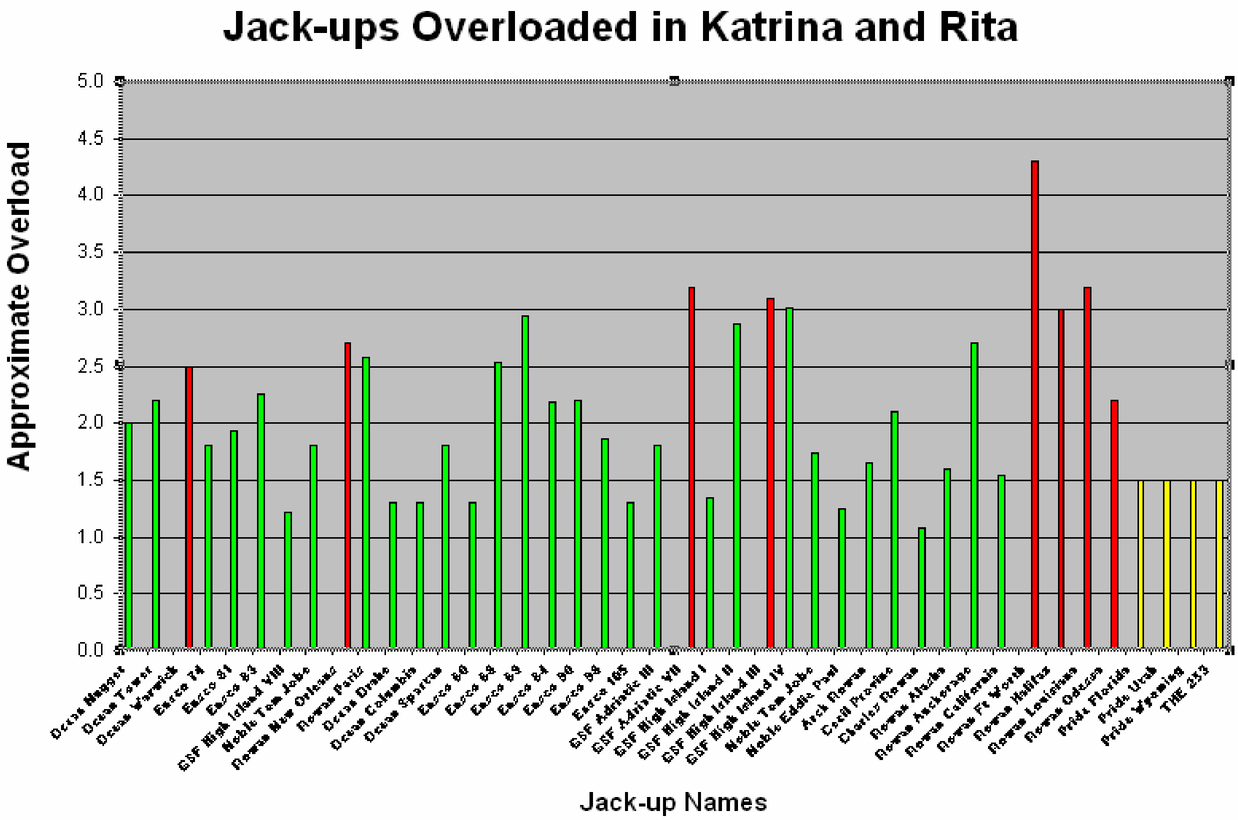


Figure 7: Jack-ups Overloaded in Hurricane Katrina and Rita

The green lines depict the survivals, the red lines the failures (or loss of stationkeeping), which may have occurred from structural reasons or because of foundation issues. As indicated none of the jack-ups failed pre-maturely (i.e. they would have exceeded the design load at that location). The four (4) mat jack-ups on the right are those mat units that slid on their foundations with no reported damage (thus, these are classified as loss of stationkeeping since the soil failed to hold them on location). It becomes clear from the above that structures appear to be able to survive 2-2.5 times their design capacity. Since calculations are being done for the GoM Annex Assessment case (to factored load and resistance limits), and to the GoM Annex Contingency case (to factored resistance limits) -for some low consequence cases it may be deemed sufficient to perform some approximate calculations to show the “safety” of the rig for the unmanned Survival case. It is always best to do rigorous analysis, but engineering judgement may be able to determine the projected outcome for the expected metocean conditions at the site while the jack-up is on location. The analyst can make such a determination and propose a result in the Checksheet for the approver to evaluate. If such an approximation is used it should take into account the following:

- Difference in wind speed to closest calculated case
- Difference in current speed to closest calculated case
- Difference in airgap to closest calculated case
- Difference in penetration to closest calculated case

- Difference in waterdepth to closest calculated case

For example, an estimate can be made by changing the wave height as a result of the above conditions, and then squaring the ratio of the wave height for the Survival storm which the assessor has selected to the wave height for which the assessor has determined the jack-up would survive within the allowables. The result provides the assessor with an approximate potential overload and thus determine if this is less than historic figures (in the Katrina/Rita case) provided the soil parameters were appropriate to prevent additional penetrations of more than 6 ft (the industry determined settlement before additional loads from the storm might cause progressive failure).

The above only solves the structural issue. It is probably more important to evaluate the increase in load in excess of preload for the Survival case and thus determine if additional penetrations will be sufficient to cause foundation pushover.

Page 4 – Mudslide (Location & Geotech worksheets)

The Checksheet automatically checks the area illustrated in Section 5 as being a mudslide zone. This is a rather old illustration and thus it may be appropriate to update this diagram and the locations stipulated in the Checksheet related to this. We have been unable to source a better diagram at this time. For those locations where it is determined the jack-up will be in the mudslide zone, a report from a mudslide expert will be able to determine the danger (or not) of the jack-up being on location, and drilling the well and would also be able to propose mitigation methods –which would be discussed with the MMS.

Independent jack-ups in the Gulf of Mexico are limited more often by soil, historically. On mat rigs the foundation gives way through a sliding mechanism and structural collapse is usually avoided. Thus it may be appropriate to identify a case for which the standard calculation is acceptable, even if the factor of safety on structure is less than 1, since collapse is unlikely to result if the structural capacity is exceeded by a reasonable amount. Foundation, therefore, becomes the more critical item for a Gulf of Mexico application for both rig types. It is clear that if the foundation survives the storm for an independent leg rig, the jack-up has a very good chance of surviving. Survival in a full population hurricane, for an independent leg jack-up has been defined as no more than 6 ft settlement, since once the rig starts leaning a combination of decreasing airgap increasing the chance of the hull bottom getting hit with a wave, and the additional load from the weight of the hull leaning on the leg that is settling, increases the reaction on the foundation by the weight times the sine of the angle of incline and the vertical distance to the rig's center of gravity: thus a progressive additional load results on the most susceptible leg.

There is a check for suitability of the soil. One check is that the soil sample is close to the location: this is now set at 1000 ft from the location. The parameter of 1000 feet may be excessively liberal for good engineering practice (good practice is considered by some practitioners as one mat or spud can hole diameter away). Nevertheless, the 1000 feet was proposed as a value to ensure data from an excessive distance was not used and relied upon unless it could be tied in with subsurface profiling. There is no set standard for age, but caution should be exercised, particularly for mat rigs because surface soil is prone to change over time. Previous rigs on location can alter the surface soil for mats and bearing capacity assumptions for independent legs area because the footings and distance between the legs differ, sometimes significantly, from rig to rig as illustrated by the diagram Figure 8 showing the position that various rig footprints might have working over the same platform:

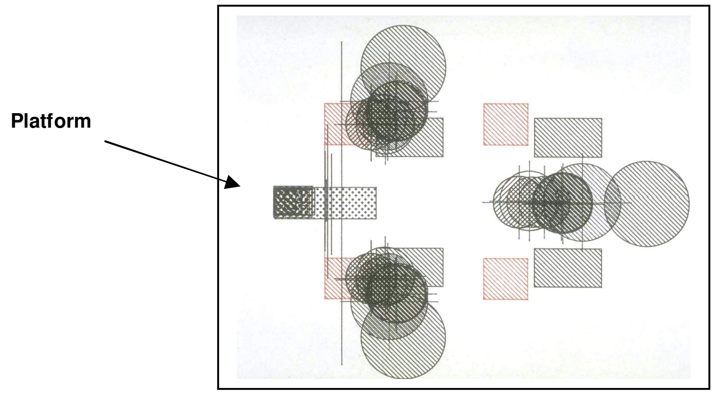


Figure 8: Footprints of a variety of rigs positioned to workover a platform showing the variety of shapes, sizes and geometries.

This check appears on the Location worksheet to highlight it up front.

If the jack-up is not in the mudslide zone and is an independent leg jack-up, further questions are asked on the Geotech worksheet. For a mat-supported jack-up once the user determines if the rig is in a mudslide zone, the user is diverted to the Page 5.

For independent leg jack-ups, scour is frequently not an issue. An initial screening looked at waterdepths limited to 20 ft with 10 ft penetration, or 100 ft with 20 ft penetration, anticipated to experience high currents and/or breaking waves. It was decided however, that a more appropriate check might be to identify locations where the spud can had not penetrated 5 ft or more than the maximum bearing area (e.g. largest diameter) of the spudcan, on sand, with no waterdepth dependency but only in areas of high current and/or breaking wave. The value of high current remains undefined and to the judgement of the owner.

For Independent leg rigs the Checksheet requests if a calculated site-specific load-penetration curve exists for the specific jack-up for the location and the soil is described for an appropriate distance under the spud can at the final depth. Some of the earlier-built jack-ups may not be able to preload to greater than the contingency storm: only if the jack-up can be shown not to settle further if the preload value is exceeded should these sites be approved without providing justification. If at final preload, there is sand under the can one should proceed through the Checksheet only when the Contingency case expected reaction has a factor of safety of 1.2 (arising from a L.F. =1 and an R.F.=0.85) when compared to the preload reaction punchthrough check. If the factor of safety is lower than 1.2, then an explanation is requested as to why the operator believes this to be safe and has provided a description of any controls implemented at the site. For a sand location, the Checksheet calls for confirmation that, for the Contingency case, there is no further anticipated penetration (4 ft) unless the user provides details of the soil limits and consequence of additional penetration.

For the unmanned, full population hurricane Survival case an explanation is requested if the settlement is greater than 6 ft (this being the level prior to when airgap decrease becomes a problem, and progressive leaning may cause additional load, and thus additional leaning).

For Independent leg rigs where clay is under the spud cans there is a response required if there is a potential punchthrough situation during a storm on location. As with the sand case above, a check against the settlement thresholds from a Contingency case (4 ft or less), and from the Survival case (6 ft or less) is required. For values greater than this, the Checksheet asks for an explanation of the soil limits and consequence of this additional penetration. If the soil is clay for the Survival case and additional penetration is anticipated to be more than 4 ft beyond what was achieved for preload, an explanation of the soil limits is requested. At the same time the user is asked if the loading increases by a factor of 50% in an extreme storm, however unlikely what would be the anticipated outcome in a survival storm. The outcome may simply be that the jack-up foundation would be unable to support this load and the jack-up would be expected to exceed the 6 ft allowance: the question merely creates an awareness of the outcome which needs to be acceptable to the stakeholders. It may be simpler, however, to request that the soil load-penetration curve be included. This enhancement to the Checksheet may be added in subsequent revisions. In an earlier version of the Checksheet there was optionally a space to provide further soil bearing and penetration information if the responder wishes to make a clearer understanding of the situation in the explanations. This was though to be both onerous and leads to potential further questions, and would be primarily “of interest” rather than compulsory.

Page 5 – Mat Rigs only

For mat jack-ups there are two potential consequences, depending on the soil being either sand or clay. For a sand foundation, particularly in shallow water less than 200 ft, the wave forces easily reach the seabed and can cause scour. If experience shows this is an issue there are some remedial actions that can be taken, however, it is important to maintain an awareness of the scour potential and perhaps guard for it by observation after storms. Experiments have been done for scour on mat units, but it may not be very predictable, nor is scour known to have been the cause of a direct major casualty to a mat jack-up. The Checksheet does not restrict the waterdepth but does acknowledge this needs to be in an area of high currents and/or breaking waves, the applicability of which is left to the engineering judgement of the owner/leaseholder Scour is only checked on mat jack-ups in High or Medium consequence cases, pending further experience with the Checksheet.

For mat jack-ups on clay soil the general rule-of-thumb used by some soil consultants is for shear strengths less than 100 psf there is a good likelihood that sliding may occur in a storm and it becomes more important to carry out the calculations for sliding and overturning. Further information from owners may alter this number, and so it is considered preliminary in the Checksheet at this time.

The Checksheet requires calculations be performed on mat rigs only if the location is High or Medium consequence. A particularly important issue for mat units is that the surface soil can change over time in the Gulf of Mexico, so old information may not be appropriate for a prudent assessment. Additionally modern geotechnical investigation techniques have improved over time which may show up, for example, silt lenses in the clay layers that decrease the sliding resistance of the mat rigs which is important in evaluating a site. It should also be noted that mat rigs operating manuals frequently do not contain enough information to determine the forces on the mat and legs that were considered in design. The forces on the mat can be a significant part of the total forces and thus must be included in the foundation calculations (Ref 26).

Page 6 - Assessment Summary

This is a summary sheet showing the potential explanations and if appropriate, reports to complement the responder's Checksheet answers.

The complete flowchart follows in Appendix A:

As part of the guidance but not included in the Checksheet are some suggested combinations of characteristics which offers insight in ensuring that additional consideration is given for some jack-ups on certain locations in the peak of hurricane season. Though somewhat arbitrary and judgmental it is offered only for caution, not as guidance or a requirement. Combinations seen as more consequencey at the peak of the season are:

- Mat unit on soft soils during the hurricane season
- Jack-ups on sand in shallow water, in the Central or West Central zone
- Jack-ups in the mudslide zone in the Central zone at any time
- Jack-ups constructed prior to1976 since very low preloads were common
- Independent leg unit (pre-1980s) in greater than 50% of the rated depth which have not been modified (age is to do with the fact that older rigs do not have as high a preload capacity) in the Central zone
- Independent leg unit (pre 1980s) in greater than 50% of the rated depth, and with less than approximately 30 ft penetration in the Central or West-Central zone. The thought is that in typical GoM soils without preload appropriate for the (unmanned) Survival storm more penetration might be expected to take the jack-up over the 4ft-6ft allowance in some cases. Clearly, the explanation can be provided if site-specific soils show otherwise.
- Independent leg jack-ups (pre-1990s) in greater than 75% of rated depth and with penetration less than 75 ft

Other combinations may be added to this list, or these changed after discussion with industry.

7. The CHECKSHEET

The Checksheet is found in Appendix B in hard copy and the excel spreadsheet is included electronically with this report.

The Leaseholder worksheet is related to questions asked by the NTL, and information that can appropriately be provided by the Leaseholder (e.g. site soils information, information to determine if this is a high consequence location, and Operator's Survival Case criteria).

The Location worksheet provides questions related to strength, soils and an initial screening in an attempt to identify any particular issues with the location. Initially it was thought it might be possible to develop a simplified checksheet with a simplified submission covering the majority of locations: the Leaseholder and Location worksheets was thought to provide almost sufficient information for submission with much further detail provided there were no "red" flags. While several attempts were made to do this, it is believed it will require further industry experience with the Checksheet to identify how this may be done after experience with Checksheet submissions.

In its current revision the Checksheet is "protected", however, can be unprotected by using the password "password" (as indicated in the page 1 title block) allowing experimentation with preferred layouts, additional or modified checks to be incorporated. (route: Tools, Protection, Password).

8. Recommendations for Future Consideration

Appendix F contains a form which if completed by Operators/Drilling Contractors and filed with the MMS after each departure from location of a jack-up, would be quite helpful in determining historic foundation issues at future Gulf of Mexico locations. Drilling contractors often have issues retrieving data from Operators and previous rigs on location for a variety of reasons, and such a filing will provide this information on, hopefully, a readily retrievable form.

It would be helpful if the form is completed by the rig mover when the rig reaches location, completed preloading, elevated to drilling depth, and the rig released to the OIM. The form could be made part of the rig mover's report and kept on file with the drilling contractor in their main office.

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31. Hirst T.J., Evans D.J., Scales R.E., Remy N.D., Steele J.E., Foundation Analysis and Performance History of Bethlehem Mat –Supported Drilling Platforms on Soft Soils. Bethlehem Report 1978.

32. Hirst T.J., Steele J.E., Remy N.D. and Scales R.E., Performance of Mat –Supported Drilling Rigs, OTC 2503, OTC 1978.

33. Turner E.L., Chevallier J., and Rapoport V., Placement of Mat Supported Jack-up Rig on Very Weak Soils, OTC 5358, OTC 1987.

34. Young A.G., House H.F., Turner R.D., and Helfrich S.C., Foundation Performance of Mat-Supported Jack-up Rigs in Soft Clays, OTC 4143, 1981.

35. Cox W.R., McClure S.C., and Sorensen, Settlement of Mat-Supported Mobile Units in Very Soft Clays, OTC 6468 OTC 1990.

36. Brekke J., White M., Weaver W., and Rogers R. Application of SNAME 5-5A Gulf of Mexico Annex: Assessment of Jack-ups for the Manned Condition in the Gulf of Mexico. Presentation 2007 City University Jack-up Conference.

37. McClelland Engineers 1979 - Strength Characteristics of the Near Seafloor Continental Shelf Deposits of Northern Central Gulf of Mexico.

38. JIP OSCAR :Offshore SCour Assessment and Remedial Measures, Delft Hydraulics – ongoing research, http://www.wldelft.nl/cons/area/oft/im/jip-oscar.pdf

39. NTL 2008-G06 April 1, 2008 – March 31, 2013 Shallow Hazards Program

ACKNOWLEDGEMENTS

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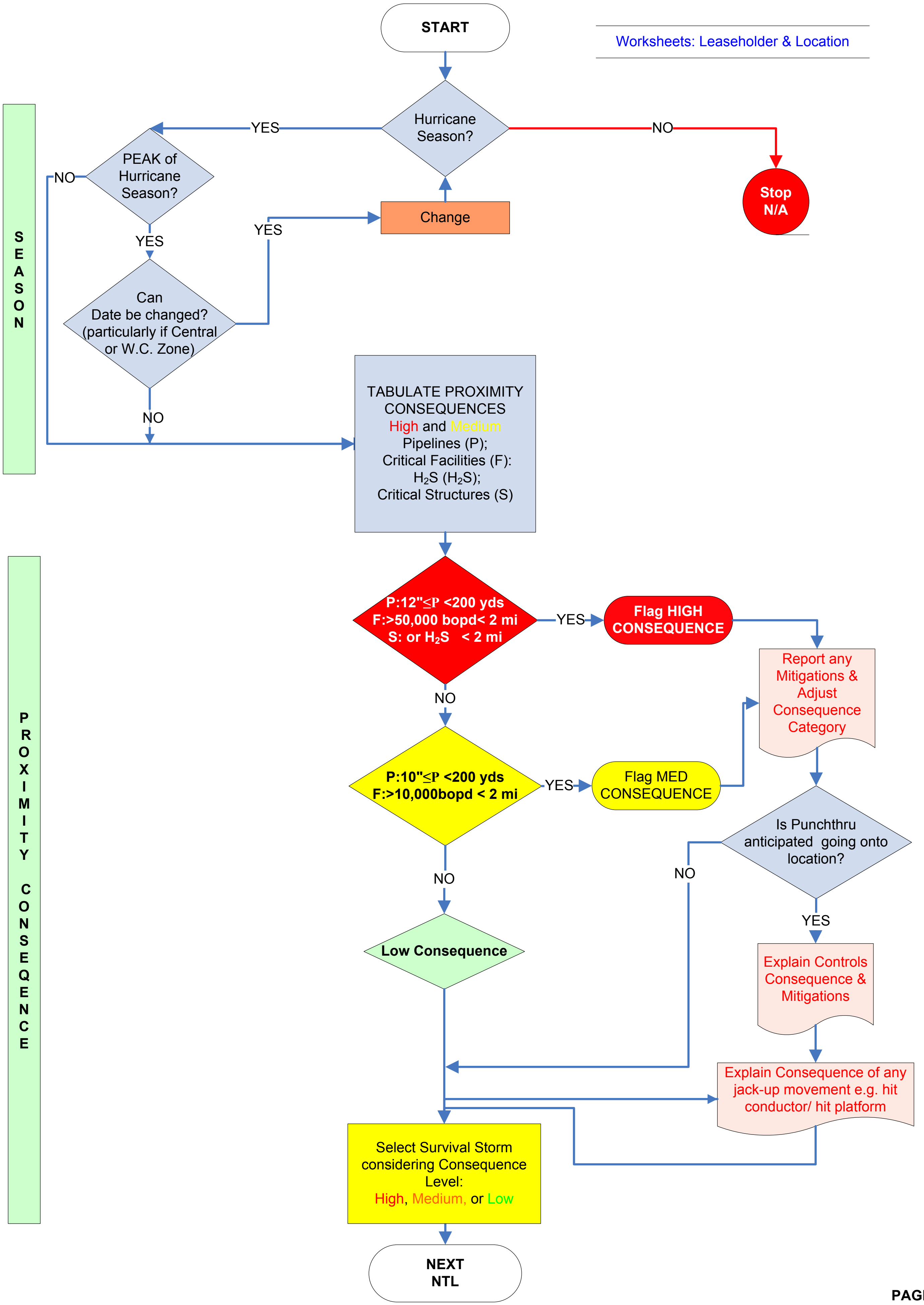
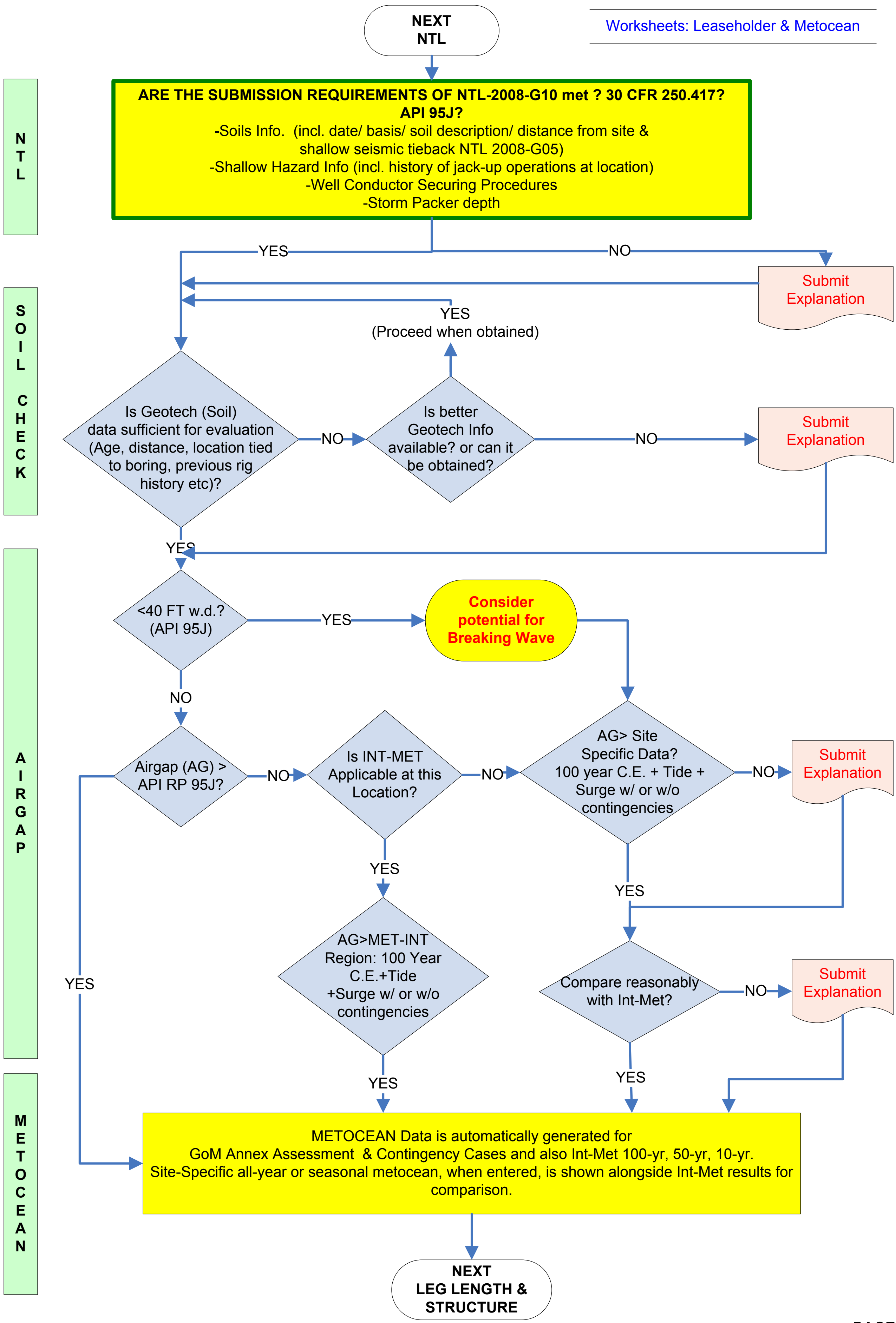
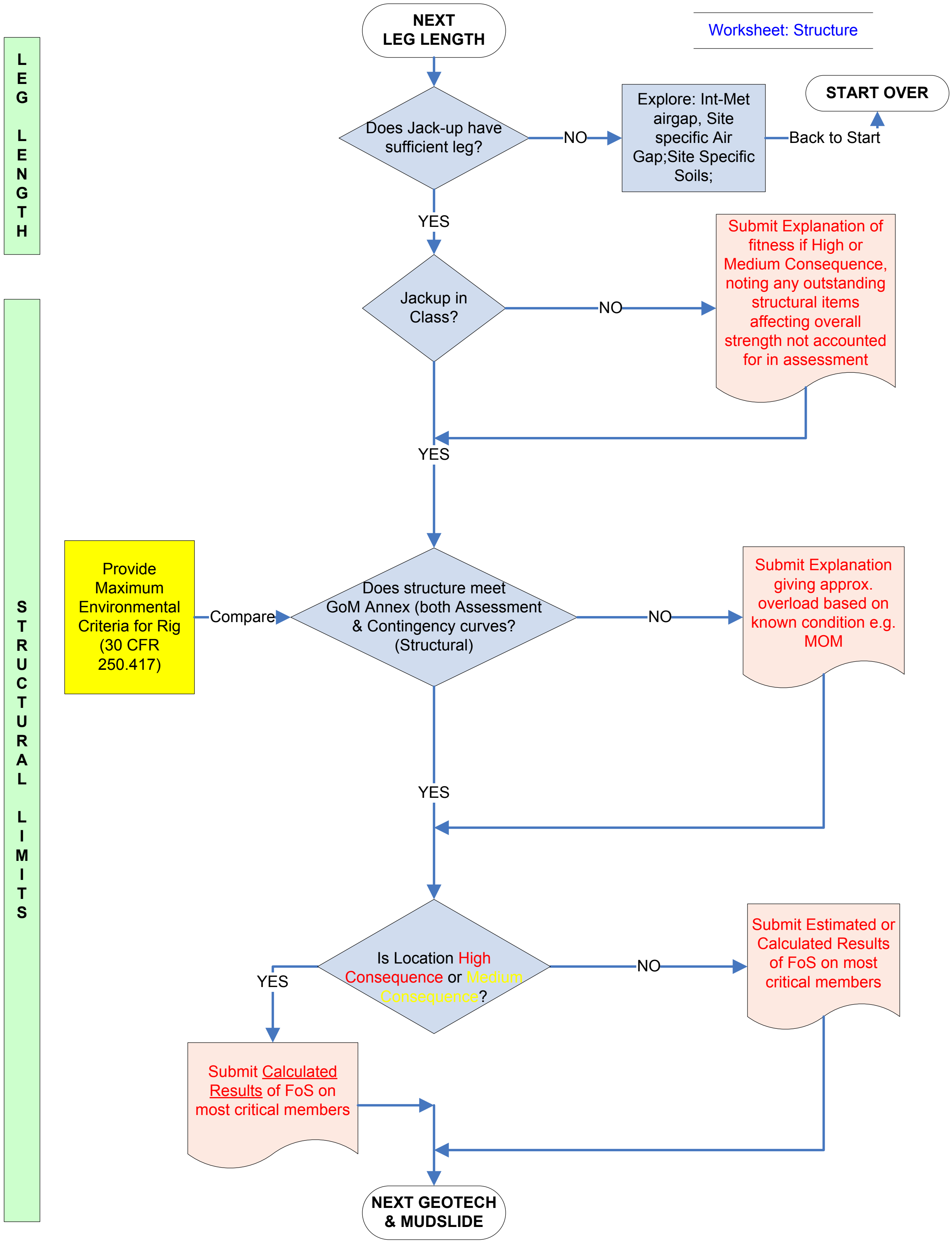
Steve Nowak - Premium Drilling
Alberto Morandi - Global Maritime
GoM Annex Committee
Others

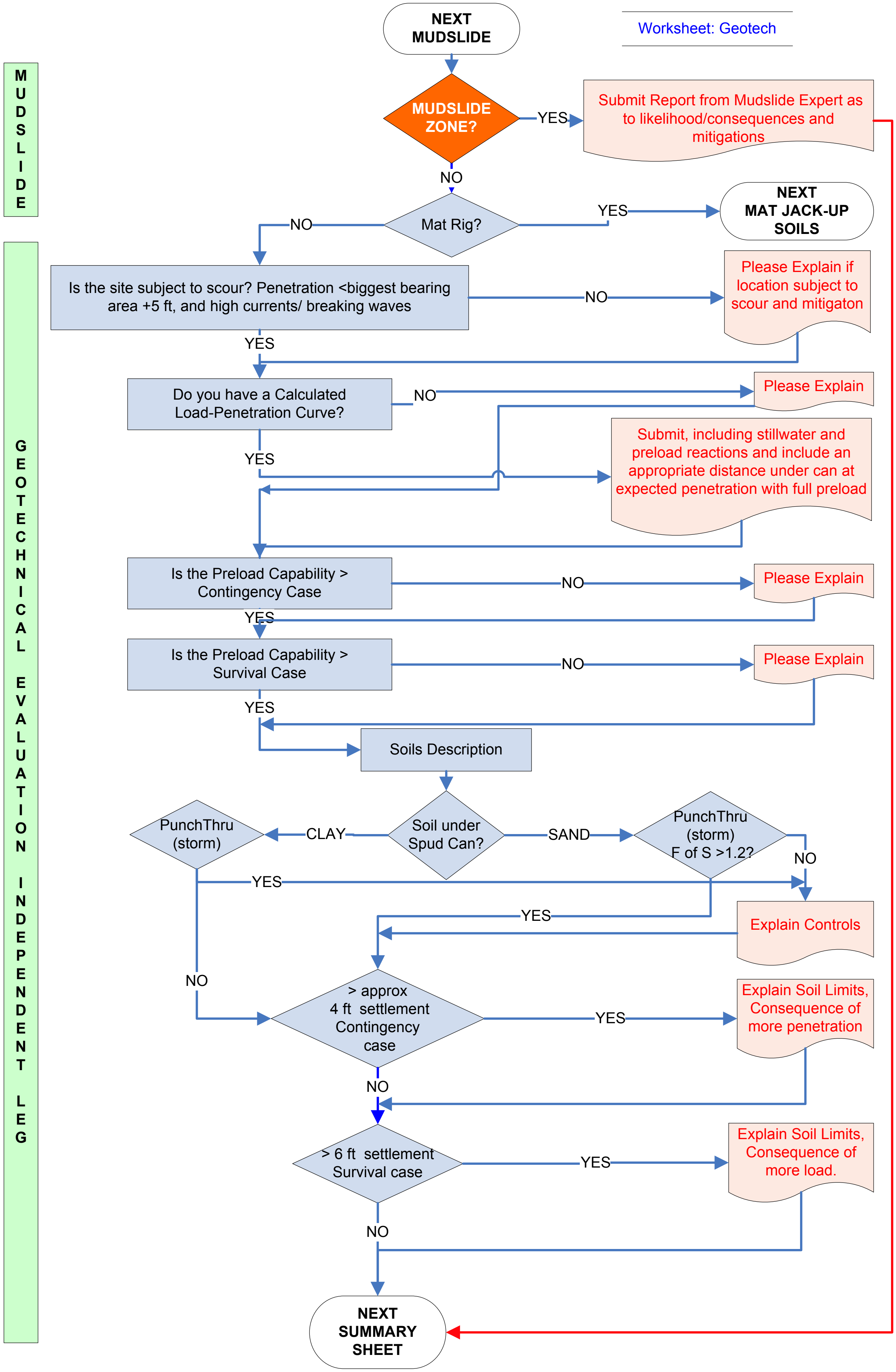
APPENDIX A: FLOWCHART

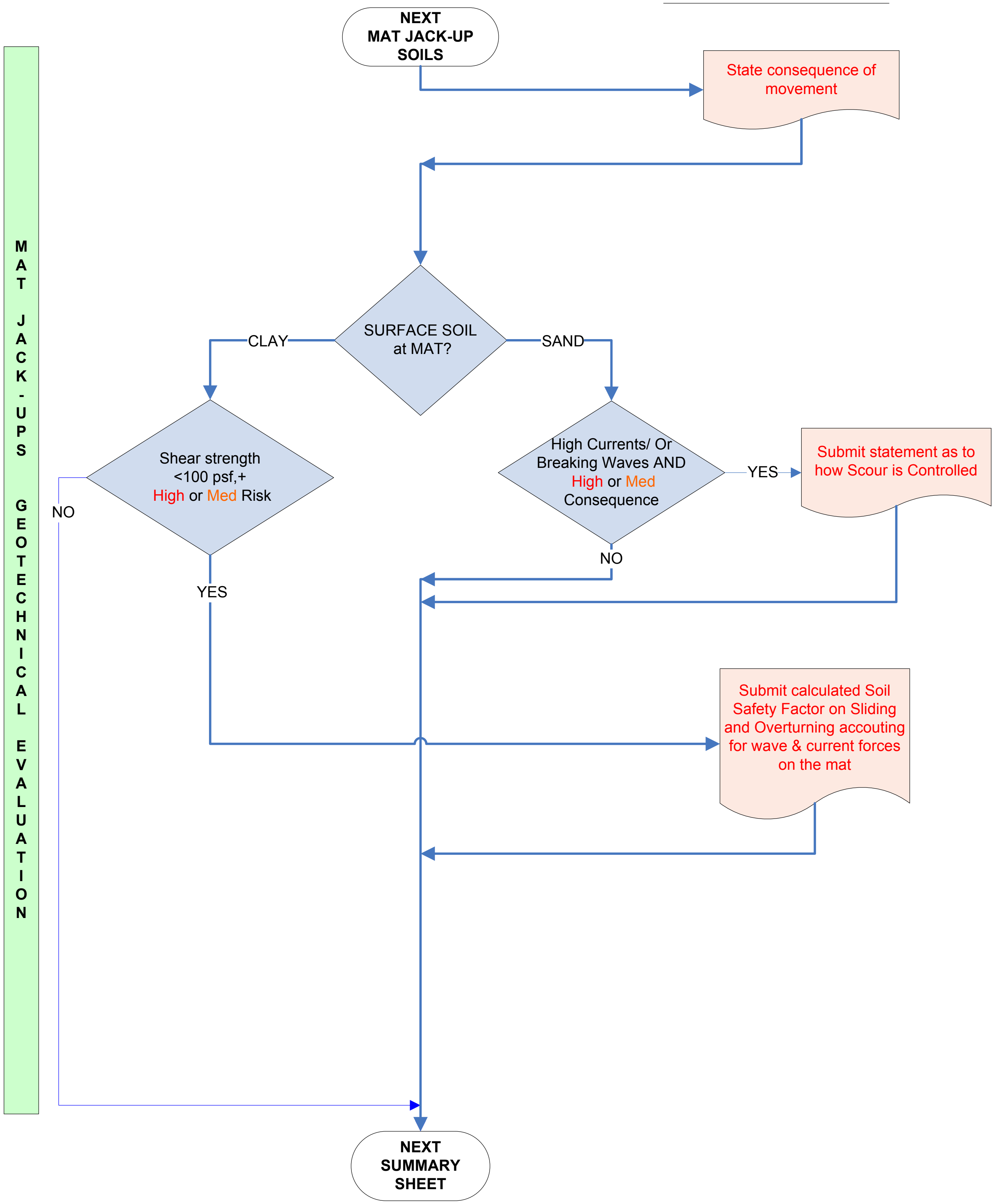

START
Worksheets: Leaseholder & Location
SEASON
Hurricane Season?
YES
NO
Stop N/A
PEAK of Hurricane Season?
NO
YES
Change
YES
Can Date be changed? (particularly if Central or W.C. Zone)
NO
TABULATE PROXIMITY CONSEQUENCES
High and Medium
Pipelines (P);
Critical Facilities (F):
H2S (H2S);
Critical Structures (S)
PROXIMITY CONSEQUENCE
P:12"≤P <200 yds
F:>50,000 bopd< 2 mi
S: or H2S < 2 mi
YES
Flag HIGH CONSEQUENCE
Report any Mitigations & Adjust Consequence Category
NO
P:10"≤P <200 yds
F:>10,000bopd < 2 mi
YES
Flag MED CONSEQUENCE
Is Punchthru anticipated going onto location?
NO
NO
YES
Low Consequence
Explain Controls Consequence & Mitigations
Explain Consequence of any jack-up movement e.g. hit conductor/ hit platform
Select Survival Storm considering Consequence Level:
High, Medium, or Low
NEXT NTL

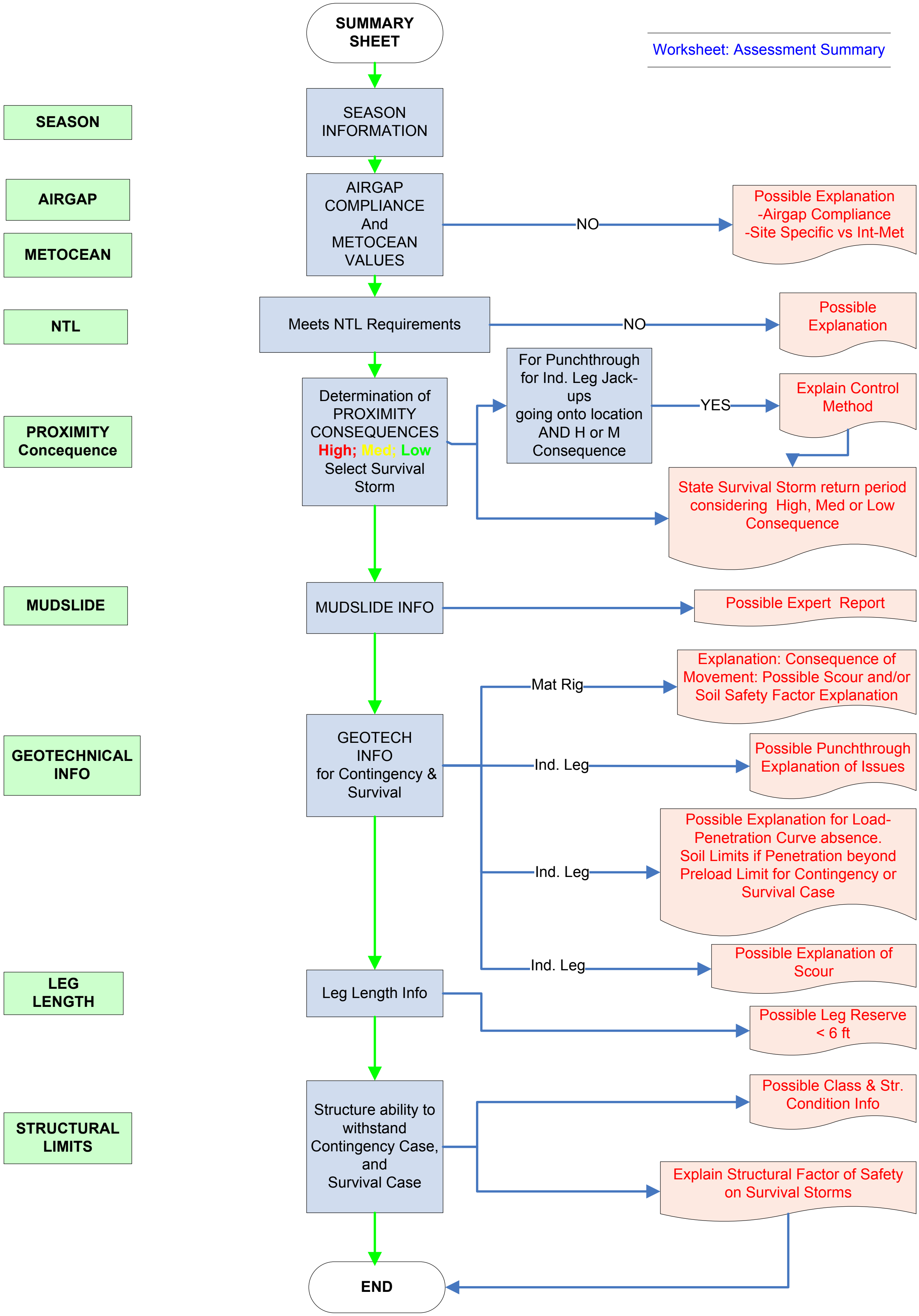

Worksheets: Leaseholder & Metocean
NEXT NTL
N T L
ARE THE SUBMISSION REQUIREMENTS OF NTL-2008-G10 met ? 30 CFR 250.417? API 95J?
-Soils Info. (incl. date/ basis/ soil description/ distance from site & shallow seismic tieback NTL 2008-G05)
-Shallow Hazard Info (incl. history of jack-up operations at location)
-Well Conductor Securing Procedures
-Storm Packer depth
YES
NO
Submit Explanation
YES
(Proceed when obtained)
S O I L C H E C K
Is Geotech (Soil) data sufficient for evaluation (Age, distance, location tied to boring, previous rig history etc)?
NO
Is better Geotech Info available? or can it be obtained?
NO
Submit Explanation
YES
A I R G A P
<40 FT w.d.? (API 95J)
YES
Consider potential for Breaking Wave
NO
Airgap (AG) > API RP 95J?
NO
Is INT-MET Applicable at this Location?
NO
AG> Site Specific Data? 100 year C.E. + Tide + Surge w/ or w/o contingencies
NO
Submit Explanation
YES
YES
YES
AG>MET-INT Region: 100 Year C.E.+Tide +Surge w/ or w/o contingencies
Compare reasonably with Int-Met?
NO
Submit Explanation
YES
YES
M E T O C E A N
METOCEAN Data is automatically generated for GoM Annex Assessment & Contingency Cases and also Int-Met 100-yr, 50-yr, 10-yr. Site-Specific all-year or seasonal metocean, when entered, is shown alongside Int-Met results for comparison.
NEXT LEG LENGTH & STRUCTURE



Worksheet: Structure
LEG LENGTH
NEXT LEG LENGTH
Does Jack-up have sufficient leg?
NO
Explore: Int-Met airgap, Site specific Air Gap;Site Specific Soils;
Back to Start
START OVER
YES
Jackup in Class?
NO
Submit Explanation of fitness if High or Medium Consequence, noting any outstanding structural items affecting overall strength not accounted for in assessment
YES
STRUCTURAL LIMITS
Provide Maximum Environmental Criteria for Rig (30 CFR 250.417)
Compare
Does structure meet GoM Annex (both Assessment & Contingency curves? (Structural)
NO
Submit Explanation giving approx. overload based on known condition e.g. MOM
YES
Is Location High Consequence or Medium Consequence?
NO
Submit Estimated or Calculated Results of FoS on most critical members
YES
Submit Calculated Results of FoS on most critical members
NEXT GEOTECH & MUDSLIDE


NEXT MUDSLIDE
Worksheet: Geotech
MUDSLIDE
GEOTECHNICAL EVALUATION INDEPENDENT LEG
MUDSLIDE ZONE?
YES
Submit Report from Mudslide Expert as to likelihood/consequences and mitigations
NO
Mat Rig?
YES
NEXT MAT JACK-UP SOILS
NO
Is the site subject to scour? Penetration <biggest bearing area +5 ft, and high currents/ breaking waves
NO
Please Explain if location subject to scour and mitigaton
YES
Do you have a Calculated Load-Penetration Curve?
NO
Please Explain
YES
Submit, including stillwater and preload reactions and include an appropriate distance under can at expected penetration with full preload
Is the Preload Capability > Contingency Case
NO
Please Explain
YES
Is the Preload Capability > Survival Case
NO
Please Explain
YES
Soils Description
PunchThru (storm)
CLAY
Soil under Spud Can?
SAND
PunchThru (storm) F of S >1.2?
NO
YES
YES
Explain Controls
NO
> approx 4 ft settlement Contingency case
YES
Explain Soil Limits, Consequence of more penetration
NO
> 6 ft settlement Survival case
YES
Explain Soil Limits, Consequence of more load.
NO
NEXT SUMMARY SHEET


NEXT
MAT JACK-UP
SOILS
State consequence of movement
SURFACE SOIL at MAT?
CLAY
SAND
Shear strength <100 psf,+ High or Med Risk
NO
YES
High Currents/ Or Breaking Waves AND High or Med Consequence
YES
NO
Submit statement as to how Scour is Controlled
Submit calculated Soil Safety Factor on Sliding and Overturning accouting for wave & current forces on the mat
NEXT
SUMMARY
SHEET
MAT JACK-UPS GEOTECHNICAL EVALUATION


SUMMARY SHEET
Worksheet: Assessment Summary
SEASON
SEASON INFORMATION
AIRGAP
METOCEAN
AIRGAP COMPLIANCE And METOCEAN VALUES
NO
Possible Explanation -Airgap Compliance -Site Specific vs Int-Met
NTL
Meets NTL Requirements
NO
Possible Explanation
PROXIMITY Concequence
Determination of PROXIMITY CONSEQUENCES High; Med; Low Select Survival Storm
For Punchthrough for Ind. Leg Jack-ups going onto location AND H or M Consequence
YES
Explain Control Method
State Survival Storm return period considering High, Med or Low Consequence
MUDSLIDE
MUDSLIDE INFO
Possible Expert Report
GEOTECHNICAL INFO
GEOTECH INFO for Contingency & Survival
Mat Rig
Explanation: Consequence of Movement: Possible Scour and/or Soil Safety Factor Explanation
Ind. Leg
Possible Punchthrough Explanation of Issues
Ind. Leg
Possible Explanation for Load-Penetration Curve absence. Soil Limits if Penetration beyond Preload Limit for Contingency or Survival Case
Ind. Leg
Possible Explanation of Scour
LEG LENGTH
Leg Length Info
Possible Leg Reserve < 6 ft
STRUCTURAL LIMITS
Structure ability to withstand Contingency Case, and Survival Case
Possible Class & Str. Condition Info
Explain Structural Factor of Safety on Survival Storms
END

APPENDIX B: CHECKSHEET (HARD COPY)

Jack-up Checksheet: Minerals Management Service

Date	Action/Modification
11-Mar-09	Rev: 10 Password: "password"
24-Mar-09	Rev: 11 Optional page N/A added to options Yes/No. - Reporting of optional issues delete from Assessment page. Structural question after establishing class -removed since structure is USCG issue. Add comment to characterize estimate and calculations in Structural Factor. Location:: Brackets around scour issue (Max bearing area of spud can + 5ft on sand) for clarity Location: note added to explain answer after mat rig on <100 psf shear strength. Metociean: Max W.D. Rating removed from metocean page - irrelevant Genotech: Remove requirement for FofS of 1.2 in Survival storm on sand - FofS for Survival is 1.0

Incorporated References:
30 CFR 250.417 What must I provide if I plan to use a mobile offshore drilling unit (MODU)? -
NTL 2008-G10 June 1, 2008-Dec 1, 2013 -Guidelines for Jack-Up Drilling Rig Fitness Requirements for Hurricane Season
NTL 2008-G05 Shallow Hazards Program - April 1, 2008, to March 31, 2013
API RP 95J 1st Edition June 2006
Recommended Practice for Site Specific Assessment of Mobile Jack-up Units - Gulf of Mexico Annex (SNAME 5-5A) Rev 0 August 2006.
API 2 Int- Met 1st Edition, May 2007
OTC 17879 - Metocean Criteria for Jack-ups in the Gulf of Mexico - 2006
McClelland Engineers 1979 - Strength Characteristics of the Near Seafloor Continental Shelf Deposits of Northern Central Gulf of Mexico.

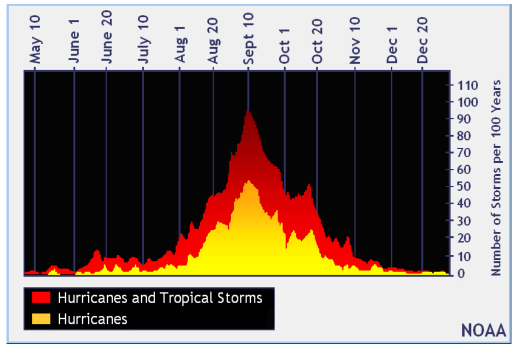
NOTE: This Checksheet does not constitute a rigorous engineering approach to safety. It merely provides a draft Checksheet for Permitting with whatever benefits/limitations that apply to that process. It in no-way confirms that the jack-up is suitable for the location. This is a Draft Checksheet and further calculations/information is required after suitable explanations are provided as requested herein.
The User of this document should check accuracy and interpolation of any industry curves (e.g. API 95J, API 2 Int-Met, GoM Annex etc) to verify correctness and accuracy. prior to using.

	To be filled in: Used in Calculating other entries
	To be filled in for Info only
	Red Flag warning - or requiring Explanation
	Green Flag warning - Explanation is probably not required.
	Explanation may be required or Explanation from another worksheet
123	Generally a response from another "cell" - No input needed
123	Responses for Assessment Results - from another "cell" - No input needed

Date on which Checksheet completed	
Drawing #, Revision & Date for Infrastructure Chart (if Submitted)	

Jack-up Checksheet
Location Assessment Worksheet

Jack-up Name:		
Jack-up Owner:		
Rig Type:	Independent Leg	
Operator:		
Location Name:		
Location Area	Galveston	
Block No	53	
OCS Designation:		
Water Depth:	240.0	Feet
Rig Heading:		[deg-Grid]
Total Leg Length:	410.0	Feet
Distance over Guides	50.0	Feet
Proposed Air Gap:	62.6	Feet
Expected Penetration at full Preload	10.0	Feet
Latitude		Degrees (decimal)
Longitude	92.00	Degrees (decimal)
UTM-N (Grid)		Feet
UTM-E (Grid)		Feet



Insert Explanation in this colored square/ column, if required by "Flag" in box to the left. It will appear on the "Assessment Results" worksheet. (It does not matter if it is not all entirely visible on this worksheet)

Potential Mudslide Area	Not in Mudslide Zone		Loc 1: Mudslide:
Leasholder Data	LOW CONSEQUENCE FROM INFRASTRUCTURE	(Result from Leaseholder Data worksheet)	
Zone	West Central	(Result from Longitude value)	

Year Jack-Up was built	1976	
Maximum Design Water Depth (feet)	250 feet	
Reserve of Leg at this Location	41 feet	(Results from Structure worksheet)

NTL 2008-G10 Requirements:			Explain (if any)
Is the Geotech (soil) information supplied sufficient to determine the soil characteristics over depth and also sufficient to determine the foundation strength at the location to satisfy NTL 2008-G10?	Yes		Loc 2:
How will you comply w/ Airgap Requirement?	API 95J		
Are you anticipating Punchthru Conditions going onto location?	No		Loc 3:

GoM Annex Information & Survival Case Selection			
Does the jack-up meet the Structural and Foundation requirements of the SNAME GoM Annex (Assessment and Contingency cases)?	Yes		Loc 4:
What Return Period was selected by Drilling Contractor for the Survival Case?	10-Yr Site Specific		Loc 5:
Operator minimum required Survival Storm (Full Population) was:	10-Yr Int Met		Leaseholder 4:

Overall Information - Independent Leg Units Only			
Is it anticipated there be equal to < 4ft settlement in the GoM Annex Contingency case?	Yes		Loc 6:
Is it anticipated there will be equal to or <6 ft settlement in the GoM Annex Survival case?	Yes		Loc 7:
Do you have a Calculated Load-Penetration curve for the site specific location?	Yes	Please attach Load-Penetration Curve for soils to at least half the spudcan diameter below expected penetration. Show stillwater and preload reactions on the curve	
Do any of the following apply making the jack-up prone to possible scour? The maximum penetration is < (Max bearing area of spud can + 5ft on sand) AND High current speed OR Breaking wave	No		Loc 8:

Overall Information - Mat Units Only			
Independent Leg Rig: Please ignore	Yes		
Independent Leg Rig: Please ignore	No		Loc 9:

Checksheet completed by:
Phone:
Email:

Jack-up Checksheet

Leaseholder/Operator Provided Information Worksheet incl.
Infrastructure Proximity Information
Survivability Assumptions

Dates on Location				Item	Start and End Date	
Note that there is a ramping period from 1 Aug to 14 Aug before the peak and 7 Oct to 21 Oct after the peak. These ramping periods have been assumed to be within the "Peak Hurricane Season"	Planned date for Arrival at Location	May 5th		Hurricane Season	1-Jun	30-Nov
	Planned date for Departure from Location	November 29th		Pre-Peak	1-Jun	1-Aug
	Days on Location	208	Days	Peak	1-Aug	20-Oct
	On Location during Hurricane Season?	Yes		Post Peak	20-Oct	30-Nov
	On Location during PEAK Hurricane Season?	Yes		Non-Hurricane	30-Nov	1-Jun

High Level Overview of Threat		
GoM at Peak of Season, but not most severe zone		Leaseholder: 1

Select from Potential Issues Below: Note "numeric" to all that apply

"Number of Items"	Description of Critical Items: LEASEHOLDER SUPPLIED INFORMATION	
HIGH CONSEQUENCE		
How Many Major Pipelines = or >12" , 200 yards of the jack-up?	0	Note: High or Medium Consequence sites trigger a check on Punchthrough going onto location: calculations to be used rather than estimates of Survivability: and a check against scour or sliding on location for mat units. If mitigations exist that downrates the consequence, then type "downrated" instead of the number to indicate there "was" a consequence that is downrated and the number will reduce to the default addition of other consequences
How Many Major Hub Structures (throughput >50,000 bopd or equivalent) are within 2	0	
How Many Critical Facilities (production >50,000 bopd or equivalent) within 2 miles?	0	
If jack-up is working in an area (2 mi) where H_2S is expected - type "1", otherwise type "0".	0	
How many Offshore Terminals or similar structures within 2 miles (e.g. LNG Offloading/ LOOP Facility)?	0	
Total Number of High Consequence Items	**0**	
If there are mitigating factors that would downgrade the consequences e.g. 12" pipeline flow is reduced or pipeline is abandoned: Please Explain : or type NONE	NONE	
Information on Calculation Requirements for High Consequence		
Rigorous Calculations Required: Approximate Methods not allowed		
MEDIUM CONSEQUENCE		
How Many Major Pipelines (= or > 10" diam.) are <200 yards of the jack-up?	0	Note: As above, type in "downrated" if mitigating factors presented in the Explanation provide for downgrading of risk from criteria set.
How Many Major Hub Structures (throughput >10,000 bopd or equivalent) are within 2	0	
How Many Critical Facilities within 2 miles = or >10,000 bopd going through facility?	0	
Total Number of Medium Consequence Items	**0**	
If there are mitigating factors that would downgrade the consequences e.g. Critical facility is not on line: Please Explain: or type NONE	NONE	
Information on Calculation Requirements for Medium Consequence		
Rigorous Calculations Required: Approximate Methods not allowed		
LOW CONSEQUENCE		
Anything Else		

SUMMARY INFORMATION: LEASEHOLDER SUPPLIED INFORMATION			
Consequence Summation for this Location from Above and Further Explanation of any consequence of movement	LOW CONSEQUENCE FROM INFRASTRUCTURE	Leaseholder 3 :	
What are your (Leaseholder/Operator) minimum requirements for the Survival Case at this location (GoM Annex)	10-Yr Int Met		Leaseholder 4:

Note: It may be necessary in the future to characterize Offshore Terminals close by, and Offshore Wind farms

NTL 2008-G10 Requirements: LEASEHOLDER SUPPLIED INFORMATION			**Explain (if any)**
Have you supplied Geotech (Soils) data sufficient to determine soil characteristics over depth and foundation strength of the proposed location (in satisfaction of the NTL 2008-G10) ?	Yes		Leaseholder 5:
Has data been supplied that allows a geotechnical professional to give a high confidence prediction of expected penetration and final soil beneath the spucan (e.g. a load-penetration curve)	Yes		Leaseholder 6:
Have you supplied the appropriate bottom survey data (shallow hazards survey and/or bottom Mesotech scan) for best positioning of the jack-up on location to satisfy NTL 2008-G10? Note: Guidance to requirements for shallow hazards is in NTL 2008-G05.	Yes		Leaseholder 7:
Is there a plan for the cantilever to be skidded in for a storm?	Yes		Leaseholder 8:
Is there a plan for the conductor to be supported during the storm?	Yes		
What is the proposed depth below mudline of your storm packer? (feet)	100		

Jack-up Checksheet

Leaseholder/Operator Provided Information Worksheet incl.
Infrastructure Proximity Information
Survivability Assumptions

API RP 95 J Information: LEASEHOLDER SUPPLIED INFORMATION - HAZARD INFORMATION ONLY: NOT AS ONLY PENETRATION DATA			
Has there been a jack-up operating at this location before?	Yes		
Has the history of jack-up type and leg penetrations at position been provided?	Yes		Leaseholder 9:

Overall Information: LEASEHOLDER SUPPLIED INFORMATION			**Explain (if any)**
What is the year the site Geotechnical Information was obtained at the proposed site? (YYYY)	2008		
How Far Away from the Center of the Rig was the geotechnical information? (ft)	79		Leaseholder 10:
What is the basis of Soils Assumptions ?	On Arrival at Location	Optional Explanation of Suitability of the soil data for evaluating fitness for purpose	Leaseholder 11:
Has a Borehole Log been Provided?	No		
Description of Soil at Location	Leaseholder 12:		

Overall Information - Independent Leg Units Only: LEASEHOLDER SUPPLIED INFORMATION			**Explain (if any)**
Please Ignore shallow seismic tieback requirement as < 1000 ft	No		Leaseholder 13:

Date on which Leaseholder Information completed	
Drawing #, Revision & Date for Infrastructure Chart (if Submitted)	
Name of person completing Leaseholder Information: Phone: Email:	

Jack-up Checksheet

Metocean Worksheet

Waterdepth (ft)	**240**

This worksheet's job is to develop the appropriate airgap, API 95J, or API Int-Met and to interrogate the various standards for wave height, wind speed, and current parameters from API 95J, API Int-Met and GOM Annex. If Site Specific numbers are available it requires you fill in those numbers here. Int-Met data is provided for comparison purposes only.

Please NOTE WARNING: The numbers generated for the GoM Annex and API Int-Met need to be verified for correctness and accuracy. They are produced by curve fitting to the charts within these documents which should be referenced for correctness and change as appropriate.

Selected Airgap Compliance Method	API 95J
Airgap (ft)	**62.6**
Airgap Compliance with API 95J?	Complies with API 95J
API 95J Airgap (ft)	**62.5**
Sufficient Airgap for API 95J?	YES
Is the Location in the area that Int-Met requires Site-Specific Data?	**NO**
Airgap Compliance with Int-Met incl 3% and 4 ft settlement	YES
Airgap Compliance with Int-Met and no Contingency or Settlement	YES
Airgap Compliance with Site-Specific Data?	Please Ignore
Table For Site Specific Data: Survival Case	**10-Yr Site Specific**
Report Source: Author/Company	
Return Period for Site-Specific (yrs)	
1-Min Wind for Site-Specric Return Period (kts)	
1-min Wind 100 Yr (kts)	
1-min Wind 50 Yr (kts)	
1-min Wind 10 Yr (kts)	
Crest Elevation = or > 100-year (ft)	0
Site-Specific Hmax (ft)	50
Tide = or > 100-year (ft)	0
Surge = or > 100-year (ft)	0
Contingency 3%-5% 3%	**0.00**
Settlement Amount	0
Airgap based on Site Specific data Total (ft)	**0.00**

Table For API Int-Met Data for Applicable Region -	
API INT-MET Region	West Central
1-min Wind 100 Yr (kts)	**93.6**
1-min Wind 50 Yr (kts)	**83.3**
1-min Wind 10 Yr (kts)	**58.5**
100 Year Hmax Int-Met (ft)	**62.0**
50 Year Hmax Int-Met (ft)	**58.1**
25 Year Hmax Int-Met (ft)	**51.3**
10 Year - see below	
100 Year Crest Elevation (ft) Incl (Surge & Tide)	**43.3**

Wave Heights	**Value**
Contingency Case (ft)	40.4
Assessment Case (ft)	37.0
Winter Storm Case (ft)	32.6
10-Yr Site Specific (ft)	

10 Year Hmax Int-Met (ft)	**40.7**

Wind Speed	1 Min mean / feet/sec
Return Period	**Wind Speed**
Contingency 1-min mean (kts)	66.1
Assessment 1-min mean (kts)	61.1
Winter Storm 1-min mean (kts)	53.1
10 yr Site Specific	0
50 yr Site Specific	0
100 yr Site Specific	0

Wind Speed	**Int- Met Wind Speed**
1-Min Mean Wind (knots)	**1-Min Mean (knots)**
66.1	
61.1	
53.1	
0.0	**58.5**
0.0	**83.3**
0.0	**93.6**

GOM Annex Current		
Designation	**Value (kts)**	
Contingency- Surface	1.60	
Contingency- MidDepth	1.49	
Contingency- Off Bottom	1.40	
Off Bottom Distance	-42.65	(ft)
Assessment- Surface	1.47	
Assessment- MidDepth	1.37	
Assessment- Off Bottom	1.28	
Off Bottom Distance	-42.65	(ft)
Winter Storm- Surface	1.13	
Winter-MidDepth	1.09	
Winter-Off Bottom	1.00	

Site Specific Current	feet/sec	
Return Period	**Value**	**Value (kts)**
10 Yr - Surface	1	0.6
10 Yr - MidDepth		0.0
10 Yr- Off-Bottom		0.0
Off Bottom Distance		0.0
50 Yr - Surface		0.0
50 Yr - MidDepth		0.0
50 Yr- Off-Bottom		0.0
Off Bottom Distance		0.0
100 Yr - Surface		0.0
100 Yr - MidDepth		0.0
100 Yr- Off-Bottom		0.0

Jack-up Checksheet

GEOTECH (SOILS) WORKSHEET

Note: Many of the items on this worksheet are input from other worksheets, and assembled on this page as a reminder of answers given elsewhere related to Geotech matters.

Note: 30 CFR 250.417 requires submission of information to show that site-specific soil and oceanographic conditions will support the drilling unit			
Rig Type:	Independent Leg		
Consequence & Mudslide Potential:	LOW CONSEQUENCE FROM INFRASTRUCTURE		Not in Mudslide Zone
Waterdepth on Location (ft)	240		
Site-Specific Soils both Mat and Independent Leg Jack-ups			**Explanation (if any)**
Year the Site Geotechnical Information was obtained at the proposed site (YYYY)	Leaseholder Provided Data sheet →	2008	Geotech 1:
What is the basis of Soils Assumptions	On Arrival at Location	Optional Explanation of Suitability of the soil data for evaluating fitness for	Leaseholder 11:
Description of Soil at the Location	Leaseholder Provided Data sheet →	Leaseholder 12:	
Are you Relying on Mc Clelland Reference 1979? Or other similar reference; and Explanation if appropriate	No	→	Geotech 2:
Please complete this Block of Questions for this Independent Leg Jack-Up			
Independent Leg Jack-up Only			**Explanation (if any)**
How Far Away from the Center of the Rig was the Samples for the Geotechnical Report taken? (ft) If > 1000 Ft Explain.	79		Leaseholder 10:
Less than 1000 ft: Please ignore	(See Leaseholder Provided Data worksheet)		Leaseholder 13:
There is a Calculated Load-Penetration Curve available	Please attach Load-Penetration Curve for soils to at least half the spudcan diameter below expected penetration. Show stillwater and preload reactions on the curve		Geotech 3:
No potential to scour	→ (See Location worksheet)		Loc 8:
Selected Survival Case (Drilling Contractor's) :	10-Yr Site Specific	Survivability Selected on Location worksheet	Loc 5:
Expected Leg Penetration on Location (full preload)	10 feet	(from Location worksheet)	
What will be soils under spudcan at expected penetration	Sand		
Is Punchthrough a possibility on Location during storm?	No		Geotech 4: this is ind leg
You previously indicated that the rig has no more than 4ft settlement in the GoM Annex Contingency case			Loc 6:
You previously indicated that the rig has no more than 6 ft settlement in the GoM Annex Survival case			Loc 7:
Please ignore this block of questions for Independent Leg Jack-Up			
Mat Jack-up Only			**Explanation (if any)**
Independent Leg Rig: Please ignore			Geotech 6:
Independent Leg Rig: Please ignore	80		Geotech 7:
Independent Leg Rig: Please ignore	→		
Independent Leg Rig: Please ignore			**Geotech 8:**
Independent Leg Rig: Please ignore			**Geotech 9:**
Independent Leg Rig: Please ignore			
Independent Leg Rig: Please ignore			
Independent Leg Rig: Please ignore	1		
Independent Leg Rig: Please ignore			
Independent Leg Rig: Please ignore	Yes		Geotech 10:

Jack-up Checksheet

Jack-up Rig Information Worksheet - and Pre-Structural Evaluation

Principal Particulars:	
Length (ft)	
Breadth (ft)	
Depth (ft)	
No of Legs	
Cantilever (Yes/No)	
No of Chords/leg (1-4)	
If Other: Describe	

Arrangements at Location	
Reserve of Leg (ft)	41.4
Total Leg Length	410
Distance Over Guides	50
Airgap (ft)	62.6
Waterdepth (ft)	240
Expected Penetration: Full Preload (ft)	10

Zone:	West Central

Spud Can Diameter (ft)	
Spud Can Height (ft)	
Maximum Design Operating Waterdepth (ft)	250
Rig Type (Builder)	
Model	
Classification - In Class?	Yes

Structure 1:

From the Location Sheet: The rig meets the Structural requirements of the SNAME GoM Annex (both curves)		**Loc 4:**

COMPARISON OF Benchmark Information to GoM Annex Cases						**Survival Case** as defined by GoM Annex	
Maximum Environmental Information: (may be contained in Marine Operating Manual) referred herein as "Benchmark" Cases (Optional)				**GoM Annex**	**GoM Annex**	**Please Ignore Below**	**10-Year Site Specific**
Note: 30 CFR 250.417 requires submission of maximum environmental and operating conditions: Fill in Closest match in #1, #2 and/or #3	**#1**	**#2**	**#3**	Assessment **Case**	Contingency **Case**	**Please Ignore**	
Waterdepth (ft)				240.0	240.0	240.0	240.0
Wind Speed (kts)				61.1	66.1		
Wave Height (ft)				37.0	40.4		
Wave Period (secs)							
Surge Ht (ft)				Incl. in C.E.	Incl. in C.E.		
Tide (ft)				Incl. in C.E.	Incl. in C.E.		
Air Gap (ft)				62.6	62.6	62.6	62.6
Surface Current (kts)				1.47	1.60		
Penetration Assumed (ft)						10.0	10.0
Analysis Method:					**Calculated**	Estimated *	Estimated *

Note: Estimates and Calculations are subject to many variable factors. The stated "Structural Factor" is intended to be an inexact comparison of chosen storm to adjusted MOM storm conditions by those with sufficient experience to make an engineering judgement about the values.

Estimated/Calculated Amount of Structural Overload compared to calculated Design Conditions	Calculated	Calculated	Calculated			Structure Factor 1	Structure Factor 2
Further Explanation if Needed:							

Jack-up Checksheet

Optional Worksheet: on NTL G10 Information

Note: This information is worksheet is part of the "requirements" of the NTL. The questions are do not at this time form part of the evaluation process - except to note the answers.

NTL 2008-G10 Information: (Currently Considered Optional)			
Have you supplied USCG with read access to the rig's GPS Tracking Information ?	Yes		
Have you reviewed and updated your USCG Marine Operating Manual to minimize the possibility of adverse consequences of any tropical storm (as suggested in the NTL) ?	Yes		
Do your anticipated preloading procedures minimize the potential for further settlement from potential hurricane loading ?	Yes		Optional 1:
What is the minimum holding time after settlement has stopped at maximum preload? (hrs)		Answer here	Optional 2:
What is the preloading methodology? (Single leg? Multiple leg? etc).		Answer here	Optional 3:

Jack-up Checklist

ASSESSMENT RESULTS	
Location Name	
Max. Design Water Depth (feet)	Galveston
Block Area	53
OCS Designation:	
Water Depth	240
Rig Heading	
Latitude:	
Longitude:	92
Rig Type	Independent Leg Jack-up
Rig Name	
Operator	
Jack-up Owner	
Zone	West Central
Part of Season	PEAK
Hurricane Threat	GoM at Peak of Season, but not most severe zone

Note: Below Yellow area is for OPTIONAL Comments

General Information	Result	Comments
	Not in the Mudslide Area - No Further Info Required	Loc 1: Mudslide:
Proximity Consequence Summation for this Location and any Mitigating Factors .	LOW CONSEQUENCE FROM INFRASTRUCTURE	
If Consequence Level was downgraded either from High or Medium to a lower Value, the explanation is as follows:	NONE	NONE
Either No expected punchthrough going on location or Low Consequence		Loc 3:
Sufficient Leg Length	OK	
Classification?	OK	Structure 1:
Basis of Soil Information and year obtained. and Suitability	On Arrival at Location Borehole NOT provided	Leaseholder 11:
Year in which Geotech data was obtained at site? Explanation if appropriate:	2008	Geotech 1:
The Soil at location is described as:	Leaseholder 12:	
The selected Survival Case used for Calculation (drilling contractor) was:	10-Yr Site Specific	Loc 5:
Operator minimum required Survival Storm (Full Population) was:	10-Yr Int Met	Leaseholder 4:

NTL 2008-G10 Requirements	Result	Comments
Operator has supplied Geotech (Soils) data for the Location		Leaseholder 5:
Operator has supplied Geotech information from which a Load-Penetration Curve can be provided	Please attach Load-Penetration Curve for soils to at least half the spudcan diameter below expected penetration. Show stillwater and preload reactions on the curve	Leaseholder 6:
The Geotech (soil) information supplied is sufficient to determine the soil charateristics over depth and foundation strength of the location		Loc 2:
Operator supplied shallow hazards survey or Mesotech for jack-up optimal siting: NTL 2008-G05		Leaseholder 7:
The cantilever will be stowed and the conductor supported during the storm		Leaseholder 8:
Proposed depth below mudline of storm packer? (feet)	→	100

API RP 95 J Information	Result	Comments
There has been a jack-up operating at this location before		
A history of jack-up type and leg/mat penetrations at this location has been been provided		Leaseholder 9:
Airgap compliance	**Result**	**Comments**
Selected Method of Compliance with Airgap	API RP 95J	
API RP95J Airgap Compliant?	YES	
Airgap Compliance with Site Specific Data?	Please Ignore	
The location is in the Int-Met boundaries but in non-applicable area of API Int-Met?	NO	
Airgap Compliance with API Int-Met With 3-5% crest elevation +4ft settlement	YES	
Airgap Compliance with API Int-Met without Contingency	YES	
Airgap Compliance with Site Specific Values	Please Ignore	
Leg Length Check	Leg Length OK	

Structural Information	Result	Comments
Jack-Up meets the Structural requirements of the SNAME GoM Annex (both Assessment and Contingency curves)	OK	Loc 4:
Survival Case: Method Used (Calculated/ Estimated) and resulting % of design allowable to which the jack-up was loaded	Estimated *	Structure Factor 2

ASSESSMENT RESULTS

Soils information for Independent Leg Units	Result	Comments
Geotech information is <1000 ft from location		**Leaseholder 10:**
Tieback of soil MAY not be required	→	**Leaseholder 13:**
Jack-up punchthrough during storm is NOT anticipated	**Please ignore**	**Geotech 4: this is ind leg**
Settlement in Contingency storm	**Settlement in Contingency Case is = or < 4ft**	**Loc 6:**
Please Ignore	→	**#REF!**
Calculated Load-Penetration Curve	**Submit Load-Penetration Curve annotated as described**	**Geotech 3:**
Settlement in Survival storm	**Settlement in Survival storm is = or < 6ft**	**Loc 7:**
Comment on Potential Scour:	**None**	**Loc 8:**
Further Explanation of any consequence of sideways or sway movement:	→	**Leaseholder 3 :**

Soils Information for Mat Rig	Result	Comments
Independent Leg Rig: Please ignore		
Independent Leg Rig: Please ignore	→	
Independent Leg Rig: Please ignore		
Independent Leg Rig: Please ignore		
Independent Leg Rig: Please ignore		
Independent Leg Rig: Please ignore		
Independent Leg Rig: Please ignore		
Independent Leg Rig: Please ignore	→	

NTL 2008-G10 Optional Information:	FROM OPTIONAL NTL WORKSHEET	Comments
Answer to question as to whether the preloading procedures have been reviewed to minimze further settlement in a hurricane:		**Optional 1:**
What is the minimum holding time after settlement has stopped at maximum preload? (hrs)	Answer (to the right)	**Optional 2:**
Response to question about Preloading Methodology:	Answer (to the right)	**Optional 3:**

APPENDIX C: 30 CFR 250.417

APPENDIX C: CFR § 250.417 What must I provide if I plan to use a mobile offshore drilling unit (MODU)?

If you plan to use a MODU, you must provide:

(a) *Fitness requirements.* You must provide information and data to demonstrate the drilling unit's capability to perform at the proposed drilling location. This information must include the maximum environmental and operational conditions that the unit is designed to withstand, including the minimum air gap necessary for both hurricane and non-hurricane seasons. If sufficient environmental information and data are not available at the time you submit your APD, the District Manager may approve your APD but require you to collect and report this information during operations. Under this circumstance, the District Manager has the right to revoke the approval of the APD if information collected during operations show that the drilling unit is not capable of performing at the proposed location.

(b) *Foundation requirements.* You must provide information to show that site-specific soil and oceanographic conditions are capable of supporting the proposed drilling unit. If you provided sufficient site-specific information in your EP, DPP, or DOCD, you may reference that information. The District Manager may require you to conduct additional surveys and soil borings before approving the APD if additional information is needed to make a determination that the conditions are capable of supporting the drilling unit.

(c) *Frontier areas.*
(1) If the design of the drilling unit you plan to use in a frontier area is unique or has not been proven for use in the proposed environment, the District Manager may require you to submit a third-party review of the unit's design. If required, you must obtain the third-party review according to §250.903. You may submit this information before submitting an APD.
(2) If you plan to drill in a frontier area, you must have a contingency plan that addresses design and operating limitations of the drilling unit. Your plan must identify the actions necessary to maintain safety and prevent damage to the environment. Actions must include the suspension, curtailment, or modification of drilling or rig operations to remedy various operational or environmental situations (e.g. vessel motion, riser offset, anchor tensions, wind speed, wave height, currents, icing or ice-loading, settling, tilt or lateral movement, resupply capability).

(d) *U.S. Coast Guard (USCG) documentation.* You must provide the current Certificate of Inspection or Letter of Compliance from the USCG. You must also provide current documentation of any operational limitations imposed by an appropriate classification society.

(e) *Floating drilling unit.* If you use a floating drilling unit, you must indicate that you have a contingency plan for moving off location in an emergency situation.

(f) *Inspection of unit.* The drilling unit must be available for inspection by the District Manager before commencing operations.

(g) Once the District Manager has approved a MODU for use, you do not need to re-submit the information required by this section for another APD to use the same MODU unless changes in equipment affect its rated capacity to operate in the District.

[68 FR 8423, Feb. 20, 2003

APPENDIX D: MMS NTL 2008-G10

UNITED STATES DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE
GULF OF MEXICO OCS REGION

NTL No. 2008-G10

Effective Date: June 1, 2008
Expiration Date: December 1, 2013

NOTICE TO LESSEES AND OPERATORS OF FEDERAL OIL, AND GAS LEASES IN THE OUTER CONTINENTAL SHELF (OCS), GULF OF MEXICO OCS REGION

Guidelines for Jack-up Drilling Rig Fitness Requirements for Hurricane Season

This Notice to Lessees and Operators (NTL) provides guidance on the information you must submit with your Form MMS-123, Application for Permit to Drill (APD), to demonstrate the fitness of any jack-up drilling rig you will use to conduct operations in the Gulf of Mexico (GOM) OCS during hurricane season. As required by 30 CFR 250.417(a), this information must demonstrate that the associated jack-up drilling rig is capable of performing at the proposed drilling location. The Minerals Management Service (MMS) Gulf of Mexico OCS Region (GOMR) will use the recommendations in the American Petroleum Institute's (API) *Recommended Practice 95J, Gulf of Mexico Jackup Operations for Hurricane Season – Interim Recommendations, First Edition* (API RP 95J), to guide our review and evaluation of the information and data that demonstrate the jack-up rig's capability to perform at the proposed location. The MMS GOMR highly recommends that you follow the recommendations in API RP 95J as you prepare APD's to conduct drilling operations during hurricane season. Failure to follow the recommendations in API RP 95J may delay the approval of an APD or result in disapproval. This guidance also applies to jack-up rig operations you conduct under Form MMS-124, Application for Permit to Modify (APM).

Background

The effects of Hurricanes Ivan, Katrina, and Rita during the 2004 and 2005 hurricane seasons were detrimental to oil and gas operations on the OCS. These effects included structural damage to fixed production facilities, semi-submersibles, and jack-up rigs. During these hurricanes, nine jack-up rigs experienced a total failure of station-keeping ability. Additionally, there were several moored MODU's that were unable to keep station through these storms. Guidelines for improved moored MODU station-keeping are addressed in a separate NTL.

Fortunately, these hurricanes did not cause any loss of life or significant pollution because of industry's ability to secure wells and evacuate personnel successfully. However, the MMS GOMR is concerned about the loss of these facilities and rigs as well as the potential for catastrophic damage to key infrastructure and the resultant pollution from future storms. In an effort to reduce these effects, real and potential, the MMS GOMR has set forth guidance to ensure compliance with 30 CFR 250.417 and to improve performance in the area of jack-up station-keeping during the environmental loading that may be experienced during hurricanes.

Scope

This guidance covers drilling, workover, and completion operations conducted by jack-up rigs during hurricane season. All jack-up rigs that will be used to drill, complete, or workover a well under an APD or APM after the effective date of this NTL are covered by the requirements set forth below. The jack-up rig information required for permitting a well during hurricane season relates primarily to foundational issues addressed in the pre-loading process and determination of the appropriate air gap for a specific well location. Information regarding procedures to secure and protect wells in open water locations when the rig is secured prior to hurricane evacuations is also required.

If you already have an approved APD or APM and you plan to use a jack-up rig to drill or conduct other well operations during hurricane season (between June 1 and November 30), contact the appropriate GOMR District Manager to determine if you need to submit additional information concerning the jack-up rig's capability to operate at the proposed location.

Jack-up Rig Fitness

The MMS GOMR has determined that the level of detail and recommendations set forth in the API RP 95J will help to bring about the sought after improvement in performance during hurricane season. Therefore, the MMS GOMR will use API RP 95J to review and evaluate the information submitted with each APD or APM. The MMS GOMR highly recommends that you follow these same recommendations as you prepare APD's and APM's for operations you will conduct during hurricane season.

Make sure that the information you provide in your APD's and APM's to comply with 30 CFR 250.417(a) includes the following:

1. A statement documenting that you have provided or will provide appropriate bottom survey data (shallow hazards survey and/or bottom Mesotech scan) to the rig contractor to allow the best location for the rig to be established prior to moving on location.
2. A statement documenting that you have provided or will provide appropriate geotechnical data (sufficient to determine soil characteristics over depth and foundation strength of the proposed location) to the rig contractor prior to moving on location to facilitate adequate assessment of the foundation prior to preloading operations.
3. A statement documenting that you have provided or will provide site-specific metocean data (using the criteria in Appendix C of API RP 95J), including winds, waves, currents, storm surge, and tides, to the rig contractor prior to moving the rig on location to facilitate proper positioning of the rig on location and determine the appropriate air gap. In lieu of site specific data, the MMS GOMR will also accept the use of the more conservative generic data depicted in Appendix D of API RP 95J.

4. The rig contractor's anticipated preloading procedures and holding times that are proposed to minimize the potential for further settlement from potential hurricane loading.
5. The rig contractor's information on how the air gap determination was made for the site-specific location. The MMS GOMR will accept a site-specific 100-year hurricane wave crest elevation (using available metocean data from 1950 to the present) with the addition of (a) a wave crest uncertainty allowance of 3 to 5 percent and (b) a settling allowance for the given rig type and soil characteristics and the expected hurricane loading (see item no. 3 above relative to metocean data). As an alternative, the MMS GOMR will accept the more conservative air gap curve depicted in Appendix "A" of API RP 95J.
6. Your plans for supporting and securing the well prior to evacuation. In addition to complying with the MMS requirement for all drilling wells to be properly secured prior to evacuation (30 CFR 250.402), set the storm packer at a depth sufficiently below the mudline to ensure that wellbore integrity is not compromised should failure of the drive pipe/conductor pipe occur.
7. Any additional information that would mitigate or otherwise alter these jack-up rig fitness requirements during hurricane season.

The MMS GOMR encourages you to

1. Provide the United States Coast Guard with read-only access to the Emergency Position Indication Radiobeacon (EPIRB) data for your jack-up rig fleet before hurricane season begins; and
2. Review and update your Coast Guard Marine Operations Manual to minimize the possibility of adverse consequences of any tropical system.

Guidance Document Statement

The MMS issues NTL's as guidance documents in accordance with 30 CFR 250.103 to clarify, supplement, and provide more detail about certain MMS regulatory requirements and to outline the information you provide in your various submittals. Under that authority, this NTL sets forth a policy on and an interpretation of a regulatory requirement that provides a clear and consistent approach to complying with that requirement. However, if you wish to use an alternative approach for compliance, you may do so, after you receive approval from the appropriate MMS office under 30 CFR 250.141.

Paperwork Reduction Act of 1995 Statement

The information collection referred to in this NTL is intended to provide clarification, description, or interpretation of requirements contained in 30 CFR 250, Subpart D, Oil and Gas Drilling Operations. The Office of Management and Budget (OMB) has approved the information collection requirements in these regulations under OMB control number 1010-0141. This NTL does not impose additional information collection requirements subject to the Paperwork Reduction Act of 1995.

Contacts

Please direct any questions you may have regarding this NTL to the Drilling Engineer in the respective MMS GOMR District Office, as listed below:

District	Engineer	Phone Number	Email
New Orleans	David Trocquet	504-734-6749	david.trocquet@mms.gov
Houma	Ben Coco	985-853-5903	benjamin.coco@mms.gov
Lafayette	Marty Rinaudo	337-289-5107	marty.rinaudo@mms.gov
Lake Charles	David Moore	337-480-4604	david.moore@mms.gov
Lake Jackson	Lee Fowler	979-238-8125	ronald.fowler@mms.gov

[original signed]

Lars T. Herbst
Regional Director

APPENDIX E : MMS NTL 2008-G05

UNITED STATES DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE
GULF OF MEXICO OCS REGION

NTL No. 2008-G05

Issue Date: April 1, 2008
Effective Date: May 1, 2008
Expiration Date: March 31, 2013

NOTICE TO LESSEES AND OPERATORS OF FEDERAL OIL, GAS, AND SULPHUR LEASES AND PIPELINE RIGHT-OF-WAY HOLDERS IN THE OUTER CONTINENTAL SHELF, GULF OF MEXICO OCS REGION

Shallow Hazards Program

This Notice to Lessees and Operators and Pipeline Right-of-way Holders (NTL) supersedes NTL No. 2007-G01, effective February 15, 2007. It (1) specifies the group intervals for acquiring medium penetration seismic profiler information, (2) discontinues the process of obtaining prior approval if you want to substitute 3-D data and information for high-resolution subbottom profiler or a medium penetration seismic profiler information, (3) clarifies the procedures for submitting shallow hazards reports on CD-ROM's, (4) amends the format for listing magnetic anomalies and sidescan sonar contacts in shallow hazards reports, (5) clarifies that the onsite provisions for mitigation of shallow hazards apply to lift and jack-up boats, and (6) allows a MODU or other vessel to depart a location without fully raising its legs or mat as long as they are raised sufficiently to ensure no contact with pipelines and other potential hazards.

I. Introduction

Pursuant to 30 CFR 250.106, the Minerals Management Service (MMS) Gulf of Mexico OCS Region (GOMR) has established a shallow hazards program to ensure that you conduct exploration, development, production, and transportation operations with a minimum risk to human life and the environment. This NTL describes the surveys, reports, analyses, and mitigation that will ensure that the objectives of the shallow hazards program are met.

II. Shallow Hazards Assessments and Analyses

A. Exploration Plan (EP) and Development Operations Coordination Document (DOCD)

According to 30 CFR 250.214(f) and 250.244(f), you must include in your EP or DOCD a shallow hazards assessment for each well proposed at an unapproved surface location. Make sure that you include a shallow hazards assessment of a pipeline route in a pipeline application, not in a DOCD.

Include the following in each shallow hazards assessment for an EP or DOCD:

1. A discussion and review of all available geological and geophysical data within 300 meters (985 feet) of each proposed well site to a depth 760 meters (2,500 feet) below the seafloor or to the anticipated surface casing setting depth, whichever is deeper.

2. An assessment of any seafloor and subsurface geologic and manmade features and conditions that may have an adverse effect on the proposed well operations. Seafloor geologic hazards include fault scarps, gas vents, hydrate mounds, unstable slopes, slumping, active mud gullies (crown cracks, collapsed depressions), furrows, sinkholes, surface channels, and reefs. Subsurface geologic hazards include faults, gas-charged sediments, shallow-water flow, and buried channels. Manmade hazards include pipelines, wellheads, shipwrecks, ordnance, communication cables, and debris, including that caused by hurricanes.

3. If applicable, a specific discussion of mass movement of sediments, unstable slopes, active faulting, or gaseous sediments

4. A discussion of any special safety measures that would minimize the adverse effects of shallow hazards on the proposed well, including a discussion of how you will comply with the provisions of Section VI, paragraphs B and C, of this NTL.

5. An interpreted hazards map showing the annotated well locations.

6. A top-hole prognosis diagram, seafloor “rendering” or shaded relief map, and seafloor amplitude map if you are using 3-D seismic reflection data in lieu of high-resolution data to prepare the shallow hazards assessment.

B. Application for Permit to Drill

Under 30 CFR 250.418(h), the appropriate District Manager may require additional shallow hazards surveying and/or analysis to support an Application for Permit to Drill (Form MMS-123). The District Manager may also request to review original survey data.

C. Platform Site Investigation Report

In accordance with 30 CFR 250.906(d), you must prepare and submit for each platform an overall site investigation report that includes the findings of the shallow hazards survey required by 30 CFR 250.906(a).

D. Pipeline Application

In accordance with 30 CFR 250.1007(a)(5), a pipeline application must include a shallow hazards analysis that assesses the proposed route 150 meters (490 feet) on either side of the centerline to a depth of 23 meters (75 feet) below the seafloor for its entire length except for areas with acoustic void caused by biogenic gas, and any additional areas that could be disturbed physically by your pipeline construction activities.

1. Include the following in a shallow hazards analysis for a pipeline for which you conducted a specific pipeline pre-installation survey:

a. A shallow hazards report prepared according to Section IV, paragraph B, of this NTL; and

b. A discussion of any special safety measures that would minimize the effects of shallow hazards on the proposed pipeline, including a discussion of how you will comply with Section VI, paragraphs B and C, of this NTL.

2. Include the following in a shallow hazards analysis for a pipeline for which you did not conduct a specific pipeline pre-installation survey:

a. A discussion of the specific data and reports you used to make the analysis;

b. An assessment of any seafloor and subsurface geologic and manmade features and conditions that may have an adverse effect on the proposed pipeline activities;

c. A discussion of any special safety measures that would minimize the adverse effects of shallow hazards on the proposed pipeline activities, including a discussion of how you will comply with Section VI, paragraphs B and C, of this NTL; and

d. An interpreted hazards map showing the annotated pipeline route.

To provide sufficient information on which to base a shallow hazards analysis for all right-of-way (ROW) pipelines, and for lease term pipelines in water depths 200 meters or greater, conduct a pipeline pre-installation survey, as prescribed in Section III, paragraph C.4, of this NTL. For lease term pipelines in water depths less than 200 meters (656 feet), you may not need to conduct a pipeline pre-installation survey if you can make a thorough analysis using geological and geophysical data or information (seafloor man-made obstructions) from an updated lease survey or site-specific survey conducted using state-of-the-art equipment and a navigation system based on the Global Positioning System (GPS). If you are uncertain about the adequacy of available data or information to prepare an acceptable analysis for a lease term pipeline, you may contact the MMS GOMR Pipeline Section for guidance before you submit the lease term pipeline application.

III. Shallow Hazards Surveys

A. Introduction

Make sure you perform your shallow hazards field surveys by using the navigation systems, patterns, and instrumentation described in paragraphs B through D below. Since shallow hazards surveys are similar to other surveys (e.g., archaeological resource and live-bottom), the MMS GOMR encourages you to conduct the surveys concurrently (see NTL No. 2005-G07, effective July 1, 2005). If you have been directed by the MMS GOMR to conduct a shallow hazards survey, but you would like to use a survey pattern or survey data acquisition instrumentation different from that specified in this NTL, submit a written request (30 CFR 250.142) to the MMS GOMR Plans Section or Pipeline Section, as appropriate, for approval. In your request, include a description of the alternate pattern or instrumentation and a discussion of your rationale.

B. Navigation

Use a state-of-the-art navigation system that can continuously determine the surface position of the survey vessel. Ensure that the precision of the navigation system is ± 5 meters (16 feet). Continuously log position fixes digitally along the vessel track and annotate them on all records at intervals no greater than 150 meters (490 feet). For surveys you conduct in water depths 200 meters (656 feet) or greater, use an acoustic positioning system for the deep tow system or AUV to ensure accurate mapping of any recorded contacts.

C. Pattern

Design the pattern for each type of shallow hazards survey to cover the area of anticipated physical disturbances. This area includes, but is not limited to, the area within which drilling vessel or pipeline-lay barge anchors may be placed, but does not include the area within which work boat anchors will be placed or the area within which similar minimal disturbances may occur.

Use the following survey patterns when you conduct a high-resolution shallow hazards survey:

1. Lease Survey - When it is likely that you will conduct multiple operations on the lease, it may be advantageous for you to conduct a lease survey. A lease survey covers the entire area of a lease, as well as areas external to the lease to provide coverage of an area 300 meters (985 feet) around any wellsite, and areas within which activities may cause physical disturbances. Run a lease survey along parallel lines spaced at a maximum of 300 meters (985 feet) with cross lines spaced at a maximum of 900 meters (2,950 feet).

2. Site-Specific Survey - A site-specific survey covers an area at least 1,800 meters (5,900 feet) square centered upon a proposed drilling or platform site, as well as that portion external to the square within which activities may cause physical disturbances. Run a site-specific survey along parallel lines spaced at a maximum of 300 meters (985 feet) with three equidistant cross-tie lines. You may not need to conduct a site-specific survey in any area sufficiently covered by a lease survey conducted using state-of-the-art equipment and a navigation system based on the Global Positioning System (GPS).

3. Seafloor Obstruction Survey - Before you begin operations involving MODU's, pipeline-lay barges, and anchor-handling vessels, you may need to conduct a seafloor obstruction survey to locate existing pipelines and other potential hazards. You do not need to conduct a seafloor obstruction survey if the data from previously conducted surveys are adequate to accomplish this purpose. Run a seafloor obstruction survey for a well or platform in an area at least 300 meters (985 feet) square with three equidistant primary lines and at least one cross line. Run a seafloor obstruction survey for a pipeline using the same pattern as that required for a pipeline pre-installation survey described in paragraph No. 4 below. For operations in water depths 200 meters (656 feet) or greater, you may need to conduct the seafloor obstruction survey by using a deep tow system or autonomous underwater vehicle (AUV).

4. Pipeline Pre-installation Survey - The survey pattern for a pipeline pre-installation survey consists of a line run along the proposed pipeline route (centerline), an offset parallel line on one side of the centerline located approximately 50 meters (165 feet) from the centerline, and at least two additional offset parallel lines (on either side of the centerline) spaced at a maximum of 300 meters (985 feet). Make sure that the number of offset parallel lines is sufficient to provide coverage of the entire area that could be disturbed physically by your pipeline construction activities.

D. Data Acquisition Instrumentation

Make sure that geophysical instrumentation for shallow hazards surveys represents state-of-the-art technological development. Deploy it in a manner that minimizes interference between the instrumentation systems. Record all data digitally at a sampling rate of at least one sample per second. Interface all data recorders to the navigation system to ensure proper integration of information. Ensure that all instruments are adequately tuned and that all recorded data are readable, accurate, and properly annotated. Use the following instrumentation when you conduct a shallow hazards survey:

1. Depth Sounder

A high-frequency, narrow-beam depth sounder to obtain bathymetry. Set up the depth sounder system to record with a sweep appropriate to the range of water depths expected in the survey area. You may also use a multibeam bathymetry system in lieu of a high-frequency, narrow-beam depth sounder if you need to obtain continuous bathymetric data of 100 percent of the survey area. The MMS GOMR encourages you to use a multibeam bathymetry system in areas where the seafloor is complex or in areas where pinnacles or reef structures exist.

2. Magnetometer

For a shallow hazard survey you conduct in a water depth less than 200 meters (656 feet), a total field intensity magnetometer to determine the presence of pipelines and other magnetically susceptible objects. Tow the magnetometer sensor as near as possible to the seafloor (no more than 6 meters (20 feet)) and in a manner that minimizes interference from the vessel hull and the other survey instruments. Ensure that the magnetometer sensitivity is 1 gamma or less. Make sure that the background noise level does not exceed a total of 3 gammas peak to peak.

3. Sidescan Sonar

A digital dual channel sidescan sonar system with dual frequency of nominal 100 and 500 kHz to record continuous planimetric images of the seafloor. Correct for slant range and ship speed to provide a true plan view. Mosaic the recorded data in areas of complex seafloor relief and unknown manmade debris. Output the mosaics by using the digital map format described in the last paragraph of Section IV.A. of this NTL. Operate the system in a manner that provides 100 percent coverage of the seafloor in the survey area.

Tow the sidescan sonar sensor above the seafloor at a distance that is 10 to 20 percent of the range of the instrument. The following table provides suggested coverage areas.

Height Above Seafloor	**Range at 10 Percent of Fish Altitude**	**Range at 20 Percent of Fish Altitude**
5 meters	50 meters/channel	25 meters/channel
10 meters	100 meters/channel	50 meters/channel
15 meters	150 meters/channel	75 meters/channel
20 meters	200 meters/channel	100 meters/channel

Ensure that the line spacing and display range you use are appropriate for the water depth. In addition, ensure that the data you obtain are of such quality as to permit detection and evaluation of seafloor objects and features within the survey area.

Further, make sure that the vertical sound beam width is appropriate to the water depth, and the horizontal sound beam width provides optimum resolution. Tune the instrument to enhance echo returns from small nearby objects and features without sacrificing the quality of echo returns from more distant objects and features.

For shallow hazards surveys, you do not need to use a sidescan sonar for a lease survey or a site-specific shallow hazards survey you conduct in a water depth 200 meters (656 feet) or greater. However, please be advised that if you propose activities in areas of high archaeological potential, you may not forego conducting a side scan sonar survey nor may you substitute 3-D seismic information for high-resolution sidescan sonar data for archaeological surveys.

For a pipeline pre-installation shallow hazard survey you conduct in a water depth 200 meters (656 feet) or greater, run the sidescan sonar with a deep-tow system or use an AUV in lieu of running it with a cable-towed fish.

4. Shallow Penetration Subbottom Profiler

A subbottom acoustic profiler system to determine the character of near-surface geological features. Make sure that the subbottom profiler system is capable of achieving a resolution of vertical bed separation of at least 0.3 meters (1 foot) in the uppermost 15 meters (50 feet) below the mudline.

For a pipeline pre-installation survey you conduct in a water depth 200 meters (656 feet) or greater, run the shallow penetration subbottom profiler with a deep tow system or use an AUV in lieu of running it with a hull-mounted sonar sensor.

5. Medium Penetration Seismic Profiler

A profiler system to determine the character of deeper geological features. Make sure that the profiler system is capable of penetrating at least 750 meters (2,460 feet) or to any potential surface casing depth, whichever is greater, and that the vertical resolution is less than 6 meters (20 feet). Tow the profiler system cable and source no more than 3 meters (10 feet) from the water surface. The recording sample interval should be no greater than 1 millisecond. Make sure that the maximum channel offset range is no less than ½ the total depth of interest for shallow hazards evaluation.

Make sure that the seismic source delivers a simple, stable, and repeatable signature that is near to minimum phase output with usable frequency content across the 20 to 300 Hz band. A single-channel CHIRP boomer seismic profiler might be more practical in water depth less than 8 meters (25 feet). The MMS GOMR discourages your use of a sparker as an acoustic source unless it demonstrates a high quality signature.

Acquire the data digitally (24 channels or more at group intervals of 12.5 meters (41 feet)). Process the data (time migration) to enhance the interpretation.

You do not need to run a medium penetration profiler system for seafloor obstruction surveys and pipeline pre-installation surveys, as discussed in paragraphs C.3 and C.4 of this section.

6. Three-dimensional (3-D) Seismic Reflection Surveys

For areas in water depths greater than 200 meters (656 feet), you may not need to use a shallow penetration subbottom profiler or a medium penetration seismic profiler (see Items Nos. 4 and 5 above) if you have previously run a 3-D seismic reflection survey over 100 percent of the area (see NTL 2008-G04, paragraph (g), under **Geological and Geophysical Information (30 CFR 250.214 and 250.244)**, for guidance on providing 3-D survey data and information in lieu of high-resolution survey lines when submitting EP's and DOCD's. You may not substitute 3-D data and information for shallow penetration subbottom profiler high-resolution data for pipeline pre-installation surveys. The minimum coverage area for 3-D data is the same as that for high-resolution surveys set forth in Section III, paragraphs C.1 and C.2 of this NTL.

7. Additional Investigations

Under certain conditions, the MMS GOMR may direct you to use additional instrumentation and methods, such as divers, coring, remote or manned submersibles, video cameras on ROV's, and additional geophysical survey lines.

8. Archaeological Discoveries

In accordance with 30 CFR 250.194(c), if you discover manmade debris that appears to indicate the presence of a shipwreck (e.g., a sonar image or visual confirmation of an iron, steel, or wooden hull, wooden timbers, anchors, concentrations of manmade objects [such as bottles or ceramics], piles of ballast rock) within or adjacent to your lease area or pipeline right-of-way during your shallow hazard survey, seafloor obstruction survey, diver inspection, or ROV inspection, you must immediately halt operations, take steps to ensure that the site is not disturbed in any way, and contact the MMS GOMR Regional Supervisor, Leasing and Environment, within 48 hours of its discovery. You must cease all seafloor-disturbing operations within 305 meters (1,000 feet) of the site until the Regional Director instructs you on what steps you must take to assess the site's potential historic significance and protect it.

IV. Shallow Hazards Survey Reports

A. Introduction

According to 30 CFR 250.214(e) and 250.244(e), you must include in your EP or DOCD a shallow hazards survey report (or a reference to a previously submitted report) based on the information obtained from your shallow hazards survey. According to 30 CFR 250.1007(a)(5), you must include a shallow hazards survey report in an ROW pipeline application.

In the shallow hazards survey report, include an evaluation and synthesis of the data you gathered during the shallow hazards survey and integrate it with other available geological and geophysical information with compatible local projections. Make sure that the report is prepared, signed, and dated by a geophysicist or geologist specializing in high-resolution geophysical interpretation. Ensure that these professional personnel have the credentials and experience sufficient to qualify them to perform the necessary work. As needed, specialists in other fields may participate in data analysis and report preparation. The MMS GOMR encourages you to combine shallow hazards survey reports with archaeological resource reports (see NTL No. 2005-G07, effective July 1, 2005), when required, since these reports are similar. You do not need to prepare a shallow hazards survey report for a seafloor obstruction survey, as discussed in Section III, paragraph C.3, of this NTL.

To minimize possible delays in the review of your EP or DOCD by the MMS GOMR, you may submit a shallow hazards survey report to the MMS GOMR Plans Section (reports for lease surveys or site-specific surveys) before you submit the related EP or DOCD.

Whether you include the report with your EP, DOCD, or pipeline application or submit it separately in advance, provide an original, hard copy report and an identical copy (two (2) identical copies if an archaeological report is also included). If the EP or DOCD proposes activities in water depths greater than 400 meters (1,312 feet), provide an additional copy.

In lieu of submitting a hard copy report, you may prepare the report in digital format and submit a CD-ROM (two (2) separate CD-ROM's if an archaeological report is also included). If the EP or DOCD proposes activities in water depths greater than 400 meters (1,312 feet), provide an additional CD-ROM. Submission of shallow hazards reports in digital format may expedite the review of your EP, DOCD, or pipeline application.

If you submit your shallow hazards report on CD-ROM's, make sure that it is a complete report (including all text, maps, sample seismic lines, and other graphics). Submit it as a non-editable (read-only) digital file in portable document format (PDF) with hyperlinks to maps and seismic data examples to facilitate storage, review, and plotting. Prepare the digital copy of all survey maps as shape files (desired format) or drawing (DWG) files for each individual layer group, or GeoTIFF files (for 3-D survey information only) oriented to the North American Datum of 1927 (NAD 27) coordinate system based on latitude and longitude. Make sure that the data are compatible with ArcGIS9.1. Submit the computer-aided design (CAD) files in layers as shown in the Appendix to this NTL.

B. Report Contents

Include the following information in your shallow hazards reports:

1. Area Description

A description of the area that you surveyed that includes the
(a) OCS lease number(s), block number(s), and lease area(s); and
(b) minimum and maximum water depths of the survey area.

2. Personnel List

A list of the individuals involved in survey planning, fieldwork, and report preparation, and a brief description of their duties.

3. Survey Description

A discussion of the shallow hazards survey that includes

(a) a brief description of the navigation system with a statement of its estimated accuracy for the surveyed area;

(b) a brief description of survey instrumentation including scale and sensitivity settings, sampling rates, and tow heights off the seafloor for the magnetometer and sidescan sonar sensors;

(c) a description or diagram of the survey vessel, including its size, sensor configuration, navigation antenna location, cable lengths, and distances from sensors to navigation antenna;

(d) vessel speed and course changes;

(e) sea state and weather conditions;

(f) a copy of the daily survey operations log;

(g) a description of survey procedures, including a statement of survey and record quality, a comparison of data from survey line crossings, and a discussion of any problems that may have affected the ability of the geophysicist or geologist to identify and analyze shallow hazards in the surveyed area; and

(h) an explanation if you were unable to follow the survey line spacing or instrumentation guidelines of this NTL.

4. Maps

A map or separate maps at a scale of 1:12,000 (or 1:24,000 if the survey report involves multiple OCS blocks) and oriented to true north. Include on the map:

(a) a navigation post-plot of the surveyed area, showing lease block lines, latitude-longitude reference coordinates, survey lines and directions, and navigational shotpoints at intervals of no more than 150 meters (490 feet);

(b) bathymetry (at contour intervals of 0.3 meters (1 foot) to 15 meters (50 feet) depending on seafloor morphology);

(c) shallow geologic features;

(d) deep geologic structure (from medium penetration profiler data);

(e) sidescan sonar contacts (use map symbol ⊠);

(f) magnetic anomalies (use map symbol ▲);

(g) areas of shallow gas;

(h) sites of proposed oil and gas operations (e.g., well locations, platform sites, and lease term pipelines), when available at the time of report preparation;

(i) sites of former oil and gas operations (e.g., abandoned wells, removed platforms, and decommissioned pipelines); and

(j) for pipeline pre-installation surveys, the x and y coordinates of the origin and terminus of the proposed pipeline route and the points where the route crosses safety fairway and anchorage area boundaries, existing pipelines, OCS block lines, and the Federal/State boundary.

5. Assessment

An assessment of the potential for shallow hazards within the surveyed area, including but not limited to, discussions of

(a) the general geological background;
(b) oil and gas activity, including wells, platforms, and pipelines;
(c) bathymetry;
(d) seafloor features, including sidescan sonar contacts or ROV video documentation;
(e) geological structure, including faults, river channels, and karst areas;
(f) shallow gas, gas hydrate, and shallow-water flow;
(g) magnetic anomalies; and
(h) unstable seafloor areas.

6. Magnetic Anomalies

A list of all magnetic anomalies of unknown source in a "comma delimited" (ASCII) text file using the following format:

- Anomaly Number, Area, Block Number, Line Number, Shot Point, Tow Height, Signature, Intensity, Duration, NAD 27 Latitude, NAD 27 Longitude, NAD 83 Latitude, NAD 83 Longitude, Avoidance Distance, NAD 27 X Coordinate, NAD 27 Y Coordinate, Coordinate System Number Code

Provide lat/long to six decimal places.

- You may add additional items to the end of the file as long as they are separated by commas.

- Example: 1,"WD","36",6,12.5,23,"Dipole",49,100,29.456824,-90.234546,29.456823, -90.234545,100,99999999,88888888,"LA South"

We recommend that you also provide the above information in a tabular format in the report.

7. Sidescan Sonar Contacts

A list of all sidescan sonar contacts of unknown source in a "comma delimited" (ASCII) text file using the following format:

- Sonar Contact Number, Area, Block Number, Line Number, Shot Point, Length, Width, Height, Shape, NAD 27 Latitude, NAD 27 Longitude, NAD 83 Latitude, NAD 83 Longitude, Avoidance Distance, NAD 27 X Coordinate, NAD 27 Y Coordinate, Coordinate System Number Code

Provide lat/long to six decimal places.

- You may add additional items to the end of the file as long as they are separated by commas.

- Example: 1,"WD","36",6,12.5,50,20,5,"Linear",29.456824,-90.234546,29.456823,-90.234545,100, 99999999,88888888,"LA South"

We recommend that you also provide the above information in a tabular format in the report.

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8. Data Samples

Representative data samples from each survey instrument to demonstrate the quality of the records.

9. Summary

A summary of conclusions and recommendations supported by the survey data and analyses, including a discussion of known or potential shallow hazards and areas to be avoided or that may require further investigations.

10. 3-D Seismic Reflection Data

If you are using 3-D seismic reflection data to prepare your report in lieu of high resolution data, information that includes

(a) a discussion of the regional geologic setting and seafloor and subsurface conditions;
(b) examples of interpreted seismic sections;
(c) a discussion of the acquisition and processing of the 3-D seismic data you used;
(d) a bathymetry map;
(e) a seafloor "rendering" or shaded seafloor features;
(f) seafloor amplitude; and
(g) a time to depth conversion table for surveys in frontier areas.

V. Original Survey Data

Retain all original shallow hazards survey data for a lease and make it available upon request to us at any time prior to lease termination. Retain the original survey data for a pipeline ROW until the MMS GOMR notifies you that the as-built location report is acceptable.

VI. Mitigation of Potential Shallow Hazards

A. EP's, DOCD's, and Pipeline Applications

When a shallow hazards survey and report and/or shallow hazards assessment or analysis review by the MMS GOMR indicates a potential hazard within the immediate area (see below for description of "immediate area") of your proposed operations, select one of the following three alternatives:

1. Amend your EP, DOCD, or pipeline application to locate the site of the operations to avoid the potential shallow hazard;

2. Demonstrate to the MMS GOMR that the use of special protective measures will minimize the risk to safe operations; or

3. Establish, on the basis of further investigation using such equipment and techniques the MMS GOMR deems necessary, that such operations will not be adversely affected by the shallow hazard.

For magnetic anomalies with an intensity 50 gammas or greater and sidescan sonar contacts, the immediate area is the area inside a circle centered on the feature with a radius of 30 meters (100 feet). You may change this avoidance distance depending upon the signature, intensity, ambient magnetic field, and duration of any individual anomaly or contact.

For geologic features (e.g., shallow faults, shallow gas, the edge of a surface channel [not applicable for pipelines], a hydrate mound, a fluid expulsion mound, a mud volcano, a sink hole, a crown crack, a collapse depression, the nose of a mud lobe, an active mud slide, a fault scarp), the immediate area includes any site located within 75 meters (245 feet) of the feature.

B. Preparing for Operations

Before you conduct any OCS operations using MODU's, jackup or lift boats, pipeline construction vessels, derrick barges, anchor-handling vessels, or any other bottom founded or supported vessels:

1. Gather up-to-date seafloor information on the sites that will be physically disturbed. Make sure it reflects any changes brought about by recent operations or storms. If needed, perform a seafloor obstruction survey (see Section III, paragraph C.3 of this NTL) to locate existing pipelines, debris fields, rig can holes, and other potential hazards.

2. Either

(a) Input the up-to-date information into a state-of-the-art, real-time navigational positioning equipment (e.g., DGPS) system and use the system to depict all existing pipelines and other potential hazards located within 150 meters (490 feet) of the operation (including anchor patterns);

(b) Using the up-to-date information, buoy all existing pipelines and other potential hazards located within 150 meters (490 feet) of the operation (including anchor patterns) or outline with buoys a safe working area large enough to accommodate the proposed operations if the area is highly congested with pipelines or debris; and/or

(c) For jack boats or lift boats servicing platforms, using the up-to-date information, prepare a sufficiently detailed plat with a minimum scale of 1:12,000 and oriented to true north depicting the location of the proposed activity, all associated anchor patterns (if applicable), existing pipelines debris fields, rig can holes, and other potential hazards in the area. On the plat, indicate safe areas where the legs of the lift or jack-up boat can be jacked down and potential safe approach and departure paths to the platform. Make sure that the plat is dated and accurate. Provide copies of this plat to all key personnel involved with the boat move.

C. Conducting Operations

1. While conducting operations, use the above method(s) to ensure that you avoid each potential shallow hazard.

2. If you are using the buoying option described in paragraph B.2.b above, or the plat option described in paragraph B.2.c above, and you plan to move a MODU or a lift or jack-up boat within 150 meters (490 feet) of an existing pipeline(s) that is near a platform, make sure that the move takes place only during daylight hours, unless the platform has four or more piles and the move will occur on the side of the platform opposite the pipeline(s).

3. If you plan to move a lift or jack-up boat during daylight hours within 30 meters (100 feet) of any existing pipeline that is near a platform, use either (a) reflectors to depict the location of the pipeline (if buried) ***and*** a real-time acoustic imaging sonar scan while approaching the location; or (b) alternate procedures and/or equipment that provide an equivalent level of safety and protection.

4. If you plan to move a MODU or a lift or jack-up boat at night, under the conditions outlined in paragraph C.2 above, within 30 meters (100 feet) of any existing pipeline, use reflectors to depict the location of the pipeline (if buried) ***and*** a real-time acoustic imaging sonar scan while approaching the location.

5. If you are using the state-of-the-art, real-time navigational positioning equipment option described in paragraph B.2.a above, and you plan to move a MODU within 30 meters (100 feet) of any existing pipeline, use reflectors to depict the location of the pipeline (if buried) ***and*** a real-time acoustic imaging sonar scan while approaching the location.

6. While approaching a location, do not completely lower or drag the MODU or lift or jack-up boat legs or mat until the vessel is on location. Before departing a location, raise the vessel legs or mat sufficiently to ensure no contact with pipelines and other potential hazards.

Guidance Document Statement

The MMS GOMR issues NTL's as guidance documents in accordance with 30 CFR 250.103 to clarify, supplement, and provide more detail about certain MMS regulatory requirements and to outline the information you provide in your various submittals. Under that authority, this NTL sets forth a policy on and an interpretation of a regulatory requirement that provides a clear and consistent approach to complying with that requirement. However, if you wish to use an alternative approach for compliance, you may do so, after you receive approval from the appropriate MMS GOMR office under 30 CFR 250.141.

Paperwork Reduction Act of 1995 Statement

The collection of information referred to in this NTL provides clarification, description, and interpretation of requirements contained in 30 CFR 250, subparts A, B, D, I, and J. The Office of Management and Budget (OMB) has approved the information collection requirements in these regulations and assigned OMB Control Numbers 1010-0114, 1010-0151, 1010-0141, 1010-0149, and 1010-0050, respectively. This NTL does not impose additional information collection requirements subject to the Paperwork Reduction Act of 1995.

Contacts and Mailing Addresses

A. Contacts

The following chart provides contact names, telephone numbers, and e-mail addresses if you have any questions on shallow hazards surveys or reports.

For...	Contact…	At...	Or at...
Shallow hazards reports in EP's and DOCD's	Ms. Elizabeth Peuler	**Elizabeth.Peuler@mms.gov**	(504) 736-2581
Shallow hazards reports in pipeline applications	Mr. Alex Alvarado	**Alex.Alvarado@mms.gov**	(504) 736-2547
Conducting shallow hazards surveys or preparing shallow hazards reports	Mr. Adnan Ahmed Dr. William Kou	**Adnan.Ahmed@mms.gov** **William.Kou@mms.gov**	(504) 736-2501 (504) 736-2703
Reporting any shipwreck discovered while conducting a shallow hazards survey	Mr. Joseph Christopher	**Joseph.Christpher@mms.gov**	(504) 736-2759

B. Mailing Addresses

The following provides the mailing addresses for the respective MMS GOMR offices where you submit shallow hazards reports and any requests regarding shallow hazards surveys or reports.

For...	Insert in blank space below
MMS GOMR Plans Section	Plans Section (MS 5230)
MMS GOMR Pipeline Section	Pipeline Section (MS 5232)

U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Region
Office of Field Operations
Attention: ____________________________
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

[original signed]

Lars T. Herbst
Regional Director

Appendix

Appendix

Format for Digital Maps

Group 0

Label the first layer as the base map or number zero (0). This layer is the base layer on which all other layers are created. It contains the background data used for plotting features, lines, points, etc. It is not the layer on which points, lines, features, labels, etc. are visible.

General Information Group (layers 100-199)

Layers 100 through 199 contain all pertinent reference information found on the map (including labels, block lines, and other reference information for the overall map). This layer is separate from the location of data features on the map. It serves only as a legend and background information for understanding the data placed on the overall map. Include the following layers in this group:

1. Overall legend including all symbols used for depiction of
   (a) infrastructure such as pipelines and wellheads;
   (b) biological features including live bottoms, topographic features, and chemosynthetic communities;
   (c) geophysical characteristics such as acoustic voids or faults; and
   (d) other features such as unidentified magnetic anomalies and sidescan sonar targets (with avoidance radii), buried channels, and shipwrecks.

2. Make sure that each item keyed into a legend and appears as a separate layer within one of the following items:
   (a) project area map;
   (b) map scale;
   (c) map title;
   (d) company names;
   (e) personnel names, dates, file and job numbers, and map numbers (e.g., map 1 of 2);
   (f) map borders;
   (g) north arrow;
   (h) OCS area name(s) and block number(s);
   (i) lease numbers;
   (j) Federal/State boundaries;
   (k) graticules used in delineating latitude and longitude;
   (l) tic marks used to delineate State plane or UTM coordinates;
   (m) table of unidentified sonar targets depicted on the map (when appropriate); and
   (n) table of unidentified magnetic anomalies (when appropriate).

Infrastructure Group (layers 200-299)

Layers 200 through 299 contain all industry infrastructure. Place all labels pertaining to infrastructure in this group on a separate layer (i.e., all pipeline, borehole, well, structure removal labels may be on one layer and that layer located within the category of infrastructure). Include the following layers in this group:

(a) pipelines;
(b) boreholes;
(c) capped wells;
(d) proposed activities;
(e) fairways and anchorage areas; and
(f) removed structures.

Navigation Data and Bathymetry Group (layers 300-399)

Layers 300 through 399 contain the post-plot of the navigation data as well as all bathymetric data. Place all labels pertaining to the post-plot of navigation data or bathymetry data in this group on a separate layer (i.e., all shot points and line labels may be on one layer and that layer located within the category of navigation data). Include the following layers in this group:

(a) survey lines and shot points; and
(b) bathymetry data.

Seafloor Features Group (layers 400-499)

Layers 400 through 499 contain all of the geological features and unidentified sidescan sonar targets and magnetic anomalies located by the shallow hazards survey. Identify these features and anomalies with their appropriate symbols. Place all labels pertaining to these individual features in separate layers (magnetic anomalies have a layer that has only labels corresponding to the individual magnetometer targets; unidentified sidescan sonar contacts have their own label layer; etc.). Include the following layers in this group:

(a) unidentified sidescan sonar contacts (use map symbol ⊠);
(b) unidentified magnetic anomalies (use map symbol ▲);
(c) artificial reefs and artificial reef planning areas;
(d) seafloor fluid expulsion features and gas vents;
(e) brine seeps and brine pools;
(f) seafloor scarps with height;
(g) mounds and pinnacles;
(h) organic reefs and relict reefs;
(i) deepwater coral locations (e.g., Lophelia reefs);
(j) outcrops and hard bottoms;
(k) live bottoms (pinnacle trend);
(l) named topographic features and their protection zones;
(m) seafloor faults;
(n) areas of seafloor slumping, debris flows, mud slides, and collapse depressions;
(o) seafloor hydrate mounds;
(p) scour and furrows;

(q) natural and dredged channels; and
(r) other seafloor features and anomalies (e.g., shipwrecks, pockmarks, can holes).

Subsurface Features Group (layers 500-599)

Layers 500-599 contain all subsurface features located by the shallow hazards survey. Place all labels pertaining to these individual features in separate layers (e.g., all labels for channel margin features should be on one layer). Include the following layers in this group:

(a) buried faults with depth labels;
(b) shallow gas as seen on shallow penetration subbottom profiler (acoustic voids);
(c) shallow gas as seen on medium penetration seismic profiler or conventional seismic reflection data (2-D or 3-D) (high amplitudes, bright spots) with depth labels;
(d) buried slumping;
(e) buried hydrates (e.g., bottom simulating reflector (BSR), seismic blanking);
(f) shallow waterflow zones;
(g) salt;
(h) significant geologic features;
(i) karst features; and
(j) buried channel features.

APPENDIX F: Jack-up Post Installation Data Collection Form

OCS Location: ____________ Date of Report: _____________

Company: _____________Contact: _______________ Email: ______________

Rig Name: ____________ Designer/Design Model: ___________________

2. Site Information: Lat: ___________ Long: __________ Block:____________

Waterdepth: _____________ Orientation:_________ Airgap:______________

If working on a well or platform – designation of the platform/well (if possible attach diagram of jack-up oriented to a well to determine distances of legs from the well.
_______ ____

Soils Data Used: Boring Location: _____________________

Boring distance from location: ____________ Date of Boring:_______________

Description of boring to depth of interest or attach copy of Load/Penetration curve:

____

Mat Penetration (jacking up):
Forward: ______ Starboard: ________Port: _________
Mat Penetration (after preload if applicable):
Forward: ______ Starboard: ________Port: _________

Independent Leg Penetration:

Initial	Bow Leg: ______	(ft)	Port Leg: _______	(ft)	Stbd. Leg:________	(ft)
Preloaded	Bow Leg: ______	(ft)	Port Leg: _______	(ft)	Stbd. Leg:________	(ft)
Prior to Departure	Bow Leg: ______	(ft)	Port Leg: _______	(ft)	Stbd. Leg:________	(ft)

Please provide a plat showing location in relation to infrastructure within 200 yards.

Were there any events that occurred at the location which would impact future rigs – if so please describe:
____
____

Seed Questions:

Items dropped overboard, not recovered? ______________________________

Penetration different than boring/previous info indicated? ________________

Offshore: Risk & Technology Consulting Inc.

CORPORATE HEADQUARTERS

506 Nottingham Oaks Trail, Suite 200,

Houston, Texas 77079

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Principal: Malcolm Sharples, B.E.Sc, Ph.D., MIME, CEng. P.E.