USER MANUAL
Drillship

RAPID RESPONSE DAMAGE ASSESSMENT

September 2019

Contents

Revision History

Date of Revision	Detail of Revision	Approved
September 25, 2019	Added Copyright reference to front page.	RH
	Added note on Page 4 about changes to vessels principal characteristics.	RH

If you need Emergency Stability and Strength Analyses, call RRDA now at +1-(281)-872-6161 and email the most recent loading computer output to rrda@eagle.org.

- All pages of the output should be sent.
- State date and time of the condition.
- Note any significant revisions to the condition.

Note regarding changes to the principal characteristics of the vessel.

Any changes made to the vessel that revises lightship, hydrostatic particulars or hull strength, must be communicated to rrda@eagle.org for consideration. Examples of this are a tanker conversion to FPSO and an added mid-body section to a container ship. Other conversions apply.

SECTION

1

RRDA Program

1.1 General Information

RRDA maintains a website for access to the latest RRDA User Manual and other related documents. The page is found at the following link:

https://ww2.eagle.org/en/Products-and-Services/rapid-response.html

RRDA complies with the following regulations and industry guidelines:

- MARPOL Regulation 1/37(4), as circulated by resolution mepc.117(52), all oil tankers of 5,000 tonnes deadweight or more shall have prompt access to computerized shore-based damage stability and residual structural strength calculation programs.
- MARPOL 73/78 Annex I, Regulation 37 requires a shipboard oil pollution emergency plan (SOPEP) for all tankers of 150 gross tons or more and all other vessels of 400 gross tons or more.
- US Coast Guard requirements of OPA 90 in 33 CFR 155.240 for oil tankers and offshore oil barges, in which owners are required to have "prearranged, prompt access to computerized shore-based damage stability and residual structural strength calculations."
- The ISM Code, Section 8, requires the company to establish procedures to respond to potential emergency shipboard situations, including the use of drills and exercises to prepare for emergencies.
- OCIMF Guidelines on Capabilities of Emergency Response Providers.
- IACS Rec. No. 145 Recommendation for the Operation of Shore-Based Emergency Response Services.

The ABS Rapid Response Damage Assessment (RRDA) Program is administered from ABS headquarters in Spring. Texas, USA. The facility provides rapid response damage assessment support during an emergency incident affecting an enrolled vessel's stability and hull strength.

RRDA maintains an agreement to provide this service and rig-specific data for the MODU is stored electronically at ABS. This data is provided for responding to an emergency on board. RRDA should be considered an extension of the rig's own shoreside emergency response team capability.

RRDA is activated when the Master or shoreside Crisis Management Team calls the RRDA 24-hour emergency number and requests assistance with an emergency incident.

The time required for RRDA to provide accurate analyses for any given scenario affecting stability and strength is dependent on:

1. Receipt of the rig load condition and damage reports, taking into consideration if the vessel has retractable thrusters and if so, their position at the time of the emergency incident.
2. The complexity of the problem

The RRDA Program does not cover salvage engineering, class surveys, or surveys in connection with repairs, damages, conversions, compliance with outstanding recommendations, extensions, lay-up or reactivation, modifications/alterations, riding ship, change of flag or new installations.

When requested by a flag Administration, ABS is obliged to provide details of its evaluations and files. When a rig is classed or issued with a Load Line by ABS, the ABS Classification department will be advised that the RRDA team is evaluating damage on an ABS-classed or Load Line-only rig. The ABS RRDA team will review the most recent available survey status for the vessel and will communicate response activity to the ABS Classification department for consideration. However, a survey by the class surveyor continues to be a requirement for subsequent evaluation of damage and repairs or when a Certificate of Fitness to Proceed[1] is to be issued.

ABS does not act as a principal in the matter of salvage or repairs. ABS can only act in an advisory capacity, leaving it always to the client to accept or reject such recommendations as ABS may make. ABS has no authority to order or contract for repairs, salvage or other matters.

1.2 Instructions for Validating Enrollment Status

This instruction applies to vessels that are ABS classed only.
(Vessel that are not classed with ABS, will be provided an RRDA Certificate valid for 12 months)
This instruction is intended to ensure that Masters, vessel managers and other parties (Port State Control Officers, Vetting Inspectors, etc.), can easily validate whether a vessel is enrolled in the ABS RRDA Program.
There are two means to confirm if a ship is enrolled in RRDA.

1. Examination of the ABS Class Certificate.
   The vessel is enrolled in the RRDA program if the Class Certificate shows “RRDA” in the Additional Notations.
   For example:

   ADDITIONAL NOTATIONS
   RRDA, BWE, CRC(I), TCM, GRAB [20]

2. The Class Record
   Details provided in the ABS Record are available via the internet and provide reference to the RRDA notation as follows:
   https://ww2.eagle.org/ > Rules and Resources >ABS Record, Online Database >Search the Database >Enter vessel name or other search criteria >Scroll to Additional Notations.
   For example:

Additional Notations
RRDA, BWE, CRC(I), TCM, GRAB [20]

[1] Class authorization for the rig to transit, issued after recommendations made by the attending surveyor have be completed.

1.3 Types of Analyses for Response

Using the RRDA HECSALV™ model for the ship, the following useful analyses can be made:

1. Calculation and verification of initial loading condition prior to incident.
2. Calculation of afloat residual stability, evaluation of compartment flooding effect on stability after damage.
3. Evaluation of possible flooding scenarios due to progressive flooding or additional damage.
4. Calculation of wind environmental force on the unit and evaluation of the impact on the unit.
5. Evaluation of plans for offloading, ballasting or weight transfer sequences to improve residual stability and strength.
6. Calculation of residual strength of ship shaped units following structural damage.
7. Evaluation of residual strength for one way trip to safe location and/or repair facility.
8. Calculation of ground reaction force.
9. Calculation of the bending moment and shear stresses from grounding.
10. Evaluation of plans for refloating.
11. Other calculations as appropriate for the circumstances and conditions.

1.4 Drills

Knowledge about the RRDA program may be improved with regular drill activity. Drills correctly align mutual expectations and promote a more efficient level of response should an actual incident occur.

The Crisis Management Team ashore usually exercise their response capability annually and invite RRDA to participate at the appropriate level. Drills may connect RRDA and the rig directly but it is more usual that RRDA communicates with the DPA/crisis management team ashore, who relay related information to and from the rig. This relieves the OIM/Master of the need to duplicate calls and ensures all parties are using the most current information. (This is most relevant in an actual response)

RRDA's capacity for response may be tested at any time and to the extent the rig manager deems appropriate. Generally though, provision of drill activity is contingent on the following:-

1. Notification is given to RRDA by email (rrda@eagle.org), with at least one week notice.
2. Any charges to be incurred by the rig manager are agreed in advance.
3. RRDA may decline a proposed drill time if the drill activity is in conflict with other scheduled drill activities previously agreed to by RRDA.
4. RRDA may cease drill activities if RRDA is activated for an actual ship incident.

The extent that RRDA is involved in a drill can vary depending on the operator's requirement. Variations are:-

1. Live drill role play. RRDA is activated and provides analyses reports and recommendations according to the scenario and information provided by the operator. This tests RRDA's capacity to respond.
2. Pre-drill analyses. RRDA contributes to a drill scenario developed by the operator, providing accurate input data with respect to how the ship will react to a grounding or collision or other serious event. This is done in advance and allows the operator to script

a scenario and use RRDA's reports to inject accurate results. For the operator, this validates that RRDA has an effective model of the ship and that accurate analyses can be completed and reports generated.

3. Post-drill reporting. RRDA is requested to provide analyses reports after a drill is completed, using data provided by the operator. This will validate that RRDA has an effective model of the ship and can provide analyses of the conditions communicated by the operator.
4. Communication drill. Ship or management office calls RRDA's emergency number for a communication drill. This validates the number is correct and that RRDA can be activated. This is done by speaking with RRDA staff directly or, if after normal office hours, by speaking with an RRDA call center operator.

All drill activity is logged with RRDA.

1.5 Training

RRDA offers short training sessions that can be delivered remotely via the Web or by office visit. Contact rrda@eagle.org for details.

SECTION

2

Communications

2.1 Activating/Notifying RRDA Team

To activate the ABS RRDA team, the client is to establish verbal communication using the phone numbers provided below. RRDA is most commonly contacted by the crisis management team including the Designated Person Ashore (DPA), Offshore Installation Manager (OIM) or vessel Master, depending on company policy.

MOST IMPORTANT - Do not attempt to initiate an RRDA response using email only

24-hour Emergency Numbers
Primary: +1- 281-872-6161
Alternate: +1- 281-820-8697

For Consideration.

1. Do not wait to collect all information before calling. Initiate contact with RRDA immediately and provide additional information when it is available.
2. Always establish verbal communication with RRDA first. RRDA email is monitored during normal office hours only so email communications received after normal office hours will probably not connect to RRDA personnel within the time needed for an effective emergency response.

2.2 Time to Respond.

The RRDA team will respond immediately for calls received during office hours. After office hours and during weekends or holidays, your call will be taken by a call center representative who will then alert RRDA and relay message details. That process is expected to take about 30 minutes. It may be less. An RRDA Team Leader will call you back using the contact details given, and when it is confirmed that the RRDA team is required, the Team Lead and other staff will immediately travel to the RRDA facility. It is expected that RRDA will be in attendance at the office within two (2) hours after the initial call is made. It may be less.

2.3 Office Hours

The normal office hours are as listed below. During these normal office hours, a member of the ABS RRDA team can be expected to answer the incoming call directly. If personnel are temporarily unavailable, the line will automatically transfer to a call center operator who will take note of critical details and then relay that information to RRDA personnel directly.

Monday through Friday 7:30 a.m. to 4:30 p.m. (0730 to 1630) – Central US Time

Note:
Non-emergency inquiries relating to RRDA are welcomed by phone or email. Such inquiries should be made by email (rrda@eagle.org) or using the ABS main number (+1-281-877-6000).

2.4 After Office Hours

After office hours and during holidays, any emergency call directed to RRDA using the +1 281 872 6161 and the +1 281-820-8697 numbers, will be answered by the ABS RRDA call center. The caller will be asked for a contact name, vessel name and IMO number, call back number and nature of the incident. The call center operator will then connect directly with RRDA personnel to initiate the RRDA response and you will be called by the RRDA Team Leader directly thereafter.

2.5 Action After Voice Notification

After the initial phone contacts have been established and you know RRDA is activated, an email confirmation of the rig status should be sent to RRDA.

FOR INFORMATION THAT RRDA NEEDS - GOTO Section 4.

Email: rrda@eagle.org
Fax: +1-(281)-877-5964

SECTION

3

Information Sharing

3.1 Information Requirements

Emergency incidents are not prescriptive. In an emergency, phone conversations and email exchanges with RRDA will develop the mutual communications and information requirement that is relevant to the incident. Priority will be discussed with respect to the incident and what information is most important for RRDA to receive. Effort will always be made to ensure that information requested from the rig is important and relevant to the requirement. Early and transparent sharing of information is key.

INFORMATION THAT RRDA NEEDS - GOTO Section 4.

3.2 Load Condition Before the Incident.

MOST IMPORTANT!

The rig's loaded condition has to be provided to RRDA; without it, analysis results will not be reliable. Summary and detailed load distribution should be provided, including all variable and setback as applicable.

The load condition should be sent to RRDA as output from the loading computer. If the rig personnel routinely send the load condition information to RRDA, this should be identified in the initial contact and is also identified in the reporting format provided in this manual.

3.3 Collision/Damage/Flooding - (Not a Grounding Event)

The goals of RRDA are to identify the resulting damaged condition, to maintain stability, monitor hull stress and consider pollution. Analyses will examine sensitivity of the rig to reduced stability caused by buoyancy loss and increased free surface. Shifted variable loads may result in asymmetric loading and induced list with increased likelihood of deck edge immersion and down flooding. Collision may cause substantial damage about the side and deck and will reduce the measure of residual hull strength. Explosion is another event type requiring special analyses of the strength and the subsequent effect of changes to internal subdivision. Consideration must also be given to limiting the potential for pollution, either by transferring fuel oil away from the damaged area into alternate tank volume on board or by transfer/offload.

FOR INFORMATION THAT RRDA NEEDS GO TO Section 4.

3.3.1 Comments and Considerations

a. Uncontrolled ingress should be managed to the extent possible and water ingress to large spaces has to be considered very carefully. Free Surface Effect cannot under any circumstances, be underestimated.
b. Unless it is clear that pumps are incapable of bettering the ingress rate, the default condition should be to keep pumping, at least until alternate recommendations have been considered.
c. If the hull side is breached to the extent that seawater passes freely into a space, the space is considered to no longer contribute to buoyancy or stability. If the space boundary is intact but contains water due to another cause like ballast tank or piping failure or flow via an opening on deck, the space remains intact and continues to contribute to stability however, the effect of free surface and reduced righting moment, will be of particular interest.
d. The rate of seawater ingress into a space will decrease as water depth in the space increases because the pressure differential reduces as balance occurs. Therefore, initially, the pumping capacity to discharge a flooded space may not be adequate to prevent flooding but the same capacity might prevent the space from becoming fully flooded as the ingress rate slows. This may be of no concern or advantage for tank spaces that can be allowed to flood completely but, managing ingress to the lowest possible height in machinery spaces will be critical and this could provide a measure of advantage that makes the difference. Also, depending on type, pump efficiency may increase as the water level in a space adds pressure at the pumps inlet.
e. Oil outflow from damaged fuel tanks depends on the induced movement of oil, either because its height in the tank creates a head pressure compared to sea level or (and) it is displaced out of the tank by ingress of seawater with a higher specific gravity. If seawater ingress into the tank is rapid, normal tank suction arrangements will be covered by seawater preventing suction on the oil. Therefore, if oil is to be transferred out of a damaged tank successfully, pumping must be commenced without delay. The effectiveness of the transfer will depend on water ingress rate versus pumping capacity.

3.3.2 Useful questions and things to consider

a. Was this collision a T-bone or side-swiping contact?
b. What is the other vessel name and IMO number? (RRDA will do a search of the Web to source a photograph of the ship)
c. Other vessel draft at the bow. This information is useful when considering location and extent of damage. For example, damage sustained from contacting a cruise ship with an enormous bulbous bow and extensive bow flare is expected to be different to that of a more vanilla shaped bulk carrier.
d. Did the rig take a list? How much? Why? Is the rig still settling?
e. Is fuel being lost from a tank? At about what rate? Take ullages.
f. Is seawater entering the rig? Take soundings. If spaces are dry, damage may be isolated to above the waterline. It is critical that damage isolated above the waterline remains above the waterline. If, for whatever reason, the rig is listing toward the damaged side, the condition should be checked and options weighed.

3.4 Grounding

INFORMATION THAT RRDA NEEDS GO TO Section 4.

The analyses of ground reaction is more complex when thrusters are considered. Thrusters are vulnerable to contact loads and may shear and separate from the hull, allowing the rig to float free and move further inshore. RRDA will consider thrusters as pinnacle contact loads where seafloor contact is occurring and can modify reactions according to hull draft reports. Accurate reactions will be used in determining if the rig can be refloated without lightering or the extent to which lightering arrangements must be planned. Reported flooding and the effect of tide will be considered, as well as whether there is internal capacity to change load distribution by transferring variable, fuel or changing ballast. Consideration for the measure of stress in the hull will be made based on bottom contact details provided to RRDA.

3.4.1 Comments and Considerations

a. Anchors

Consideration should be made to the deployment of anchors in order to arrest movement onto the lee shore or obstruction. Clearing anchors from the hawse in a controlled condition is preferred and then either walking the chain or letting-go, depending on the water depth close-in and whether the seafloor is rising gently of shelving rapidly.

b. Drafts

Your initial report to RRDA should include a best estimate of the drafts aground and the time that the drafts were taken. RRDA's analyses result is contingent on the accuracy of drafts and the change that occurred when the rig grounded. It is acknowledged that drafts may not be easy to obtain and with wave action on the hull, confidence in the accuracy of draft readings may not be high. Even so, the data is critical. Best efforts are needed to establish a baseline and tuning for improvement can always be done as the situation settles, as daylight comes and as support arrives.

i. An attending boat or tug is probably the best way to acquire good drafts and soundings about the hull.

ii. If boats are not available, depending on conditions and equipment on board, the drafts may best be determined by observing the freeboard or height from the waterline to the deck or another fixed structure, noted on the General Arrangement plan.

c. Thrusters

Clearly indicate whether thruster height is to be considered in the grounding condition and any known loss or damage to thrusters. Consider whether the thrusters can be retracted and the extent to which any damage sustained, will prevent retracting the thruster(s).

d. Contact area

An accurate ground definition must be provided when possible. When known, the shape of the contact area can be applied into the RRDA model and this allows for a more detailed assessment of how the rig will react to changes in loads. It is also important in determining a more complete assessment for hull stresses that are greatly influenced by bottom support and is essential for planning and monitoring purposes.

i. Divers or ROV may be used for reporting the contact area. Divers are essential for determining the location of single or multi pinnacle contact areas including contact by thrusters.
ii. Contact area can also be reported by sounding around the rig using a lead line or other device. Use the form provided for reporting. Sketches are greatly encouraged.
iii. Use an attending pilot boat, tug or FRC to obtain soundings about the ship.
iv. Be aware that softer bottom materials like mud and clay tend to mound and rise against the bow and will create what appear to be odd or doubtful depth readings. Trust what you have and report same.
v. Be aware that sand can be moved about the hull by strong currents with resulting changes in the sounding due to scouring and deposit.

e. Damage

Structural bottom damage frequently occurs during grounding. This can be local buckling with hull plate cracks and tearing and having little effect on longitudinal strength. Alternatively, it can be as gross deformation over large areas of the bottom with impact to the inner bottom structure and bulkheads. Identifying the extent of damage under these circumstances will undoubtedly be hindered due to limited or zero access. Voids and tank spaces may be flooded and inaccessible.

f. What if?

Consideration must be made to the potential for conditions on board deteriorating, specifically with respect to the integrity of rig systems that are intact and operational initially but which fail later. Piping as an example. It may be that fuel oil could have been transferred away from the damaged area early on but later, with subsequent buckling loads on the lower structure, piping becomes disabled and ceases any opportunity for transfer or lightering the fuel, which then can require special effort by salvors to remove and has the potential to become a pollution event.

g. Refloating

Before the rig is allowed to refloat, particularly when flooding and structural damage are identified, RRDA will analyze the refloat condition to ensure that the condition gives sufficient stability and strength margin.

When a significant measure of buoyancy is lost due to hull breaches with flooding in several spaces, salvors may deem it necessary to induce buoyancy using low pressure compressed air inside the damaged spaces. This forces sea water back out of the hull, reduces ground reaction and improves the afloat condition. With the rig afloat, temporary patches can be applied and the rig dewatered to the extent needed to meet the requirements of the recovery plan.

h. Unaccountable list after refloating?

The drafts, list and trim will be determined by RRDA prior to the refloat, with results based on the known loaded condition. If there is good confidence regarding weights on board and the extent of flooding, but the rig refloats with a “mystery list”, consideration should be made to the possible taking-on of heavy sea floor material into damaged spaces. The extent to which such unintended loading affect list and trim, depends on the heeling moment, the measure of the rig’s initial stability and the volume and relative density of the material deposits.

3.5 Lightering

Lightering the rig may be required for refloating after a grounding event or to mitigate risks associated with hull stresses, stability and pollution. It is the rig that will develop the plan for lightering and RRDA will assist in the plan development by provision of supporting analyses that considers effects of damage.

3.6 Moving a Damaged Rig

Authorization for a damaged rig to be moved is contingent on reviews by flag, the Classification Society, coastal State and perhaps the Port Authority. Other stakeholders also contribute to the process of recovery. Many of these considerations remain outside of RRDA's scope; however, when damage has been sustained to a ship that affects hull strength and stability, RRDA will continue to provide analyses that determines the margin of strength and stability for the proposed transit route. This work relies on review of accurate damage assessment reports that are usually provided by the attending class surveyor.

SECTION

4

Useful Forms

The following forms and illustrations are intended to be used for efficiently communicating important information to RRDA. The expectation is that these can be quickly completed by hand and copied to .pdf for emailing to rrda@eagle.org.

These forms are available as an editable document. Contact rrda@eagle.org for a copy.

Initial Incident Report

Date and Time	UTC or Local (?)
Rig Name	
IMO Number	
Flag State	
Incident Type	
Location (Block & Lat/Long)	
Preferred Contact Name	
Preferred Telephone	
Preferred Email	
CC. Email(s)?	

Stability computer output report has been sent to rrda@eagle.org? (Most important)	YES	NO	
Load conditions are sent routinely on this rig and RRDA has the condition	YES	NO	N/A

ENTER COMMENTS RELATING TO THE ABOVE OR OTHER USEFUL INFORMATION HERE:

Follow-up Incident Report

Date and Time		(Local/GMT)
Rig Name		
Position	Lat.	Long.
Nature of Incident		
Contributing Information	Hull spaces are breached	Y N (write note below)
	Pollution to the sea	Y N (write note below)
	Hull structure is known to be damaged	Y N (write note below)
	Has weight (variable) shifted or been lost	Y N (write note below)
	Density of water body	kg/m3
	Ballast system is operational	Y - @ about m3/hr. N
	Bilge pumps to other spaces is operational	Y - @ about m3/hr. N
	E.R. bilge system is operational	Y - @ about m3/hr. N
	Propulsion is available	Y N
	Rise is remains connected to LMRP	Y N
	Thrusters retracted (if retractable)	Y N
	Steering is available	Y N
	Anchors are available	Y N
	Swell height (m) and period (sec)	
	Wind speed (knots) and direction	
	Photos attached of damage or associated subject	Y N

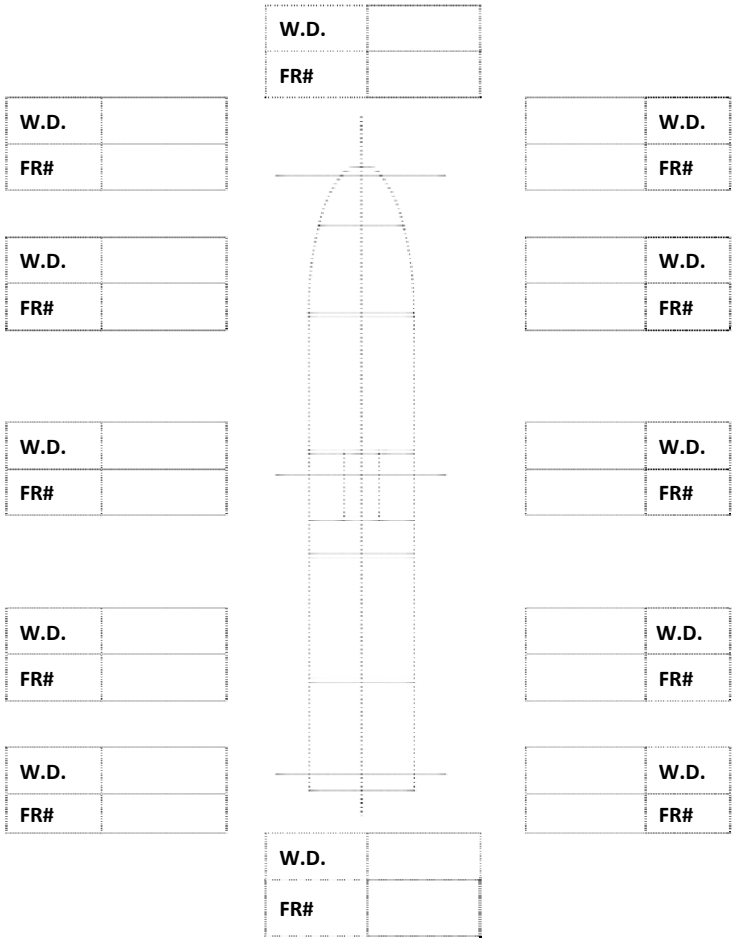
Rig is Afloat	Water depth or UKC	(m or ft)
	Heel/list (°)	P or S
	Max. roll angle (°) and period (sec)	
	Approx. steady heading	
	Seas breaking on deck	Y N
	Main deck openings secure	Y N (write note below)
	Deck edge immersed	Y N
	Other vessel I.D. (if collision) Name and ship type	

Rig is Aground	Time of grounding (very important)	(Local/GMT)
	Accurate drafts (very important)	Notate to rig sketch below
	Time drafts taken (very important)	Notate to rig sketch below
	Tides: times and range	If requested by RRDA
	Heel	Y N (Add note below)
	Heading	
	Where is bottom contact	Notate to rig sketch below
	Integrity of thrusters	Comment below
	Soundings about the rig	Notate to rig sketch below
	Nature of seabed	
	Underwater survey of contact area and damage report	Y N (write note below)

ENTER COMMENTS RELATING TO THE ABOVE OR OTHER USEFUL INFORMATION HERE:

Additional Details About a Grounding Incident

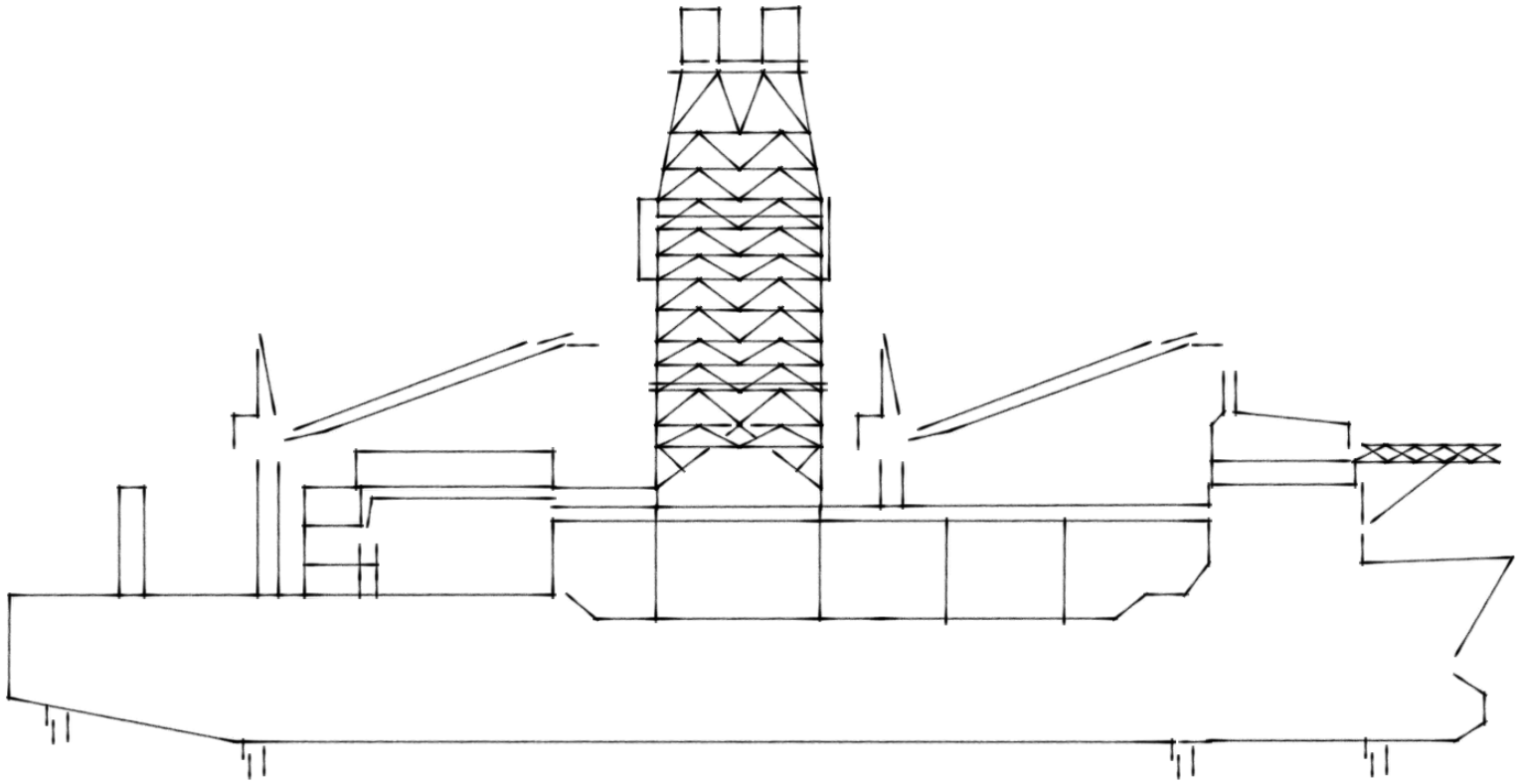
Rig Name:			
Date:			
1.	**Drafts - Aground**		
Units	Meters	Feet	
Time	-hrs.	Local	UTC
--	Forward	Amidships	Aft
Port			
Starboard			
List of Heel		Degrees	P S
2.	**Approximate Area of Ground Contact**		
Outline the approx. contact area on the hull outline.			
3.	**Provide water depths (W.D.)**		
Water depth values to the extent needed.			
Measured by a boat or tug?			
Measured from ship's deck?			
4.	**Rig Heading**		
			-Degrees (T)



Handy Sketch for Any Incident

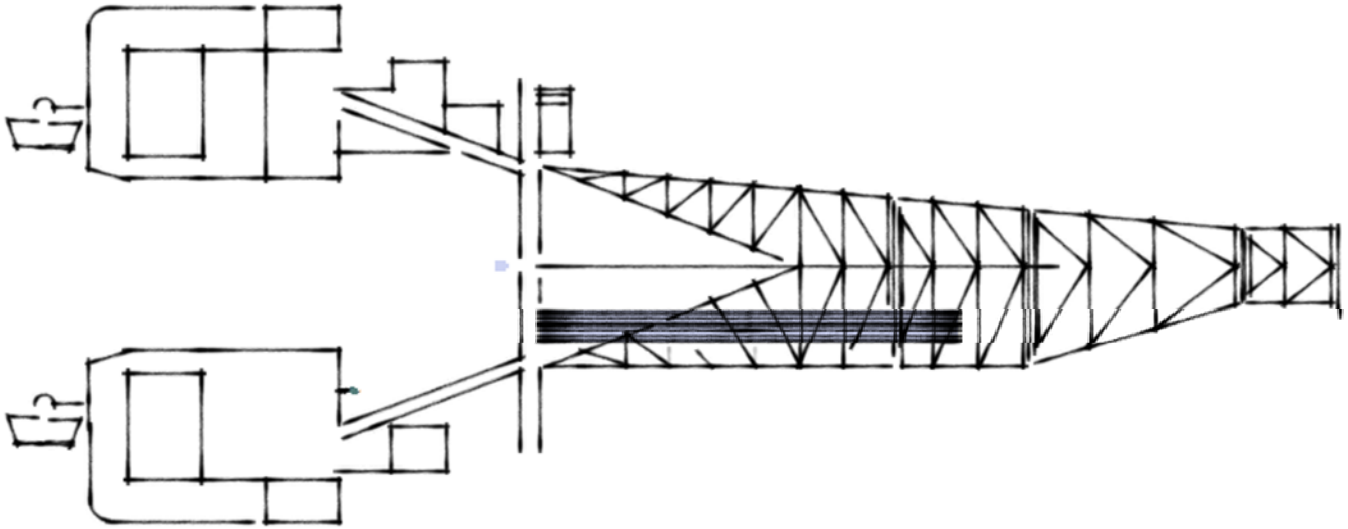
RIG NAME: **DATE and TIME:** **UTC/LOCAL**

USE THIS DIAGRAM TO ILLUSTRATE ANY ADDITIONAL PERTINENT INFORMATION LIKE GROUND CONTACT AREA, PINNICLES, AREA DAMAGED, BUCKLING or CRACKS, HULL BREACH, WATER DEPTHS, FREEBOARDS, DRAFTS, OBSTRUCTIONS, ETC.



RIG NAME: **DATE AND TIME:** **UTC/LOCAL**

USE THIS DIAGRAM TO ILLUSTRATE ANY ADDITIONAL PERTINENT INFORMATION LIKE GROUND CONTACT AREA, PINNICLES, AREA DAMAGED, BUCKLING or CRACKS, HULL BREACH, WATER DEPTHS, FREEBOARDS, DRAFTS, OBSTRUCTIONS, ETC.



RIG NAME: **DATE AND TIME:** **UTC/LOCAL**

USE THIS DIAGRAM TO ILLUSTRATE ANY ADDITIONAL PERTINENT INFORMATION LIKE GROUND CONTACT AREA, PINNICLES, AREA DAMAGED, BUCKLING or CRACKS, HULL BREACH, WATER DEPTHS, FREEBOARDS, DRAFTS, OBSTRUCTIONS, ETC.