EXHIBIT # 118
WIT:

Safety System Design Philosophy
RBS8D Project
"Deepwater Horizon"

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Safety System Design Philosophy
for the
RBS8D Semi-Submersible Mobile Offshore Drilling Unit

1. General

The RBS8D semi-submersible Mobile Offshore Drilling Unit (MODU) will include a complete Safety System that will perform emergency detection and shutdown services designed to comply with all applicable Regulatory Body requirements and/or guidelines and to preserve human life and protect the vessel in critical situations. The Safety System will be designed with a commitment to keep the system as simple as possible and to reduce the number of components (detectors, etc.) that the vessel's crew must maintain.

Emergency conditions will be detected and alarmed in three key locations:

- Bridge / Central Control Room (CCR)
- Driller's Workstation (DWS) and
- Engine Control Room (ECR).

In response to emergency conditions, shutdown actions may be initiated automatically, or manually from the CCR, DWS, or ECR.

This design philosophy corresponds to ABS Document MSC/Cir.645.and MODU rule 4/3D4.1.1. (ref. IMO MODU Code,1989 with amendments of 1991, Ch.6.5).

The principal emergency control point for all emergency incidents *other than toxic or combustible gas* on the RBS8D is the Bridge / Central Control Room (CCR) and these events will be controlled by the rig's Captain or Officer in Charge (OIC). The Engine Control Room (ECR) will be the alternate emergency control point if the CCR is not available.

Gas incidents will normally be controlled from the DWS by the duty Driller, Toolpusher, or Offshore Installation Manager (OIM), however in an emergency situation where the DWS must be abandoned, the responsible drilling crew member may take appropriate action from the other two control locations.

The Recreation Room (forward, second deck, amidships) has been designated as the vessel's Temporary Refuge area. The area on either side of the ECR (aft, second deck, amidships) has been designated as the secondary Temporary Refuge area.

There are two fire team muster points on the vessel. One fire team will muster at the Transit Room (helicopter waiting room), which is near the vessel's main Temporary Refuge. The second fire team will muster near the aft CO_2 room (aft, main deck, amidships). Fire team emergency equipment will be located in Emergency Lockers at the designated muster areas, as shown on the rig's General Arrangement and Emergency Plan drawings.

The CCR and ECR will be supplied with at least two separate means of communication, including a normal dial telephone and sound powered phones connected to the vessel's critical control points and work stations, including the main and secondary Temporary Refuge areas and the Fire Team muster points. The Fire Team muster points (also referred to as the Emergency Lockers) will therefore be equipped with both dial and sound-powered telephones, along with a number of hand-held VHF-FM radios that can communicate between the Fire Team members, Fire Team Leader, and the CCR, ECR, and DWS using the vessel's "Leaky Co-ax" system in areas where normal radio reception and transmission is prevented by the rig's structure.

2. Definitions

CCR	Bridge/Central Control Room
DCS	Drilling Control System
DWS	Driller's Workstation
DP	Dynamic Positioning / Dynamically Positioned
ECR	Engine Control Room
ESD	Emergency Shutdown
F&G	Fire and Gas
HVAC	Heating, Ventilation, and Air Conditioning
NRTL	Nationally Recognised Testing Laboratory
OIC	Officer in Command
OIM	Offshore Installation Manager

3. System Architecture

The Safety System will consist of two (2) independent systems. One system will perform Fire and Gas detection, and the other system will perform Emergency Shutdown (ESD) functions. Failure of one system will not affect the other system.

The Fire and Gas (F&G) detection system will consist of a supervisory level employing Kongsberg Simrad AIM2000 hardware and software and a fire detection subsystem employing Autronica BS100 hardware. The supervisory level will employ the same type of hardware used elsewhere in the vessel's Integrated Automation

and Control System (IACS). The supervisory level shall employ redundant processors and simplex Input/Output (I/O) structure. Detectors that are not individually addressable (such as flame and gas detectors) will be connected directly to this supervisory level using 4-20 mA analog loops. The fire detection subsystem will use an approved fire detection panel that uses individually addressable detectors on up to a maximum of sixteen (16) loops. The fire detection subsystem shall be approved by the Regulatory Bodies, and shall be listed for marine duty by the applicable Regulatory Body(s). The overall F&G system shall be approved for use on thew RBS8D by the applicable Regulatory Body(s).

The Emergency Shutdown (ESD) system will also employ the Simrad AIM2000 hardware and software as used elsewhere in the vessel's Integrated Automation and Control System (IACS). The ESD system shall employ redundant processors and redundant Input/Output (I/O) structure.

The two segments of the overall Safety System will be interconnected with a each other and with a dedicated Safety System Operator's Console by a dedicated dual redundant fiber-optic industrial network (Ethernet). The Safety System will further be connected to the vessel's Integrated Automation and Control System (IACS) by network bridge units between the dedicated Safety System network and the separate dual redundant IACS network. This connection will allow any Simrad Vessel Control (SVC) operator's station on the rig to monitor the Safety System.

Safety System data shall be communicated to the Driller's Workstation (DWS) system supplied by Hitec ASA to present a unified man-machine interface, thus easing the task of responding to emergency situations for the designated Responsible Personnel.

The Safety System will also include a total of three (3) remote repeater and Emergency Shutdown panels installed on the vessel, one each in the Bridge, the DWS, and the ECR. These panels shall provide a summary of alarms and provide a method of activating the vessel's ESD functions. The remote Repeater / ESD panels may be connected to the Safety System by point-to-point wiring, by connection to the dedicated Safety System network, or by a combination of both methods.

4. Fire Detection System

The fire detection system shall be an integrated design, with a combination of manual alarm stations and heat, smoke, and flame detectors located throughout the vessel. The manual stations, smoke detectors, and heat detectors will be of the individually addressable type, and will be arranged in loops connected to an Autronica BS1000 fire alarm panel as described above. Flame detectors will

Autronica IR3 type and will be installed using individual 4-20 mA analog loops, wired into the supervisory portion of the Fire & Gas system.

Each compartment or space on the vessel will be an independent fire zone to allow quick identification of the exact location of an alarm point. Fire zones will be numbered with the cooperation of RBF, the shipyard, and the Safety System vendor(s).

Fire detector alarm response will be in accordance with Table No. 1 – Fire Alarm Responses. Normally, a fire alarm will be acknowledged by the Ballast Control Console Operator (BCCO) under the direction of the OIC, who will direct other personnel to respond to the alarm or to investigate the cause of an alarm and report on the situation. Based on information received by the BCCO or the OIC, subsequent alarms may be manually issued and ESD actions may be initiated or inhibited.

Audible and visual alarms will be issued automatically or manually in accordance with Table No. 1 and the Rules and Regulations applicable to the vessel. A detailed matrix of responses to alarms or other conditions will be established in the Safety System Cause and Effects Table for the vessel.

Table 1 - Fire Alarm Responses

CAUSE / EFFECT	Audible alarm IACS	Visual alarm IACS	Audible alarm DWS station	Visual alarm DWS station	Audible CCR Matrix panel	Visual CCR Matrix panel	Audible ECR Matrix panel	Visual ECR Matrix panel	Audible DWS Matrix panel	Visual DWS Matrix panel	Audible alarm accommodation	Visual alarm accommodation	Audible alarm machinery	Visual alarm machinery	Audible alarm control spaces	Visual alarm control spaces	Audible alarm all areas (note 1)	Visual alarm all areas (note 1)		
Manual - Quarters	X	X	X	X	X	X	X	X	X	X	X	X								
Manual - Other Areas	X	X	X	X	X	X	X	X	X	X			X	X	X	X				
Smoke/Thermal - Quarters	X	X	X	X	X	X	X	X	X	X	O	O					X	X		
Flame - Qtrs (Smoking Rec. Rm.)	X	X	X	X	X	X	X	X	X	X	X	X								
Smoke/Thermal - Other Areas	X	X	X	X	X	X	X	X	X	X			O	O	O	O	X	X		
Flame - Other Areas	X	X	X	X	X	X	X	X	X	X			X	X	X	X				

LEGEND: X – Single Detector or Manual Station
O – Confirmed Fire (Multiple Detectors)

NOTES: 1. Issued if alarm is not acknowledged within the statutory period.

5. Gas Detection System

The Safety System will include an approved gas detection system. The gas detection system shall consist of both combustible gas and toxic gas (hydrogen sulfide or H_2S) detectors installed at various locations throughout the vessel and monitored by the Fire & Gas Detection portion of the Safety System.

Gas detectors will be located along the drilling mud path and in other locations where gas may be expected to appear as a result of drilling activities or where the presence or accumulation of gas poses exceptional risks. Combustible gas detectors will be located high to detect gasses that are normally lighter than air and toxic gas detectors will be located low to detect H_2S, which is heavier than air.

Gas detectors will not require dedicated gas detector cards or input or monitoring arrangements, and will include self-diagnostic capabilities. Each detector will be connected as a 4-20 mA analog current loop to the supervisory portion of the Fire & Gas panel, which will be installed in the Port Process Equipment Room adjacent to the CCR.

As previously noted, the F&G detection system and the vessel's Integrated Automation and Control System (IACS) will be connected by network bridge units between the dedicated Safety System network and the separate dual redundant IACS network. Fire and gas detection data will also be communicated to the Drilling Control System (DCS) in the DWS from the IACS via serial link. The serial interfaces will communicate detailed information regarding the gas detectors' status, including Trouble, Alarm, and High Alarm conditions. This data shall be displayed graphically and in tabular form on the IACS consoles and the Cyberbase stations. The location and severity of the gas alarm shall be presented as an alarm banner at the top of the Cyberbase control screens.

All gas alarm events shall be automatically logged in the IACS history station and shall be printed for permanent record of the event.

As a minimum, both Combustible and Toxic (H_2S) Gas Detectors will be installed in the following locations:

- Moon Pool Area, near the Diverter housing, just below the drill floor
- Drill Floor
- DWS and DER Purge Fan Air Intakes
- Driller's Workstation (internal)
- Drilling Equipment Room (internal)
- Shaker / Mud Process Room
- Mud Pit Room
- Mud Pump Room
- Accommodations and Galley Ventilation Air Intakes

- Well Test Area

Combustible Gas Detectors alone will be installed in the following locations:

- Engine Room Air Intakes
- Welding Shop (to detect acetylene leakage)
- Battery Room (to detect hydrogen accumulation)

Gas detector alarm response will be in accordance with Table No. 2 – Gas Alarm Responses. Activation of a gas detector will result in immediate audible and visual alarm in the CCR, ECR, and DWS. Alarms shall be acknowledged from the DWS or the alternate stations if the DWS is inaccessible. Gas alarms will be acknowledged by the Driller, who may direct other personnel to investigate and report, based on the location and severity of the gas alarm. Based on the reports received by the Driller, subsequent alarms may be manually issued.

Table 2 - Gas Alarm Responses

CAUSE / EFFECT	Audible alarm IACS Consoles	Visual alarm IACS Consoles	Audible alarm Hitec Consoles	Visual alarm Hitec Consoles	Audible CCR Matrix panel	Visual CCR Matrix panel	Audible ECR Matrix panel	Visual ECR Matrix panel	Audible DWS Matrix panel	Visual DWS Matrix panel	Audible alarm all areas (note 1)	Visual alarm all areas (note 1)	Audible alarm all areas	Visual alarm all areas	Audible alarm all areas except quarters (note 1)	Visual alarm all areas except quarters (note 1)	Audible alarm all areas except quarters	Visual alarm all areas except quarters
Combustible Low - Quarters Intakes	X	X	X	X	X	X	X	X	X	X	X	X						
Combustible High - Quarters Intakes	X	X	X	X	X	X	X	X	X	X	X	X	O	O				
Combustible Low - shaker room	X	X	X	X	X	X	X	X	X	X						X		
Combustible Low - moon pool	X	X	X	X	X	X	X	X	X	X						X		
Combustible Low - drill floor	X	X	X	X	X	X	X	X	X	X						X		
Combustible Low - other areas	X	X	X	X	X	X	X	X	X	X						X		
Combustible High - shaker room	X	X	X	X	X	X	X	X	X	X					X	X	O	O
Combustible High - moon pool	X	X	X	X	X	X	X	X	X	X					X	X	O	O
Combustible High - drill floor	X	X	X	X	X	X	X	X	X	X					X	X	O	O
Combustible High - other areas	X	X	X	X	X	X	X	X	X	X					X	X	O	O
Toxic Low - Quarters Intakes	X	X	X	X	X	X	X	X	X	X	X	X	O	O				
Toxic High - Quarters Intakes	X	X	X	X	X	X	X	X	X	X	X	X	O	O				

Explanations: X = single actions. (single detector or manual station)
O = confirmed. (more than one detector)

Notes:
Note 1: Alarm in all areas if alarm not acknowledged within the statutory period.

6. Other F&G System Inputs and Outputs

6.1. Fixed CO_2 Fire Suppression Systems

The RBS8D will be equipped with a fixed CO_2 fire suppression system. The CO_2 fire suppression system will protect the control rooms, engine rooms, electrical equipment rooms, etc. as identified in Chapter 14 of the vessel's construction specifications, and shall employ Carbon Dioxide (CO_2) gas as the active fire extinguishing agent, deployed as a total flooding system. Additionally, the generators and thruster motors, being totally enclosed water cooled designs, will include CO_2 machine enclosure flooding systems. The fixed CO_2 fire suppression systems for total flooding shall be connected to and monitored by the F&G system to assure that the CO_2 systems are as safe and effective as possible.

The CO_2 system is divided into a number of sub-systems, each of which protects a particular space or compartment. All of the CO_2 systems on the RBS8D are manually actuated. Automatic release of extinguishing agent is not employed. Further, release of agent requires two (2) separate and distinct manual actions, such as opening an enclosure door and pulling a handle, or operating two manual controls in sequence. The CO_2 extinguishing systems can only be activated from a location directly outside the protected space and from the centralized CO_2 bottle room serving the protected space.

Activation of the CO_2 release controls will initiate immediate audible and visual alarms and HVAC shutdowns. Audible alarms are provided by CO_2 pilot pressure. Visual alarms, as defined elsewhere in this document, will be controlled by the F&G system. After a minimum 30 second time delay to allow personnel that may be in the affected space time to respond to the visual and audible alarms and evacuate the space, the CO_2 is released. Note – the time delay is provided by a pneumatic device installed in the CO_2 system pilot system piping.

To allow the F&G system to monitor the CO_2 systems, there shall be an individual digital (ON/OFF) input to the F&G system to indicate when agent release has been initiated by actuation of any manual release. Additionally, there will be a pressure switch in the CO_2 discharge piping to confirm to the F&G system that agent has, in fact, been released.

6.2. Sprinkler System

The RBS8D will include an automatic sprinkler system in the accommodations block and a separate, manually activated structural fire protection deluge system to protect the drill floor support structure within the moonpool area. The sprinkler

system and deluge system shall include pressure or flow monitoring switches connected to the F&G system to indicate any time either of these systems have been activated and to automatically sound alarms and shutdown ventilation in the affected area if the sprinkler system is activated.

6.3. Foam System

The RBS8D will have a foam fire extinguishing system serving the helideck fire monitors and the helicopter fuel storage area. Flow or pressure monitoring and foam pump indication will be connected to the F&G system to indicate when this system has been actuated.

6.4. HVAC Interface

The F&G system will automatically shut down supply and exhaust ventilation equipment and close all fire dampers in the ventilation ducts or trunks leading to or from any space where CO_2 has been released, as indicated by the operation of one of the manual controls or when the sprinkler system has been activated, as indicated by flow or pressure switches in the four main zones of the sprinkler system.

Ventilation shutdowns will be effected by group or individual output points in the F&G system. These circuits shall be Normally Deenergized 120V AC output circuits (with line monitoring) connected to interposing relays in the applicable motor starter or control panel. All control power for these circuits shall be derived within the F&G system.

Fire dampers will be fail-safe, spring closed, pneumatically opened types, in accordance with all Regulatory Body requirements applicable to the RBS8D. The fire dampers will be opened by rig air pressure, applied through normally energized solenoid valves with 120V AC coils, which shall in turn be connected to normally energized output points in the F&G system. All control power for these circuits shall be derived within the F&G system.

To minimize system complexity, wiring, etc., the shipyard is to group fire damper controls and shutdowns by using a single solenoid valve to control all of the dampers serving a single space wherever possible. For example, if a space is protected by CO_2 and is served by a single supply fan and a single exhaust fan, there will normally be two fire dampers, one each for the supply and exhaust fans. Using a single solenoid valve to control both dampers will both simplify the F&G system by removing a set of control wiring and assure that the space is isolated when a single circuit is tripped.

Fire dampers will be fitted with local position indication in accordance with ABS requirements. Remote position indication for fire dampers will not be included in the F&G system. The Norwegian Oil Directorate accepts this solution.

The detected conditions and/or events that cause automatic HVAC shutdowns are summarized in Table No. 3 – F&G Automatic HVAC Actions, below, and are detailed in the vessel's Safety System Cause & Effects Matrix.

Table 3 - F&G Automatic HVAC Actions

CAUSE / EFFECT	Close Accommodations Inlet Dampers (1)	Stop Accommodations Air Handlers (1)	Stop Accommodations Vent Fans (1)	Close Fire Dampers (1)	Stop Ventilation Fans Exc. Haz. Areas (1)	Stop DWS/DER Purge Fan(s)	Stop DWS/DER HVAC Unit(s)						
Manual - Quarters		X	X	X									
Manual - Other Areas				X	X								
Smoke/Thermal - Quarters		O	O	O									
Fire - Thruster Spaces				X	O								
Combustible Low - Quarters Intakes	O		O										
Combustible High - Quarters Intakes	X	O	X										
Combustible High - other areas					O								
Toxic Low - Quarters Intakes	X	O	X										
Toxic High - Quarters Intakes	X	X	X										
Combustible - DWS/DER Intakes						X							
Combustible - DWS/DER						X	X						
H2S - DWS/DER Intakes						X							
H2S - DWS/DER						X	X						

LEGEND: X – Single Detector or Manual Station
O – Confirmed Event (Multiple Detectors or Manual Station)

Notes: 1. Equipment in the affected zone only.

7. Visual and Audible Alarm System

The vessel will have an integrated visual and audible alarm system to communicate emergency conditions to all appropriate personnel on the vessel, regardless of background conditions. Visual and audible alarms will be located in all machinery, shop, working, office, storage, and accommodations areas of the vessel.

7.1. Audible Alarms

Audible alarms will be generated by the vessel's Public Address and General Alarm (PA/GA) system, and will consist of separate sounds for Abandon Vessel, Fire and General Alarm, Combustible Gas, and Toxic Gas. The PA/GA system shall have sufficient amplifiers and speakers so that all alarms are clearly audible in all normally manned and unmanned spaces over the worst case machinery noise with any single amplifier or the nearest speaker inoperative. Speakers shall be suitable for the area where installed, and shall be located to assure redundant coverage of the entire vessel. Speakers shall comply with the requirements of all applicable Regulatory Bodies, including the UK HSE 4th Edition Guidelines. The areas or zones where audible alarms will be activated under a certain condition will be in accordance with Table No. 1 and Table No. 2, above, and the vessel's Safety System Cause and Effects Matrix.

Audible alarms tones or sounds will be:

- Abandon Vessel – equivalent to the continuous sounding of a bell
- Fire, and General Alarm – equivalent to the intermittent sounding of a bell
- Combustible Gas – continuous alarm tone
- Toxic Gas – warble tone

7.2. Visual Alarms

Visual alarms will be located so that they are visible under all ambient light levels, and will be designed to be visible from all working areas, with special attention to high noise areas such as engine rooms, pump rooms, compressor rooms, etc.. Visual alarms will consist of individual high intensity strobe lights for areas outside of the accommodations block. These strobe lights will be suitable for the area in which they are installed (weatherproof, explosion proof, etc.).

Within the accommodations block, visual alarms will consist of strobe lights arranged in approved signal columns. The signal columns will be located at each

end of the transverse and longitudinal corridors, so they are visible from the doorway of each office, recreation room, stateroom, or common use room, and the hospital. Additional signal columns will be located inside the messroom and other common use rooms such as the cinema, recreation rooms, gymnasium, etc..

The areas or zones where visual alarms will be activated under a certain condition will be in accordance with Table No. 1 and Table No. 2, above, and the vessel's Safety System Cause and Effects Matrix.

Visual alarms will be :

- Fire or General Alarm – Red
- Combustible Gas – Blue
- Toxic Gas – Yellow or Amber
- CO_2 Fire Extinguishing Agent Release – White or Clear

7.3. Ease of Conversion

The visual and audible alarm system will be designed and built to allow simple conversion of the company's standard signals to those developed for operations in the North Sea. Conversion shall be by re-programming or selector switch operation (must be available to authorized crew members, and must not require the intervention of a field service technician). Conversion of visual beacons shall be by simple lens change, again by rig personnel.

7.4. Testing

The Safety System and the PA/GA System will include provisions to periodically test the visual and audible alarms. Additionally, the systems will include provisions to suppress all alarms during tests or system maintenance. Alarm suppression will be controlled by a key-operated switch, and will generate a recurring alarm in the IACS system as long as the audible and visual alarms are suppressed.

7.5. Training System

A special set of visual and audible alarm signals will be installed in the Transit Room (helicopter waiting room). These signals will be used for training persons just coming on board the vessel. These training signals shall ***only*** be manually activated from a small control panel located in the room, and this control panel shall not activate any other signals on the rig.

8. Emergency Shutdown System

8.1. General

The overall Safety System will include an independent Emergency Shutdown (ESD) System. The functions provided by the ESD system will be in addition to the alarm and HVAC shutdown systems provided as a part of the F&G system to control fire and gas incidents, and other machinery shutdowns included in the Simrad Vessel Control (SVC) and Simrad Dynamic Positioning (SDP) portions of the IACS. The ESD system is required to comply with ABS requirements, as well as the requirements of other Regulatory Bodies, and is considered a critical requirement for the safety of the crew and the vessel in an emergency situation.

It is important to note that the ESD responses on a Dynamically Positioned (DP) MODU such as the RBS8D are different from the ESD philosophy employed on MODUs that are not DP. On a DP MODU, there is generally not a single top level shutdown level that stops all engines and disconnects all possible sources of ignition in case of an uncontrolled well blowout. Instead of this type of shutdown, a DP MODU will perform an emergency disconnect from the wellhead and escape the hazardous area in such a case.

The centralized portion of the ESD system will be located in the starboard process equipment room, adjacent to the CCR. The Fire & Gas system will be interfaced with the ESD system to allow operation of certain HVAC shutdown or Fire Damper control functions from the ESD system.

Remote ESD stations will be combined with the F&G repeater panels described above, providing the rig's emergency situation managers (OIC, OIM, BCCO, Driller, etc.) with a quick summary of the nature and location of the safety event, as well as a way to quickly effect any necessary ESD action(s). Remote ESD Stations shall consist of a series of push buttons that are hard-wired to provide the functions listed in the vessel's Safety System Cause & Effects Matrix. All ESD pushbuttons shall be protected from inadvertent operation by guards, shrouds, or equivalent means approved by RBF. ESD pushbutton wiring will be normally de-energized with line monitoring to protect against line break, short circuit, or ground fault.

Additionally, the ESD system may be controlled from any Safety System console of the IACS, using appropriate password protection.

8.2. ESD Hierarchy

The ESD system for the RBS8D will employ a simple two-tier hierarchical structure, as shown in Table 4 – ESD Hierarchy, below. There will ***not*** be a single pushbutton

to activate all Group 1 (Power Plant) or Group 2 (Propulsion) shutdowns, while there ***will*** be single pushbuttons to activate all Group 3 (HVAC/Oil XFER), and Group 4 (Drill Floor) shutdowns.

Table 4 – ESD Hierarchy

1st Tier	2nd Tier	Description
ESD 1-1		Engine Room # 1 ESD
ESD 1-2		Engine Room # 2 ESD
ESD 1-3		Engine Room # 3 ESD
ESD 1-4		Engine Room # 4 ESD
ESD 1-5		Engine Room # 5 ESD
ESD 1-6		Engine Room # 6 ESD
ESD 2-1		Thruster # 1 ESD
ESD 2-2		Thruster # 2 ESD
ESD 2-3		Thruster # 3 ESD
ESD 2-4		Thruster # 4 ESD
ESD 2-5		Thruster # 5 ESD
ESD 2-6		Thruster # 6 ESD
ESD 2-7		Thruster # 7 ESD
ESD 2-8		Thruster # 8 ESD
ESD 3		HVAC / Oil Xfer ESD
	ESD 3-1	Air Cond Inlet Dampers Close
	ESD 3-2	P/F 2nd Deck Qtrs HVAC ESD
	ESD 3-3	P/F 3rd Deck Qtrs HVAC ESD
	ESD 3-4	S/F 2nd Deck Qtrs HVAC ESD
	ESD 3-5	P/F 3rd Deck Qtrs HVAC ESD
	ESD 3-6	P/F Machinery Spaces HVAC ESD
	ESD 3-7	S/F Machinery Spaces HVAC ESD
	ESD 3-8	P/A Machinery Spaces HVAC ESD
	ESD 3-9	S/A Machinery Spaces HVAC ESD
	ESD 3-10	AFT/MID HVAC ESD
	ESD 3-11	Hazardous Area HVAC ESD
	ESD 3-12	Oil XFER ESD
ESD 4		Drill Floor Shutdown

8.3. ESD Summary

Table 5 – ESD Summary, provides an overview of the ESD actions for each ESD on the RBS8D. This table is provided only as a summary of the type of ESD actions that will result when a given pushbutton on one of the ESD panels is actuated, and is not meant to replace the detailed Cause & Effects Chart for the vessel.

Table 5 - ESD Summary

CAUSE / EFFECT	Trip Generator C/B (1)	Engine Emergency Stop (1)	Stop Electrically Driven Fuel Pump (1)	Stop Electrically Driven Lube Oil Pumps (1)	Stop Engine Room Supply Fan (1)	Stop Engine Room Exhaust Fan (1)	Close Fire Dampers (1)	Thruster Converter Emergency Stop (1)	Stop Thruster Auxiliaries (1)	Close AirCon AHU Gas-Tight Inlet Dampers (1)	Close Duct-Mounted Fire Dampers (1)	Trip AHU and Compressor/Condenser Pkge (1)	Trip MCC # 4	Trip MCC # 3	Trip MCC # 6	Trip MCC # 5	Trip MCC # 29	Stop Fuel / Lube / Base Oil XFER Pumps	Stop All Drill Floor Equipment (2)
ESD 1-1 - Engine Room # 1 ESD (Button)	X	X	X	X	X	X	O												
ESD 1-2 - Engine Room # 2 ESD (Button)	X	X	X	X	X	X	O												
ESD 1-3 - Engine Room # 3 ESD (Button)	X	X	X	X	X	X	O												
ESD 1-4 - Engine Room # 4 ESD (Button)	X	X	X	X	X	X	O												
ESD 1-5 - Engine Room # 5 ESD (Button)	X	X	X	X	X	X	O												
ESD 1-6 - Engine Room # 6 ESD (Button)	X	X	X	X	X	X	O												
ESD 2-1 - Thruster # 1 Shutdown (Button)								X	X										
ESD 2-2 - Thruster # 2 Shutdown (Button)								X	X										
ESD 2-3 - Thruster # 3 Shutdown (Button)								X	X										
ESD 2-4 - Thruster # 4 Shutdown (Button)								X	X										
ESD 2-5 - Thruster # 5 Shutdown (Button)								X	X										
ESD 2-6 - Thruster # 6 Shutdown (Button)								X	X										
ESD 2-7 - Thruster # 7 Shutdown (Button)								X	X										
ESD 2-8 - Thruster # 8 Shutdown (Button)								X	X										
ESD 3 - HVAC / Oil Xfer ESD (Button)										X		X	X	X	X	X	X	X	
ESD 3-1 - Air Cond Inlet Dampers Close (Button)										X		X							
ESD 3-2 - P/F 2nd Deck Qtrs HVAC ESD (Button)											X	X							
ESD 3-3 - P/F 3rd Deck Qtrs HVAC ESD (Button)											X	X							
ESD 3-4 - S/F 2nd Deck Qtrs HVAC ESD (Button)											X	X							
ESD 3-5 - P/F 3rd Deck Qtrs HVAC ESD (Button)											X	X							
ESD 3-6 - P/F Machinery Spaces HVAC ESD (Button)													X						
ESD 3-7 - S/F Machinery Spaces HVAC ESD (Button)														X					
ESD 3-8 - P/A Machinery Spaces HVAC ESD (Button)															X				
ESD 3-9 - S/A Machinery Spaces HVAC ESD (Button)																X			
ESD 3-10 - AFT/MID HVAC ESD (Button)												X							
ESD 3-11 - Hazardous Area HVAC ESD (Button)																	X		
ESD 3-12 - Oil XFER ESD (Button)																		X	
ESD 4 - Drill Floor Shutdown																			X

LEGEND: X – Any Single Pushbutton Activated
O – Combined Event (Any Pushbutton AND Confirmed Fire)

Notes:
1. Associated Equipment Only (effect is typical for several units)
2. Shutdown drilling drives, central HPU, DER and DWS power, etc.

9. DWS and DER Purge/Pressurization and ESD Philosophy

The DWS and DER are located within the perimeter of the derrick, a Zone 2 hazardous area. The DWS and DER will be supplied with a purge and pressurization system that complies with ABS MODU rules and NFPA 496 (latest edition of each). The purge system shall be a Type Z purge, which renders an enclosure's contents safe in a Zone 2 area.

The DWS and DER will each be provided with two (2) fully redundant pressurization fans. These fans shall be 100% redundant, with the second fan starting automatically upon failure of the lead fan. The purge/pressurization fans will be located in a safe area, above the drawworks shed, and their output shall be ducted to the associated house. Additionally, each house will be provided with two (2) fully redundant split type Air Conditioning (A/C) systems. The air handlers will be installed within the associated house, and the explosion-proof condensing units will be located on the roof of the house it serves.

The purge/pressurization fans and the air conditioners will be supplied with 460V AC power from the HVAC panel in each house. Each fan or A/C unit will have a separate power feeder so that a failure of a single switchboard or MCC will not cause both fans or both A/C units to fail. The power sources for each purge/pressurization fan shall be located in safe (non-classified) areas.

Upon loss of pressurization, the gas-tight inlet damper shall close, and an audible and visual alarm shall be activated in both houses. As the DER may be normally unmanned, it is imperative that a purge failure in the DER be alarmed in the DWS. The duty Driller will be the person responsible for determining the cause for the loss of pressurization and to take steps to restore pressurization. The A/C systems will continue to operate unless turned off by the order of the duty Driller.

Upon detection of combustible gas or low level H2S gas concentration in the DWS or DER air intake, the inlet air dampers shall be automatically closed by the F&G system to isolate the space inside the DWS from the external gas source. The pressurizing fans shall be immediately, automatically shutdown by the F&G system and a visual and audible alarm shall be immediately initiated. The duty Driller shall be prepared to manually shutdown all electrical equipment not rated for hazardous duty operation. This shutdown shall be effected by a single button, ESD 4, on the ESD panels.

The emergency and lighting equipment and emergency signaling equipment (visual and audible alarms) within the DWS and DER shall be listed by an approved Nationally Recognized Testing Laboratory (NRTL) for operation in a Zone 2 area.

Prepared by:
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