THE COMMONWEALTH OF THE BAHAMAS

M.v. Platinum Explorer

IMO Number: 9463516

Official Number: 9000308

Report of the marine safety investigation into the fatal accident of the Trainee Driller on 25th February 2016 at Labuan Anchorage, Malaysia

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It should be noted that the Bahamas Merchant Shipping Act, Para 170 (2) requires officers of a ship involved in an accident to answer an Inspector's questions fully and truly. If the contents of a report were subsequently submitted as evidence in court proceedings relating to an accident this could offend the principle that individuals cannot be required to give evidence against themselves. The Bahamas Maritime Authority makes this report available to any interested individuals, organizations, agencies or States on the strict understanding that it will not be used as evidence in any legal proceedings anywhere in the world.

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1 GLOSSARY OF ABBREVIATIONS AND ACRONYMS

ABS	American Bureau of Shipping
BMA	Bahamas Maritime Authority
CCTV	Closed Circuit Television
CE	Chief Electrician
CO	Chief Officer
CMMS	Computerized Maintenance Management System
DF	Drill Floor
DH	Drill House
DNV-GL	Det Norske Veritas - Germanischer Lloyd
DP	Dynamic Positioning
DPA	Designated Person Ashore
DPO	Dynamic Positioning Officer
Drillship	A maritime vessel modified to include a drilling rig. The vessel is typically capable of operating in deep water remaining relatively stationary on location for extended periods of time, positioning being accomplished through dynamic propulsion.
FRC	Fast Rescue Craft
RFM	Riser Feeding Machine
™	Registered Trademark
Kw	Kilowatt
HSE	Health, Safety & Environment
ISM	International Safety Management
IV	Intravenous
MEDIVAC	Medical Evacuation
MERP	Medical Emergency Response Plan
MSMD	Minimum Safe Manning Document
MP	Moon Pool
O2	Oxygen
PA	Public Address System
PD	Pipe Deck
PMS	Planned Maintenance System
PPE	Personal Protective Equipment
PSC	Port State Control
QHSE	Quality, Health, Safety & Environment
RCP	Remote Control Panel
SDPO	Senior Dynamic Positioning Officer
SMS	Safety Management System
SOLAS	International Convention on the Safety of Life at Sea
SOMC	Senior Offshore Materials Coordinator
STCW	International Convention for the Standards of Training, Certification and Watchkeeping

STP	Senior Toolpusher
TD	Trainee Driller
TOMC	Trainee Offshore Material Coordinator
TRA	Task Risk Assessment
UHF	Ultra-High Frequency
UTC	Universal Co-ordinated Time
VPH	Vertical Pipe Handler

All times noted in this report are given in the style of the standard 24-hour clock without additional annotations. The vessel time used on board at the time of the incident was Universal Co-ordinated Time (UTC) + 8.

Investigation Limitations

The evidence collection team attended the vessel approximately 2 weeks after the accident. On arrival the Riser Feeding Machine had been operated and major components of the machine had been moved from their original position at the time of the accident by the certified manufacturer for the purpose of conducting an internal Company[1] investigation. This impacted the collection of evidence required to conduct detailed measurements of the Riser Feeding Machine components from their original position at the time of the accident occurrence.

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[1] All references to the Company relate to Vantage Deepwater Drilling Inc.

2 SUMMARY

2.1 On 25 February 2016 at 1435, the drill ship Platinum Explorer was anchored at Labuan Anchorage, Malaysia in a warm stack[2] condition with 23 crew onboard.

2.2 The vessel had at the time of the accident been located in Labuan Anchorage since January 19th. Prior to arriving in Labuan, Malaysia the vessel was under contract for five years in India. The vessel sailed from India, via Singapore where the majority of the 87-crew disembarked before sailing to Labuan where the ship would remain in anticipation of the next drilling contract.

2.3 A skeleton crew of 23 remained on board throughout the period in order to carry out routine maintenance and conduct function testing of equipment whilst keeping the vessel in a state of readiness.

2.4 Throughout the day and prior to the fatal accident the Senior Tool Pusher and Trainee Driller worked closely together to ensure the planned, approved and risk assessed maintenance required for the day was being conducted. The Senior Tool Pusher was present with the Trainee Driller in the drill house[3] up to the point where he proceeded to collect buckets in preparation for the next task to be conducted. The Senior Tool Pusher then left the drill house for the moon pool[4] leaving the Trainee Driller to continue with the task of function fingering the derrick.

2.5 Shortly thereafter, the Trainee Driller called the bridge from the Drill House and requested help. The Chief Officer and Crane Operator immediately went to the drill house and found the Trainee Driller in an injured condition. The Medic was called and arrived at the drill house and assessed the Trainee Driller's condition.

2.6 It was decided that due to the severity of his injuries a medical evacuation was required from the vessel, this was arranged, and a local ambulance transported him to Labuan General Hospital.

2.7 At approximately 2020 on 25 February 2016 the Trainee Driller was pronounced dead having succumbed to the injuries sustained to his chest by a component of the Riser Feeding Machine (RFM).

2.8 The Riser Feeding Machine is a material handling machine used to safely transport risers and slip joints to the drill floor. It is understood that the machine was being operated by the Trainee Driller at the time of the accident occurrence however for what purpose remains unknown due to the incident location not being covered by CCTV or the availability of an eye witness.

[2] Warm stack - Drill ship is not operational, no drilling taking place with a reduced crew onboard sufficient enough to maintain equipment, carry out basic function testing of equipment and conduct general maintenance.
[3] Drill house ('Dog House') – Control room located centrally on the drill floor and used by the drilling crew.
[4] Moon pool – The opening in the hull of the drill ship through which drilling equipment passes.

2.9 This report has identified several recommendations based on the contributory factors determined through the course of the investigation. Although several factors contributed to this accident, no single causal factor could be identified.

3 DETAILS OF INVOLVED VESSEL(s) AND OTHER MATTERS

3.1.1 The Platinum Explorer is a purpose-built Ship-shaped drilling unit owned by Vantage International Management Company Pte., Ltd. and managed by Vantage Deepwater Drilling Inc. of Houston, USA and registered in the port of Nassau, Bahamas. The principle details as at 25 February 2016 are as follows:

Flag State	Bahamas
IMO	9463516
Official Number	9000308
Owners	Vantage International Management Company Pte. Ltd.
Ship Managers	Vantage Deepwater Drilling Inc.
Classification Society	American Bureau of Shipping (ABS) (until March 2017) Det Norske Veritas Germanischer Lloyd (DNV-GL) (from March 2017)
Class Notation	✠A1, Drilling Unit BIS (DPS(3)), ✠AMS, ✠ACCU, ✠DPS-3
Builders	Daewoo Shipbuilding & Marine Engineering Co., Ltd
Year built	November 2010
Length overall	238.04 metres
Breadth	41.75 metres
Draught	11.88 metres
Gross Tonnage	67,825 tonnes
Net Tonnage	20,347 tonnes
Summer Deadweight	76,114 tonnes
Engines/rating	6 x STX MAN 14V32/40CD diesel engines c/w Siemens AC 8125 kVA alternators / 42,000Kw
Thrusters/rating	6 x Rolls Royce Ulstein Aquamaster UUC 405 Azimuth - 4500Kw each
Riser Feeding Machine	Designed and delivered by AkerSolutions™, 10-BB1510 (2009)

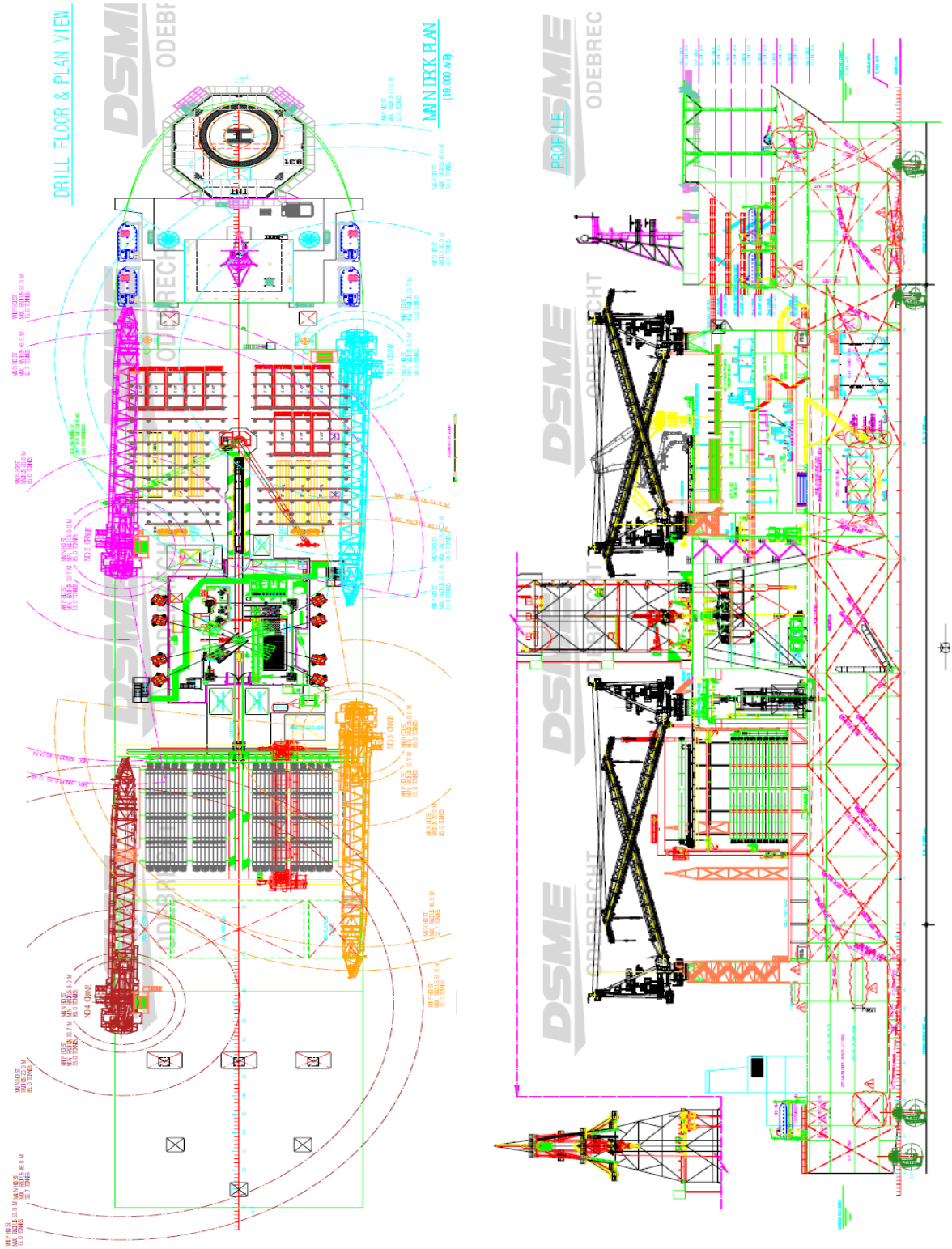

Figure 1: General Arrangement Plan of drill floor (left) and starboard side (right)

3.2 Vessel Certification

3.2.1 At the time of the incident the vessel was classed with ABS and all statutory certificates remained valid.

3.2.2 The Mobile Offshore Drilling Unit Safety Certificate issued by the Classification Society on 11 November 2015 remained valid until 14 November 2019. This certifies that the unit has been surveyed in accordance with the applicable provisions of the Code for the Construction and Equipment on Mobile Offshore Drilling Unit 1989. The survey verified that the structure, equipment, fittings, radio station arrangements and materials of the unit and the condition are in all respects satisfactory and that the unit complies with the relevant provisions of the Code.

3.2.3 The last 3 Bahamas approved Annual Inspections were conducted on 11 February 2014, 25 February 2015 and 23 February 2016 for which 5, 5 and 2 deficiencies were noted respectively. None of the identified deficiencies were related to the drill equipment onboard and all were verified as rectified during the most recent inspection on 23 February 2016. There were no PSC inspections between these periods.

3.3 Details of Crew

3.3.1 At the time of the incident, the vessel was in warm stack condition with 23 personnel on board. The following nationalities were contracted on board on 25 February: 1 Irish, 6 British, 1 Canadian, 4 Croatian, 1 Dutch, 1 Ukrainian, 6 Malaysian and 3 Indonesian. The vessel's Minimum Safe Manning Document (MSMD) was issued by the Commonwealth of the Bahamas on 16 December 2015 and remains valid.

3.3.2 The responsibilities of key personnel are divided as follows on board; the Captain is overall in-charge on board. The Chief Officer is the Safety Officer. The Senior Toolpusher is in-charge of all drilling personnel and drill equipment. The Trainee Driller works under the supervision of the Senior Toolpusher, responsible for the routine maintenance of the drilling equipment. The Maintenance Supervisor is the Chief Engineer in-charge of the machinery. The Senior Offshore Material Coordinator (SOMC) is in-charge of the drilling equipment spares and supply.

3.3.3 The Master, an Irish national held an Unlimited Master Mariner Certificate at the management level (II/2)[5] required by the Standards of Training, Certification and Watchkeeping (STCW) issued by the United Kingdom of Great Britain and Northern Ireland on 17 January 2002 and endorsed by the Commonwealth of the Bahamas on 24 February 2012 and was duly recognised in accordance with the provisions of Regulation I/10 of the STCW 1978 convention. The Master's contract commenced on 10 February 2010 on a 4-week on, 4-week off rotation maintained since March 2010.

3.3.4 The Chief Officer (CO), a Canadian national held an Unlimited Master Mariner Certificate at the management level (II/2) required by STCW issued by the Government of Canada and endorsed by the Commonwealth of the Bahamas on 02

[5] Specification of minimum standard of competence for Masters and Chief Mates on ships of 500 gross tonnage or more.

February 2016 and was duly recognised in accordance with the provisions of the Regulation I/10 of STCW 1978 Convention. He signed-on on 10 February 2016 for this contract.

3.3.5 The Senior Dynamic Positioning Officer (SDPO), a British national held a Second Officer's Certificate, STCW II/1 with an endorsement by the Commonwealth of the Bahamas which was duly recognised in accordance with the provisions of the Regulation I/10 of the STCW 1978 Convention. He signed-on on 10 February 2016 for this contract.

3.3.6 The Second Engineer (2E), a British national held a Second Engineering Officer qualification, STCW III/2 with an endorsement by the Commonwealth of the Bahamas which was duly recognised in accordance with the provisions of the Regulation I/10 of the STCW 1978 Convention. He signed-on on 24 February 2016 for this contract.

3.3.7 The Chief Electrician (CE), a Croatian national held an Electro Technical Officer qualification with an endorsement by the Commonwealth of the Bahamas which was duly recognised in accordance with the provisions of the Regulation I/10 of the STCW 1978 Convention. He signed-on on 10 February 2016 for this contract.

3.3.8 The Senior Toolpusher (STP), a British national has served in the offshore drilling industry since 1995. Experienced on jack-up rigs, drill ships and floating rigs located around the world. Initially training as a Driller before being promoted to Toolpusher and finally Senior Toolpusher, a position held on board Platinum Explorer for the past 2.5 years. He signed-on on 10 February 2016 for this contract.

3.3.9 The Senior Offshore Material Coordinator (SOMC), a British national has served in the offshore industry since 2004; 7 years with Vantage International Drilling Inc. and 5 years on the drill ship Platinum Explorer; 1 year as Roustabout, 1 year as Trainee Offshore Material Coordinator (TOMC) and 8 years as SOMC. He signed-on on 10 February 2016 for this contract.

3.3.10 The Medic was qualified with a Diploma in Medical Assistance and served on board in the capacity of on-site medic with Transocean MGH for International SOS Malaysia from September 2014. He signed-on to the vessel on 22 February 2016.

3.3.11 All crewmembers had completed their on-board Health, Safety and Environment System orientation on joining the vessel in accordance with the Company Health Safety and Environment System Manual policy.

3.4 Work routine

3.4.1 Of the 23 crew onboard, 16 members of the crew work a day routine starting at 0600 until 1800. The remaining 7 crew are watchkeepers on a 12-hour rotation, these individuals maintain a continuous watch within deck and engineering departments while at anchor in warm stack condition.

3.5 Trainee Driller (TD)

3.5.1 The Trainee Driller has been serving on board the vessel since May 2010 while the vessel was being built in Korea. He joined the vessel as an Assistant Driller and promoted to Trainee Driller on 13 November 2014. Under this contract he joined the vessel 16 days prior to the incident. The Trainee Driller is under the direct supervision of the Senior Tool Pusher and supervises the following personnel; Assistant Driller, Derrickhand, Pumphand and Floorhand.

3.5.2 The Trainee Driller completed the following professional development courses since May 2010:

a. Torque Master for Operators completed 3 March 2011

b. Well Control Instruction at an institution accredited by the International Association of Drilling Contractors completed 12 September 2014 valid through 11 September 2016

c. Rig based safety training on board from 29 May 2010 to 30 October 2015

d. Offshore Emergency Training Course on 6 January 2014.

3.5.3 As per the Company Training Matrix he was qualified for the position of Trainee Driller and was considered by his superiors to have a wealth of knowledge of the Quality, Health, Safety and Environment (QHSE), operations and maintenance functions on the drill floor, fulfilling the essential job functions required. Part of his Terms of Reference requires the Trainee Driller to train the assistant drillers who sign-on to the vessel on the operational procedures of the Riser Feeding Machine (RFM), a task considered within his capability having written the operating procedures for the system prior to the vessel being delivered to Vantage Deepwater Drilling Inc.

3.6 Riser Feeding Machine (RFM)

3.6.1 The Riser Feeding Machine (RFM) is situated longitudinally inline and aft of the drill floor (DF) (figures 2, 3 & 4). The RFM is designed for transportation of risers and slip joints from the pipe deck (PD) to the DF and vice versa. The riser support (also known as the cradle) is fixed at the front of the skate. At the rear of the skate is a riser support bucket which sits on top of the trolley.

The machine consists of the following main parts:

i. Rail assembly
ii. Skate
iii. Trolley
iv. Riser support ‘cradle’ (front)
v. Riser support bucket (rear)

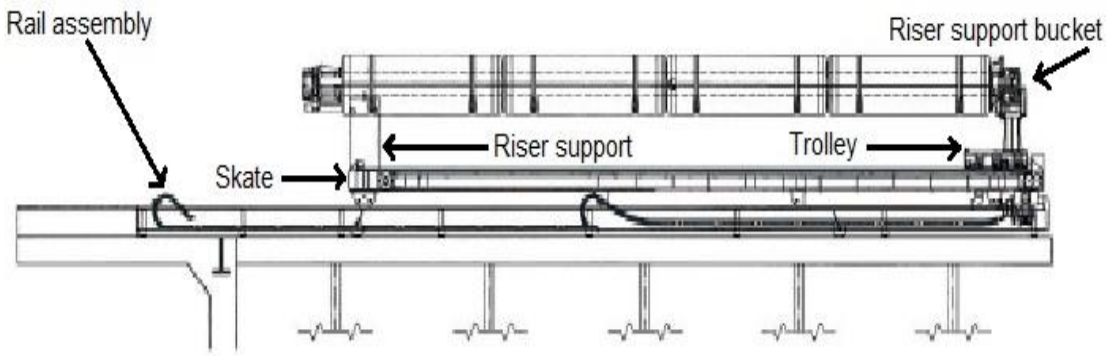

Figure 2: Schematic of the Riser Feeding Machine

Figure 3: Starboard side view of Riser Feeding Machine looking aft

Figure 4: Port side view of Riser Feeding Machine with support trolley (bucket) aft with riser support lower cradle in foreground

Figure 5: Starboard side view of support trolley (left) next to riser support lower cradle (Right)

Figure 6: An example of riser joint positioned between the bucket and the riser support supported on the skate located on the rail assembly

3.6.2 The rail assembly is installed horizontally on the aft pipe deck and connected to the drill floor. The top level of the rail section is flush with the drill floor level. The skate is running on top of the rail section between the rear stop position and the well center. The skate is a v-shaped steel frame, which is driven by a hydraulically driven rack & pinion drive system. The trolley is running on top of the skate between the rear and front stop positions. The riser support (cradle) was fixed to the front of the skate by a bolt and nut fastened to an eye plate bolted to the skate. (Figure 7).

Figure 7: Riser support Fixed to Skate with a bolt (nut is not connected to the bolt)

Figure 8: Remote Control Panel (RCP) for operating the RFM

3.6.3 The machine is hydraulically powered through the rigs hydraulic ring-line system. Once the system is powered-on the RFM can only be operated remotely by the Remote Control Panel (RCP, figures 8 & 9).

3.6.4 The enable switch must be switched-on (up) and the status yellow light will indicate that the RCP is enabled. Then normal or direct mode is selected which will be indicated by the green light. After which the skate and or trolley can be moved forward (towards the rig floor) or aft (away from the rig floor) by the respective toggle.

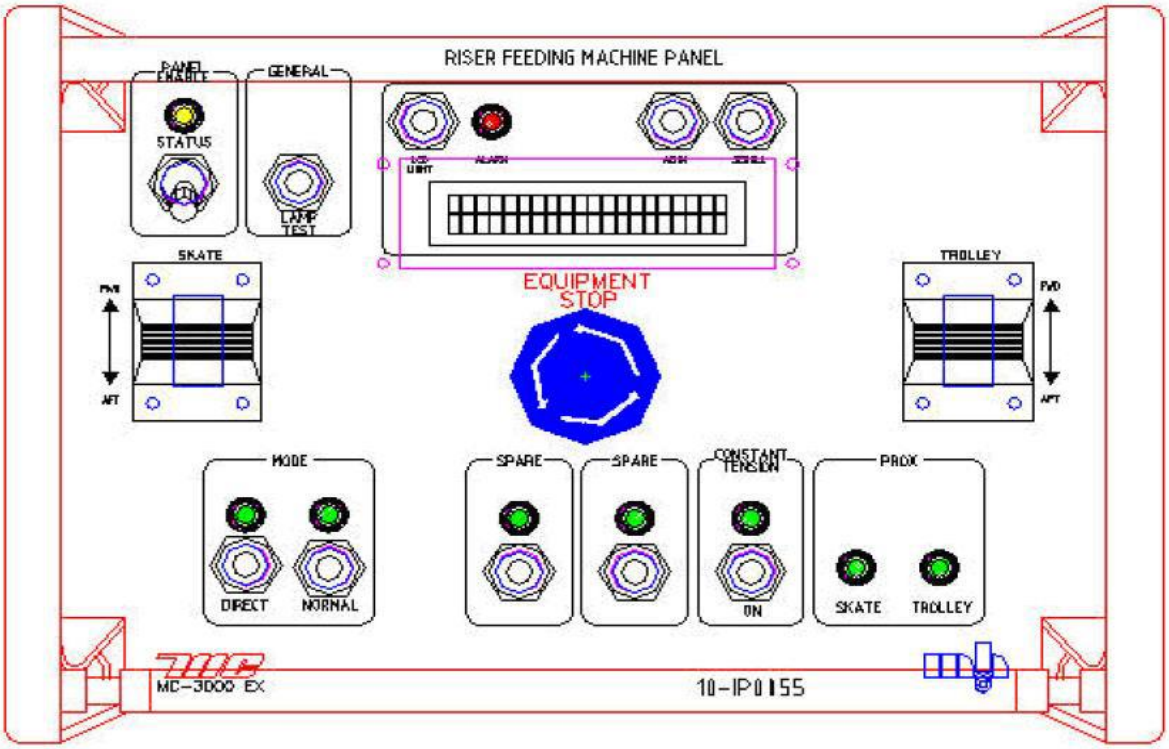

Figure 9: Schematic of the Remote Control Panel for operating the RFM

3.7 RFM Maintenance

3.7.1 The RFM was last inspected in November 2014 by MH Wirth engineers with the aim of highlighting maintenance requirement for the 5 yearly overhaul and service. On 01 December 2015, it was reported that the RFM only worked in "direct" mode. The failure was rectified and handed back to the drill floor crew. The RFM was last used for its primary purpose in an operational environment on 29 December 2015. Function testing without a riser joint in position was conducted on 05 February 2016 after completion of brake upgrade and observed to be functioning in accordance with the RFM Operational Instructions[6]; this was the last recorded testing conducted prior to the accident.

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[6] RFM Operating Instruction 170077-R-BB151-MB02-0100

4 NARRATIVE OF EVENTS

4.1 Narrative of incident

4.1.1 After the 5-year contract in India, the Platinum Explorer transited to Singapore where 87 personnel disembarked leaving a skeleton crew of 23 personnel. After replenishments, the ship proceeded for Labuan and dropped anchor on 19 January 2016 at Labuan anchorage and went into warm stack condition which involved undergoing normal routine maintenance and turning the machinery and equipment.

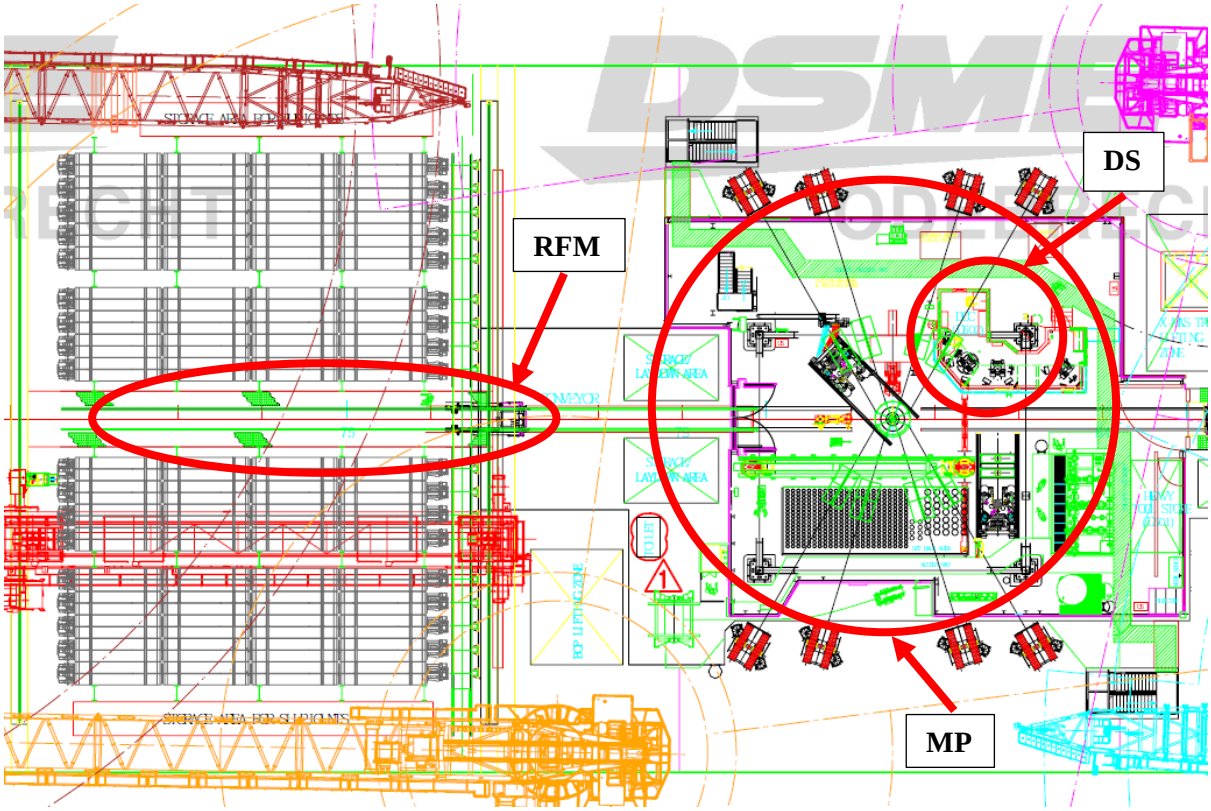

Figure 10: Schematic seen from above of the moon pool (MP) deck, drill shack (DS) and RFM

4.1.2 At 0600 daily, the Trainee Driller went to the Senior Toolpusher's office to review the jobs for the day and to receive further direction from the Senior Toolpusher as required. By 0630, the Senior Toolpusher attended the daily meeting with the other heads of departments on board to discuss the planned jobs for the day and to deconflict where necessary.

4.1.3 On the morning of 25 February 2016, the Senior Toolpusher together with the Trainee Driller commenced their daily work routine of general maintenance on various pieces of equipment located on the drill floor. The Senior Toolpusher and Trainee Driller then went for tea break at 0900 until approximately 1000. Both went back to the drill

floor and continued with more maintenance until 1100 and then stopped again for lunch until 1300.

4.1.4 The Senior Toolpusher left his office and went to the drill floor (see figure 11) to meet with the Trainee Driller to commence servicing and greasing the Vertical Pipe Handler (VPH) 1 and 2 in the drill pipe set back area. After servicing and greasing the VPHs, both individuals went into drill house (often referred to as the doghouse or Driller's shack, (see figure 11)) where the Trainee Driller sat in the Assistant Driller's chair and started up the racking system and began to function finger the derrick i.e. placing the stand of the drill pipe in front of each row to activate fingers open and close. While the Trainee Driller was performing the task the Senior Toolpusher went outside of the drill house and watched the finger board fingers open and close correctly. Half way through the task, the Senior Toolpusher went back into the drill house and told the Trainee Driller that lubricant was spraying indicating close-off fingers, commending the Trainee Driller on the excellent job on the previous service of the finger boards.

Figure 11: Drill floor with drill house to the rear

4.1.5 The next task on completion of tea break required maintenance on a leaking hydraulic cable located in the moon pool area. The Senior Toolpusher on seeing that the Trainee Driller was having no issues with the task of function fingering the derrick told him that he was going outside and try to find some plastic buckets for the next task, once he found them he made his way down to moon pool. After the Senior Toolpusher left the moon pool towards the accommodation, he had a quick chat with the Master and

Chief Officer near the Fast Rescue Craft (FRC) launch area and left at 1450 to go to his office.

4.1.6 At 1455, SDPO who was on duty on the Navigation Bridge received a call from the Trainee Driller in the drill house requesting help. The SDPO informed the Chief Officer who was in the Planned Maintenance Office with the Crane Operator and the Chief Electrician. Both the Chief Officer and the Crane Operator left the planned maintenance systems office (PMS) and went to the drill floor to look for the Trainee Driller.

4.1.7 Chief Officer and the Crane Operator found him kneeling down slumped over in the drill house (figure 12, red arrow). When asked what had happened the Trainee Driller told the Chief Officer and Crane Operator that he had crushed himself with the RFM. His face was starting to swell up and the exterior of his eyes started to turn blue-black with bruising visible through his ripped coveralls to his left side upper chest region.

Figure 12: Inside the drill house (arrow indicating location where Trainee Driller was found)

4.1.8 The Crane Operator called the bridge on UHF (walkie-talkie) requesting the Medic to attend the drill floor. The SDPO answered the call and thereafter made an announcement on the public-address (PA) system. The Chief Officer called the bridge to request a Medivac to be arranged. The Master overheard the radio call on the UHF system between the SDPO and the Crane Operator, so enquired why the Medic was needed to the drill floor, the Crane Operator informed him that the Trainee Driller had been injured and they would need to get him ashore. The Crane Operator told the Master to call the drill house phone for further information. The Master with UHF in hand picked up his mobile phone and MERP (Medical Emergency Response Plan) flow chart and immediately proceeded to the drill floor.

4.1.9 At this point, the Crane Operator left the drill floor to fetch a stretcher from the medical centre onboard, on the way he saw the Medic & told him there had been an accident and he needs to get his gear and proceed to the drill floor. He also passed the Senior Toolpusher and told him the Trainee Driller had been hurt. The Chief Officer was still with the Trainee Driller but decided to see where the Crane Operator was with the stretcher and to fetch the responder bag.

4.1.10 The Senior Toolpusher arrived at the drill floor, walked forward from the RFM, aft of drill floor and saw the RFM remote control, work gloves, safety helmet and walkie-talkie belt with holster on the port side beside the RFM (figure 13). He found the Trainee Driller alone in the drill house on his hands and knees. The Senior Toolpusher questioned the Trainee Driller on what had happened, and he responded with "*RFM*". Shortly after the Crane Operator arrived at the drill house with the stretcher followed by the Master who was closely followed by the Chief Officer and the Medic.

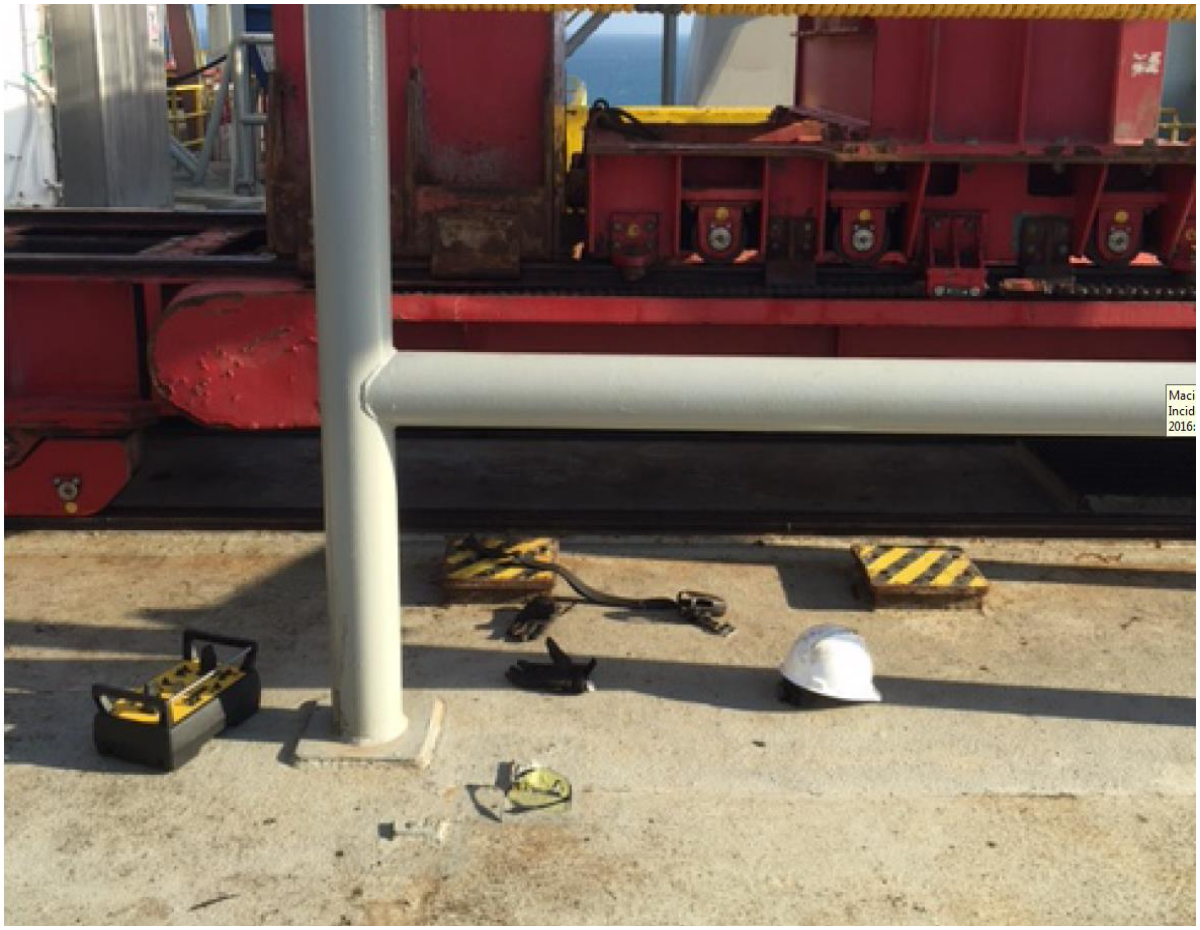

Figure 13: Remote Control Panel & PPE located adjacent to RFM (port side)

4.1.11 The Master upon arrival at the drill house questioned the Trainee Driller in an effort to determine the extent of his injuries. Although conscious, the Trainee Driller was unable to muster a response.

4.1.12 At 1509, the Master exits the drill house and calls the agent requesting a boat in order to medically evacuate (MEDIVAC) the Trainee Driller ashore, he then re-entered the drill house where he saw the Medic tending to the Trainee Driller. As the Medic was unable to administer an IV into the Trainee Driller's hand, he requested the Trainee Driller to lay down on his back on the stretcher. As the crew helped him down onto the stretcher, he complained of difficulty in breathing, so he was repositioned into an upright position. The Medic again said he needed the Trainee Driller to lay down but once again the Trainee Driller complained he could not breathe, at this point it became clear he could not be horizontal, so the Chief Officer and the Crane Operator decided to go to the onboard medical centre to get a different stretcher that would support the Trainee Driller in an upright position. The Medic then asked the Senior Toolpusher to put a neck brace on the Trainee Driller, but the Trainee Driller said he did not need it. The Senior Toolpusher then cut the Trainee Driller's ripped coveralls to see the full extent of his injuries on the left side of his chest. By now the Chief Electrician and Senior Offshore Material Coordinator (SOMC) had also arrived at the drill house.

4.1.13 The Master then left the drill floor to return to his office to call International SOS Asia Response Centre to report the medical emergency, requesting an ambulance to meet the Trainee Driller at Labuan Port Victoria and passing on the Trainee Driller details. The Master, having consulted with the 'Ship's Captain's Medical Guide', called the drill house and told the men to make sure they kept the Trainee Driller in a half upright sitting position and not to administer any morphine.

4.1.14 The Chief Office and Crane Operator arrived back at the drill floor with two different upright stretchers, one back rest to attach to the flat stretcher and one wheelchair stretcher. As the Trainee Driller was already sitting on the flat stretcher they tried attaching the back rest first, this did not work. The Chief Officer and Senior Toolpusher then lifted the Trainee Driller into the wheelchair stretcher (figure 14) with the Crane Operator supporting the Trainee Driller's head. The Chief Officer then tells the Medic to go to the medical centre to get everything ready to receive the Trainee Driller once they arrive.

Figure 14: Wheelchair stretcher used to transport the Trainee Driller

4.1.15 The Senior Toolpusher, Chief Officer, Crane Operator and the Chief Electrician started transporting the Trainee Driller down to the medical centre taking the stairs at first, it was then decided to use the elevator the remainder of the way in order to save time.

4.1.16 At 1521, the Master received a call from agent informing that the Medivac boat was on its way to the ship. The Master then informs the SDPO to make a lee[7] for the Medivac boat. SDPO starts 4 thrusters, went into DP mode and changed heading to create the lee.

4.1.17 Approximately 5 minutes later the Master called International SOS in Kuala Lumpur and relayed Medivac information and details. The Master then proceeded to the onboard medical centre, shortly after this the SOMC arrives. The Trainee Driller arrived at the onboard medical centre approximately 3 minutes later. The Senior Toolpusher left to get ready to accompany the Trainee Driller and Medic to the local hospital in Labuan, Malaysia.

4.1.18 While in the onboard medical centre, the Master made another call to International SOS and handed the phone to the Medic who spoke to them in Malay language, it is

[7] Lee – To provide a sheltered area on one side of the vessel by placing the wind and sea (waves) on the opposite side

not known what details were discussed during this call. The Medic then placed a pulse oximeter onto the Trainee Driller's left finger and recorded the following observations: O2 saturation showed at 80 and pulse at 110, he then administered O2 to the Trainee Driller, O2 saturation increased from 95 to 97. An intramuscular injection (pain killer) was administered in the right forearm, followed by an intravenous (IV) needle into the Trainee Driller's right hand connected to a bag of saline solution, however minutes later the Trainee Driller alerted the SOMC that his hand had started to bubble up, the Medic removed the IV needle which then brought the swelling down.

4.1.19 The Medivac boat 'Mermaid 11' (figure 16) arrived alongside the vessel at 1605, the Trainee Driller was transported by wheelchair from the medical centre to the main deck. As the Trainee Driller could not be laid down it was decided that they would transfer the Trainee Driller from the main deck to the boat using the work basket (figure 15). The Trainee Driller had to be taken from the medical centre, down a level to the accommodation deck using the elevator and then out to the main deck. The Trainee Driller was lifted into the work basket accompanied by the Medic, it was then lifted by the crane over the side of the ship and down to the boat where the Senior Toolpusher and Chief Officer were waiting in order to safely land the basket and assist in getting the Trainee Driller out.

Figure 15: Work basket

Figure 16: Medivac Boat 'Mermaid 11'

4.1.20 Once safely onto the boat the Trainee Driller was removed from the work basket by the Chief Officer and Senior Toolpusher. The 'Mermaid 11' is a crew boat and has a flat top deck surrounded by stainless steel handrails with narrow spiral stairs to an internal cabin area. Due to the narrow stairwell the wheelchair was not able to fit down the spiral staircase to the boat's cabin. It was decided to secure the wheelchair with the Trainee Driller still sat in the wheelchair to the front rail on the flat top deck with Senior Toolpusher and Medic beside.

4.1.21 The 'Mermaid 11' departed the ship at 1632 and once away from the ship's lee, the boat encountered rough seas which then started to cause the rail the wheelchair was secured to to break. The Senior Toolpusher then shouted to the boat driver to go back to the vessel as it was clear it was not safe to stay on the top deck. Approximately 2 minutes later the boat arrived back at the vessel. The Chief Officer along with the 3rd Engineer boarded the boat and decided the only option was to get the Trainee Driller safely downstairs to the seating area. The Trainee Driller was then assisted to the cabin below by the Chief Officer, Senior Toolpusher and the 3rd Engineer. The Master told the SDPO to inform the SOMC that he would be going ashore with the boat to assist. The Trainee Driller was seated on the front seat with the Medic beside him and the Senior Toolpusher the other side. The Medic requested for more O2 bottles (figure 17). O2 bottles were lowered but the Medic requested for a bigger bottle which was also supplied from the onboard medical centre. The Chief Officer and 3rd Engineer left the boat and the SOMC embarked on the boat to accompany them ashore.

Figure 17: O2 bottles used during Medivac ashore

4.1.22 At 1700, the boat departed the ship for Labuan. During the journey, the Senior Toolpusher was constantly talking to the Trainee Driller offering him words of support and encouragement. Throughout the journey ashore the Medic in consultation with the Senior Toolpusher monitored the Trainee Driller's pulse which was reported by the Medic as "*okay".* The journey ashore took approximately 50 minutes, during this time the Medic changed over one oxygen bottle in order to continue to provide oxygen to the Trainee Driller. During the final 10 minutes of the journey ashore the Trainee Driller stated that he felt "*very tired",* at which point the Medic instructed the helm of the 'Mermaid 11' to increase speed.

4.1.23 The vessel 'Mermaid 11' arrived at the jetty and was met by shore medical personnel who examined the Trainee Driller and carried him on to the stretcher. The medical team tried to lay the Trainee Driller on his back, but he told them that he was struggling to breathe. The Trainee Driller stayed seated upright with the aid of the Senior Toolpusher's backpack behind him as the stretcher could only be elevated slightly. The ambulance departed the quay with the Trainee Driller and Medic. The ambulance crew did not speak fluent English however the Medic was able to translate while enroute to the hospital. The Senior Toolpusher and SOMC followed behind in the ship agent's car.

4.1.24 At 1811, the ambulance arrived at Labuan General Hospital and the Trainee Driller was rushed to Red Zone Hospital Emergency Room. About 30 minutes later, a Doctor informed the Senior Toolpusher, SOMC and agent that Trainee Driller was in a critical but stable condition. Approximately 45 minutes later another Doctor informed them that the Trainee Driller was "*brain dead*". At 2020, the same Doctor then came back and informed the Senior Toolpusher and SOMC that the Trainee Driller had passed away. The SOMC then called and informed the Captain of the Platinum Explorer.

4.1.25 At 2130, the agent arrived and took the Medic, Senior Toolpusher and SOMC to the police station where they were questioned in relation to the events which led to Trainee Driller's death. At 0130 on 26th February 2016 all three individuals left the police station and spent the remainder of the night at a local hotel arranged by the agent prior to returning to the vessel at 1000.

4.2 Post Incident

4.2.1 It was confirmed by the Chief Electrician who had checked whether CCTV recorded the events taken place the previous day and confirmed that the RFM was not covered by CCTV. He went to the drill house and found the 2 main hydraulic pumps and 2 circulation pumps still running which provide hydraulic power to the RFM machine. Additionally, he found the wireless RFM remote control, work gloves, safety helmet and walkie-talkie belt with holster next to the RFM. The RFM remote control 'STATUS' light was lit indicating that the Remote Control Panel was 'ENABLED' and active. The trolley was found very close to the riser support. The Master was informed and instructed the Chief Electrician to put Trainee Driller's PPE into the drill house along with the remote control and switch off the hydraulic pumps.

Figure 18: **RFM, drill floor and drill house in the background with location of UHF circled**

Figure 19: UHF on drill floor

Figure 20: Riser support secured to the skate – bolt indicated without nut attached

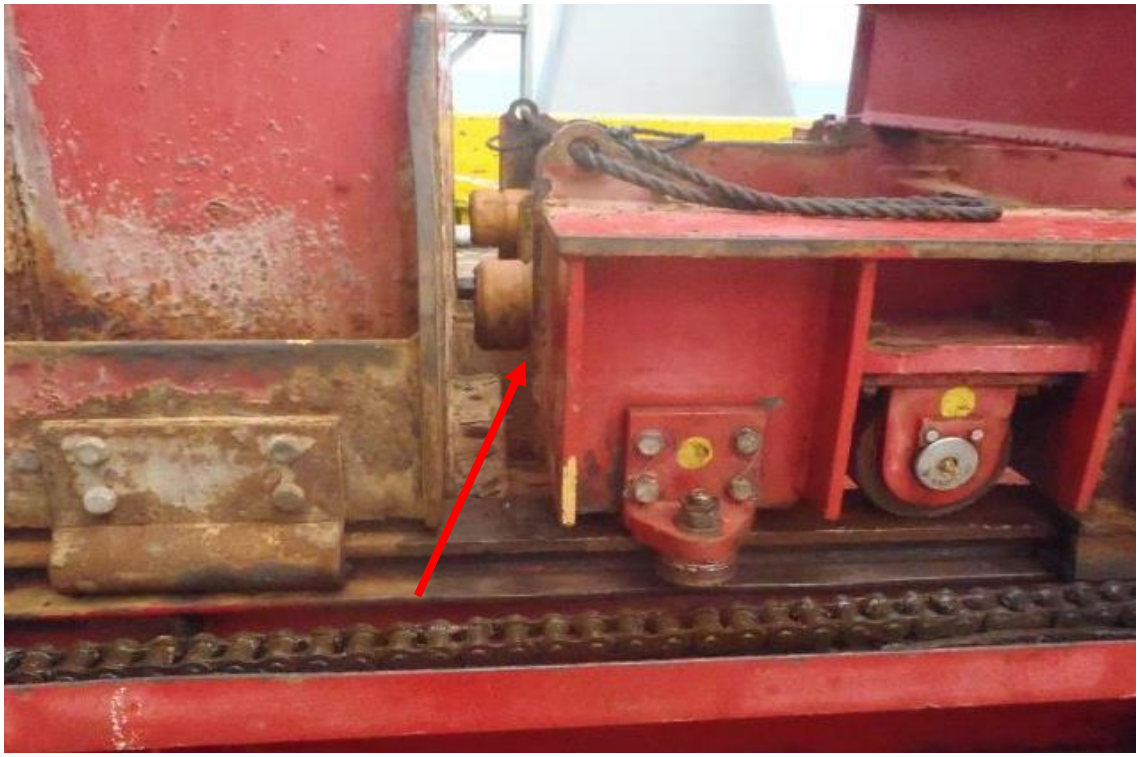

Figure 21: Riser support (left) next to trolley (right), location of securing nut indicated but not visible

Figure 22: Condition of the bolt

Figure 23: Location of the nut found on top of the trolley

4.2.2 Figures 20 to 23 were taken the following day (26 February) and it is understood to the best of the investigators knowledge that neither the bolt or the nut had been moved from this location when the pictures were taken. The nut was found on top of the frame of the trolley which was adjacent to the riser support (see figure 23).

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5 ANALYSIS AND DISCUSSION

5.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

5.2 The Accident

5.2.1 The Trainee Driller is believed to have sustained fatal injuries whilst conducting maintenance on the Riser Feeding Machine. The Trainee Driller's injuries were localised in the region of his torso and consisted of major internal haemorrhaging which is consistent with an injury sustained by blunt force trauma.

5.2.2 There were no witnesses to the accident and no CCTV covering the RFM or drill house access and therefore the investigation was unable to determine categorically how the Trainee Driller came to receive the fatal injuries. Based on the testimony of the Trainee Driller and the location of the personal protective equipment removed at the scene, it has been determined with a high degree of probability that he came to receive his injuries in vicinity of the forward end of the RFM where the trolley and the cradle were positioned on the skate.

Figure 24: Location of PPE, RCP and stopped position of the riser support and trolley, gap indicated by arrow

5.3 The Trainee Driller

5.3.1 The Trainee Driller was recognised on board as an experienced individual having served on the Platinum Explorer since 2010, bringing the vessel out of build, through commissioning of systems and equipment and finally to full operational capability. During this process, it is understood by colleagues that he had written many of the on board operating procedures for various pieces of equipment, including the RFM. Additionally, one of his responsibilities was to train other members of the drill team on the function and operation of the RFM.

5.3.2 The Trainee Driller underwent training on the RFM by the equipment manufacturers in 2010. In 2015, further training was organised onboard on the operation of the RFM, delivered by the equipment manufacturers. A witness to this training identified that due to the Trainee Driller's experience on the system in an operational environment, there was little knowledge to be imparted by the equipment manufacturer that he did not already know. The level of training conducted was in accordance with the Company Training Matrix which outlines the required training to be undertaken by each individual relative to the task required of them.

5.3.3 As per the Training Matrix, The Trainee Driller had undergone training on board as well as ashore though there are no records of his training specifically on the RFM.

5.3.4 Additionally, the Trainee Driller's superior mentioned that he was very safety conscious and would caution those who work under his supervision. From all those on board, the Trainee Driller submits the most Observation Cards[8], as part of the QHSE Management System and these are reviewed and discussed during safety meetings.

5.3.5 It was determined during the course of the investigation that no evidence exists to suggest that the effects of fatigue, drugs or alcohol contributed to this accident.

5.4 Company's Health Safety and Environment System Manual

5.4.1 Vantage Drilling HSE System Manual (Appendix VIII), Section 1.9.3, stipulate that a Task Risk Assessment (TRA) shall be performed for all tasks. For some tasks deemed inherently Low-Risk as defined by the Task Assessment Matrix, an individual's competency, skill, training and experience is sufficient and a formal recorded TRA is not required. However, the individual shall consider the associated hazards and remain vigilant to any changes in the task.

5.4.2 In the RFM Operating Manual, there is a warning for possible loss, injury or death when operating the RFM. In the RFM Maintenance Manual, there is warning for

[8] Observation Cards record non-conformities (an observed situation where objective evidence indicates the non-fulfilment of a specified requirement). One method of recording a non-conformity is on an observation card in order that appropriate corrective action to rectify can be implemented in accordance with QHSE Management System.

possible loss, injury or death and that maintenance personnel should therefore ensure pressure is bled off at any circuit scheduled for maintenance and repair, prior to loosening any components. In addition, it is stated that maintenance personnel should be completely familiar with maintenance procedures before attempting to repair or perform maintenance on the RFM.

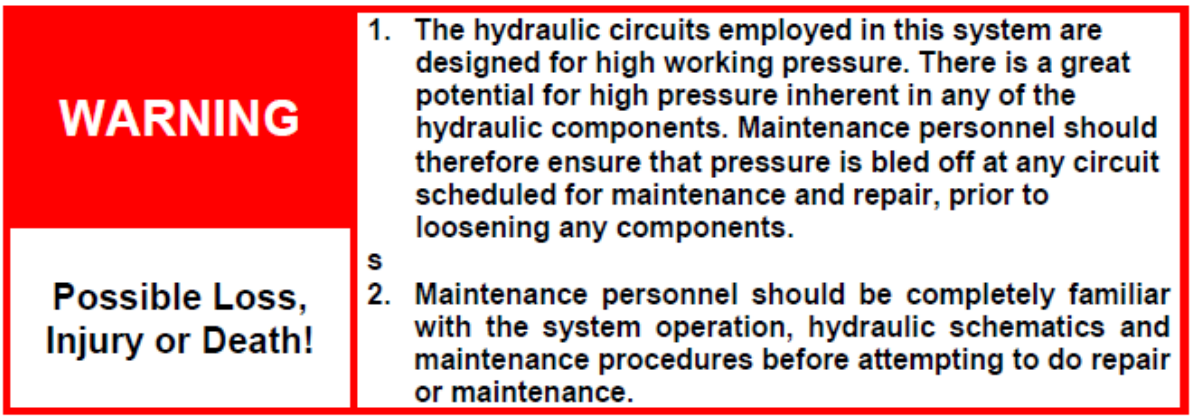

Figure 25: RFM Operating Manual warning

5.4.3 As maintenance and testing were being conducted on the drilling equipment on a routine basis, tag out procedures were only required if the system was to be overhauled on the moving parts or hydraulic system. In the event an overhaul is required the permit-to-work procedures require the isolation of the electrical and hydraulic system that would prevent the movement of any mechanical parts.

5.4.4 The company HSE System Manual section 4.12.11, refers to Remote Controlled Machinery where Remotely Operated Machinery shall only be operated in line of sight of the machinery or control panel. As such, it is thought the Trainee Driller made an Individual Plan to operate the RFM, however it remains unknown for what exact purpose.

5.4.5 Within the HSE System Manual section 4.12.12, it states that '*all machinery with moving parts shall be fitted with appropriate guards. Such guards shall only be removed once the machinery is switched off and the power sources isolated'.* On the port side of the RFM a guard rail and post are positioned to protect the forward end of the RFM but not necessarily the operator as no instructions are provided to the operator to remain behind the barrier when operating the RFM. The remainder of the RFM has unrestricted access with no barrier separating moving and non-moving machinery.

5.5 Safety Management Planning Process

5.5.1 At the start of each day, prior to commencing any work, an informal meeting between the Senior Toolpusher and the Trainee Driller is held. The purpose of this meeting is

to discuss the plan for the day, what maintenance is required to be conducted and on what equipment. On completion of this meeting, a safety meeting is held between the Head of Departments to discuss the overall vessel activity, including any maintenance or operation of machinery in order to deconflict where necessary and ensure the senior leadership onboard is aware of what equipment will be operating.

5.5.2 Part of the onboard safety management system (SMS) requires a Task Risk Assessment to be conducted when operating machinery. The Task Risk Assessment is an evaluation of a task in order to identify the associated hazards, assess the risk of those hazards on each job step, and identify barriers in place and to demonstrate that the risks have been reduced to an acceptable level. They are typically performed in the workplace and although performed once for each individual type of task, they are required to be maintained as conditions change and also used extensively as part of the daily Vantage Planning Process.

5.5.3 The Vantage Planning Process is a process performed for all tasks prior to them being commenced. The level of Vantage Planning Process used (written, verbal or individual) is established through the use of a Risk Assessment Matrix. The Planning Process is applied to all tasks even if the task is repetitive and has been done before.

5.5.4 According to Vantage HSE manual, permits to work are typically required for all non-routine work that are considered to involve high-levels of risk. In general, work permits are required for any construction work, overhauls, or repairs on systems or equipment and therefore will require the isolation of the electrical and hydraulic systems that would prevent the movement of any mechanical parts. The task being conducted by the Trainee Driller moments prior to the accident remains unknown, it is therefore difficult to know whether this task was considered low or high-risk. However, in noting his general attitude to safety, it seems unlikely that a high-risk task was being undertaken or intended to be undertaken at the time he sustained the injury.

5.5.5 There was no Task Risk Assessment conducted or permit to work arranged for the RFM on 25 February 2016. The work schedule for the day had been documented and included the following tasks: function test the Topdrive, Drawworks, Lower Guide Arm, servicing of the Crown Mounted Compensator and Active Heave Compensator, grease the Lower Guide Arm Racker Heads, service Upper Points and function test the monkey board fingers. The testing and maintenance of the RFM was not discussed at either morning meeting and confirmation that the work was not scheduled to be conducted was confirmed by absence of a documented Task Risk Assessment or permit to work.

5.5.6 It is considered with a high degree of probability that the task undertaken by the Trainee Driller was engaged unilaterally, self-assessed and in all probability considered to be of low-risk, given his propensity for maintaining appropriate safety procedures and his proactive appetite to maintain equipment to meet his own personal high standards.

5.6 Operation of the Riser Feeding Machine

5.6.1 The RFM is operated by a Remote Control Panel (RCP). The panel is designed to be operated by one person only in vicinity of the RFM. The unit is designed to be held by the operator supporting the weight of the unit with both hands. Once the RCP is set in the active position, the RFM will operate with the functioning of the controls by the operator.

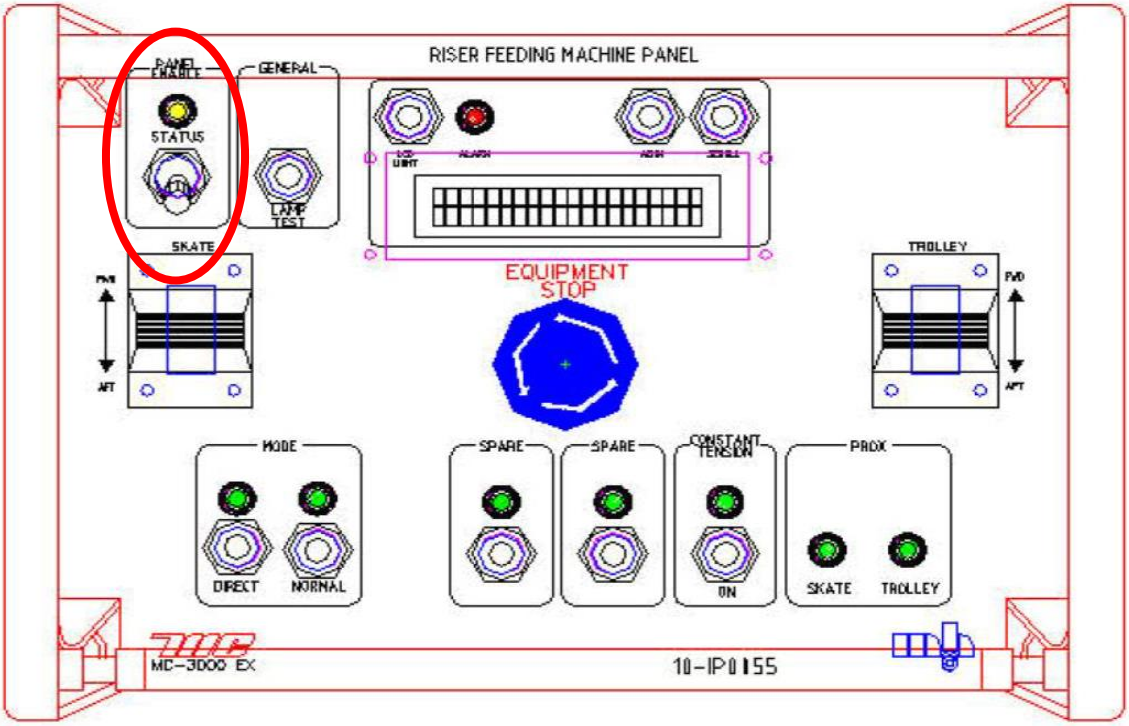

Figure 26: Remote Control Panel schematic (status button and yellow light indicated in red circle)

5.6.2 The operator of the RCP controller can stand anywhere in the vicinity (within line of sight) of the RFM to provide for an unrestricted view while operating the machine. According to the operating procedures the operator is not restricted by any physical barrier when the machine is in operation, this enables the operator to walk around the RFM to maintain a clear and unobstructed view of the RFM, laydown and storage areas.

5.6.3 Within the operating procedures, no guidance is provided instructing the operator of the RCP unit to remain at a safe distance when maneuvering the RFM. The warning provided within the manual and illustrated within figure 27, does warn the operator that caution should be used when maneuvering as this may cause injury or death through collision or interference. If the operator did not intend to manoeuver the RFM, they may consider that this warning need not apply.

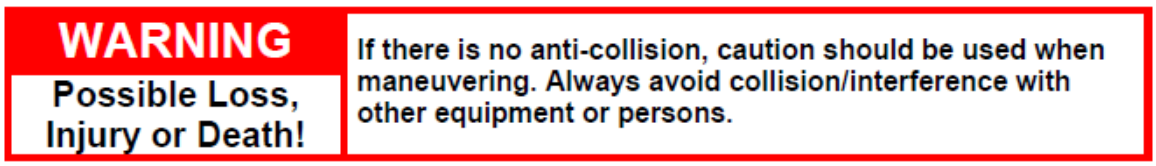

Figure 27: RFM Operating Manual warning

5.6.4 Except for the hazard warning paint surrounding the RFM on the deck, no other hazard warning signs are in place in the vicinity of the RFM.

5.7 Post-Accident Analysis

5.7.1 The RFM maintenance company MHWirth AS, were employed by Vantage Drilling Inc. after the accident to assist with the retrieval of evidence, to conduct a machine function test and verify the operation of the system. Two service technicians attended the vessel on the 01 March 2016 and commenced investigations into the AkerSolutions designed system.

5.7.2 The retrieval of historical alarm log files was achieved for the period 1400 – 1515 hours on the 25 February 2016. This was determined to be the period of occurrence of the accident. The log revealed that one system malfunction was recorded within this time frame. The system alarm log recorded '*Trolley – Low Velocity or Wrong Direction'*. According to the maintenance company this alarm only occurs in Normal mode and is only active when the system is out of mode. From the alarm list log, this alarm is recorded twice which was acknowledged and reset by the Trainee Driller on both occasions and within one second of occurrence, effectively cancelling the alarm. The functional description of this alarm can be seen within figure 28 below. The corrective action as described within the manual requires the operator to *'Check if sufficient oil supply and check position sensor and the control valve'*. It was not determined whether this action was conducted by the Trainee Driller due to the lack of CCTV or witness testimony.

2_014	Trolley - Low Velocity or Wrong Direction	Trolley - Low Velocity	The position control-monitoring program has detected a fault in the positioning control system. Cylinder or motor do not move as expected. The machine axis should move in the correct direction when commanded by the position control program.

Figure 28: Extract from RFM alarm log

5.7.3 The MHwirth also conducted a function test and recorded their findings within the technical report (see appendix II). The technical report concluded that the function test conducted found to be satisfactory however it was noted that the RCP occasionally failed to switch between Direct mode and Normal mode unless the RCP was held in a stationary position. It was recommended that the RCP be replaced for operations with no interim restrictions placed on the operation of the RFM or RCP.

5.7.4 At the scene, it was found that a threaded bolt was being utilized in place of a pin to secure the trolley to the skate via a pad eye secured to the skate (figure 29, top picture). The bolt was situated in the securing device attached to the pad eye and the nut was located in the vicinity of the bolt but not attached. The normal method of fixing was a pin as this was not as susceptible to corrosion compared to a threaded bolt. The pin was also attached to a piece of string, so it could be removed without leaning over and into the centre of the skate. When interviewed as to the origins of the nut and bolt, the Senior Toolpusher did not know why a threaded bolt was used instead of the pin, or why the Trainee Driller possibly took it upon himself to remove the threaded bolt and replace with the pin at that time.

5.7.5 The RFM will not operate without the RCP, there is no local control or alternative system in which to manoeuver any mechanical part of the RFM. The only method in which to move any mechanical part of the RFM is the operation of the RCP.

5.7.6 In noting that the RCP was located in the vicinity of the RFM and in close proximity to the Trainee Driller's PPE, it is considered likely that the Trainee Driller was in possession of the RCP at the time the injuries were sustained. If the trolley lever on the RCP unit was accidently moved the trolley would move in the direction the command was given as the system was confirmed to be in an active condition. If this occurred at the point when the Trainee Driller was positioned between the trolley and the riser support, there is no safety mechanism preventing either mechanical part from closing.

5.7.7 The normal means of communication between individuals on board but not in sight of one another was via individual's personal hand-held UHF radio. After the accident, the Trainee Driller's UHF unit was located almost equidistance between the RFM and the drill house (figure 19), indicating that enroute to the drill house he abandoned the UHF unit. During the course of the investigation, the UHF unit was not tested to confirm whether it was working.

Figure 29: Images depict the process considered to possibly undertaken by the Trainee Driller at the point of impact between the riser support and trolley

5.8 Maintenance

5.8.1 Whilst the ship was in warm stack condition, the RFM would be operated every two weeks to ensure correct functionailty and to operate the hydraulic system. Any maintenance required was recorded within a maintenance log detailing what work was undertaken and the status of rectification. A RFM function test without a riser joint in place was conducted on 05 February 2016 and found to be working satisfactorly after a brake system upgrade had been installed. Prior to 05 February, mainatenance was conducted on the 02 January, 28 December 2015, 01 December and 25 November respectively. No maintenance was observed to be required to the securing of the cradle to the skate on the above dates.

5.8.2 The RFM 5 yearly service was conducted on 19 November 2014. A number of minor maintenacne issues were identified and were addressed. Those items addressed within the report did not relate to the task which is believed to have been conducted by the Trainee Driller at the time of the accident. The general condition of the machine was reported within the report as good.

5.8.3 The Senior Toolpusher reported during the post accident interview that the RFM was tested the week before the accident and that the trolley was placed at the rear of the skate. The trolley was moved to the front of the skate on 25 February 2016 by the Trainee Driller however the reason behind moving the trolley forward and closer to the bucket remain unknown.

5.9 Medical Care and Evacuation

5.9.1 On board first aid medical assistance was administered by the medic assigned to the ship by International SOS and supported by the Master. The Master utilized the Ship Captain's Medical Guide (22nd Edition) to good effect, heeding the advice provided to ensure the appropriate medical care was administered. According to eye witnesses the first aid treatment provided was effective in reducing the pain and appeared to make the patient more comfortable whilst preparing for the medical evacuation.

5.9.2 The vessel has a Medical Evacuation Response Plan (MERP) issued by International SOS in place and was updated as of 25 January 2016, covering the ship in Labuan under warm stack condition. Therein, it is stated what boats are available for medical evacuation, 'Mermaid 11' was listed in this plan. Within the plan an alternative was also provided which states that MRCC assistance can be utilised for very urgent cases. There is no mention of any helicopter service being contracted in the MERP.

5.9.3 The ship's drill records indicate that no record of a Medical Evacuation drill had been conducted. As per the Company's HSE System Manual, Section 4.25.7, a Recovery of Injured party and Medical Evacuation should be conducted every 90 days. A Medical Evacuation drill should have been conducted to verify the Medical Evacuation Response Plan. The drills could have identified various scenarios to include the use of bulky apparatus which was used during the evacuation of the

Trainee Driller. It would have then been known that the stretcher and wheelchair could not fit into the work basket without removing the handles. Furthermore, it could have been identified that the wheelchair would not be able to fit below the deck of the Mermaid 11 whilst carrying a casualty.

5.9.4 The Medical Evacuation Response Plan recommended that Labuan Hospital should be used as a primary receiver of patients on evacuation from the ship. Instances of severe critical injuries requiring intensive care facilities, should be sent directly to Queen Elizabeth II hospital in Sabah. This route requires a ferry from Labuan to the mainland and a further 4-hour journey by road.

Figure 30: Location of Platinum Explorer in relation to Labuan

5.9.5 The distance to Labuan hospital from the Platinum Explorer is approximately 10 miles. On 25 February the journey took approximately 2 hours 40 minutes from the point the medical evacuation was ordered. Although it cannot be known for certain, due the severity of the Trainee Driller's injuries, it is considered unlikely that he would have survived no matter which hospital was designated as the primary receiving unit.

5.9.6 International SOS provided approximate times and distances to the nearest designated hospital, which could be used by the operator to incorporate within the Medical Evacuation Plan. It was stated that the journey to a hospital ashore would take approximately 25-30 minutes. In fact, the time taken to get the patient ashore took 50 minutes (actual travel time), some 25 minutes more than quoted for planning purposes.

***

6 CONCLUSIONS

6.1 The general condition of the RFM and associated equipment was found to be in general, good working order. Although the control function of the system, specifically the RCP unit had a fault, this fault was not considered contributory to the accident and did not prevent the system from operating as intended.

6.2 The Trainee Driller received fatal injuries. Based on the position of equipment, the location of his personal protective equipment immediately after the accident, it can be concluded with a high degree of probability that the Trainee Driller was crushed between the cradle and the trolley whilst conducting unplanned maintenance or repair on the Riser Feeding Machine.

6.3 The Trainee Driller was qualified and deemed experienced enough in the safe operation of the RFM, which he had demonstrated practically since installation of the machine in 2010.

Contributory Factors

6.4 The procedures and instructions on the operation of the RFM are well documented and include safety warnings sufficient to warn of the consequence of a collision which could result in possible loss, injury or death. They do not provide instruction to the operator of the Remote Control Panel to maintain a safe distance when controlling the RFM.

6.5 If the RFM hydraulic system had been isolated before commencing any planned or in this case unplanned maintenance the trolley would not have been able to move even if the control levers on the RCP had been activated. The HSE procedures manual does not require the system to be switched off when conducting any maintenance not involving the hydraulic system. There is also no requirement within the procedures for the trolley to be located at the aft end of the skate ensuring in excess of 80 meters between the trolley and the bucket. If a task is assessed to be low-risk, the individual conducting the maintenance can self-determine whether to isolate the system or not.

6.6 The temporary securing mechanism used to secure the saddle to the skate of the RFM was found to be contrary to the design specification, which should have consisted of a pin tethered to a cord to enable convenient removal. It is not known when or why a nut and bolt was used in place of the pin which was found in vicinity of the RFM.

6.7 No medical drills were undertaken in the months preceding the evacuation of the Trainee Driller. Had a medical evacuation drill taken place, the constraints and limitations of equipment would have been familiar to all personnel involved, particularly when manoeuvring the Trainee Driller from the drill shack, to Mermaid 11 via the onboard hospital.

6.8 The possibility to use a helicopter service for the medical evacuation would have expedited medical assistance. The nearest helicopter service capable of a medical

evacuation was under the control and coordination of the MRCC who had not been contacted to determine if such assistance could be rendered. It was however determined after the accident that the MRCC helicopter is not kept at immediate notice and therefore it is considered unlikely to have reduced the time taken to get the Trainee Driller to Labuan hospital any quicker than Mermaid 11.

***

7 RECOMMENDATIONS

Recommendations for the operator:

7.1 Ensure that the design specifications are adhered to when fastening the saddle to the skate and that the use of temporary securing methods are prohibited.

7.2 The safety procedures would benefit from undergoing a review and verification to ensure they remain valid and to guarantee their accuracy for the safe operation of the RFM.

7.3 Review the training matrix to ensure Medical Evacuation drills are being conducted regularly and encompass all possible eventualities for the safe evacuation of personnel as practicable.

7.4 Conduct a review of the Task Risk Assessment requirements and re-educate crew to ensure full understanding, specifically to avoid tasks being undertaken without a superior's knowledge.

***

8 ACTIONS TAKEN

8.1 Reinforcement of the 'buddy' system to avoid any equipment being operated alone.

8.2 MERP's reviewed for all vessels to include the utilization of helicopters where available.

8.3 Fleet to review and conduct emergency drills using all types of stretchers on board.

8.4 Implement a Rig specific procedure for the detailed use and testing of the Riser Feeding Machine to include cradle adjustment for different types of Riser.

8.5 Determine an alternative design to stop the use of removable pins to secure the riser support to the skate.

LIST OF APPENDICES

I. General Arrangement Plan
II. Riser Feeding Machinery – MHWirth Technical Report

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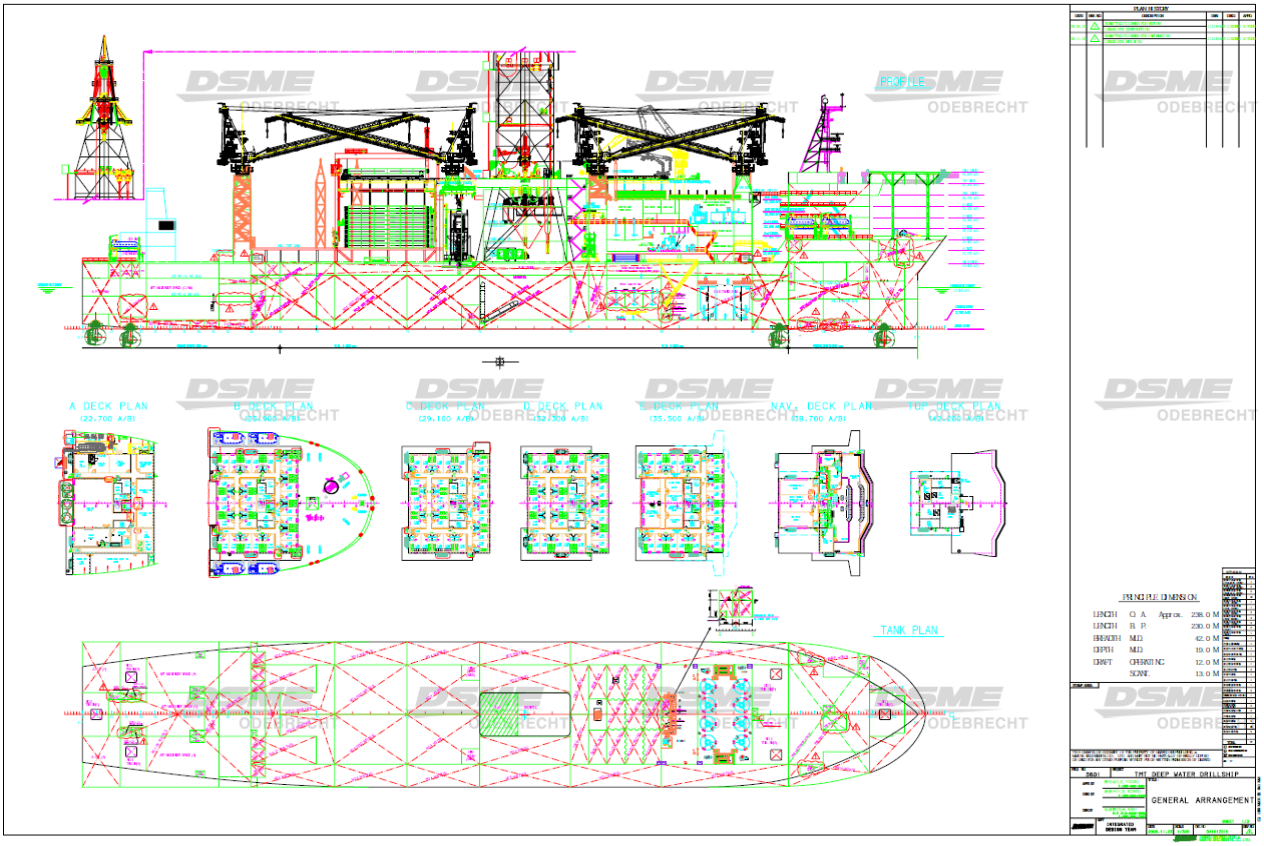
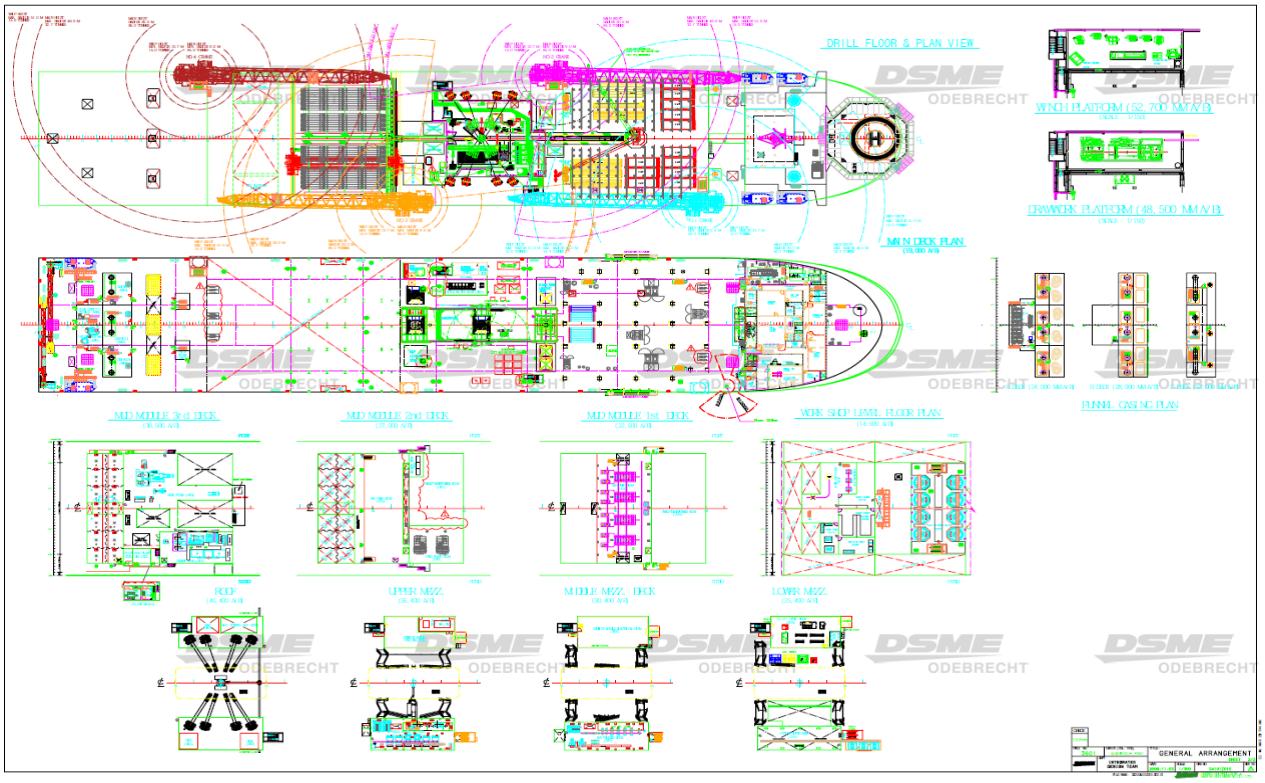
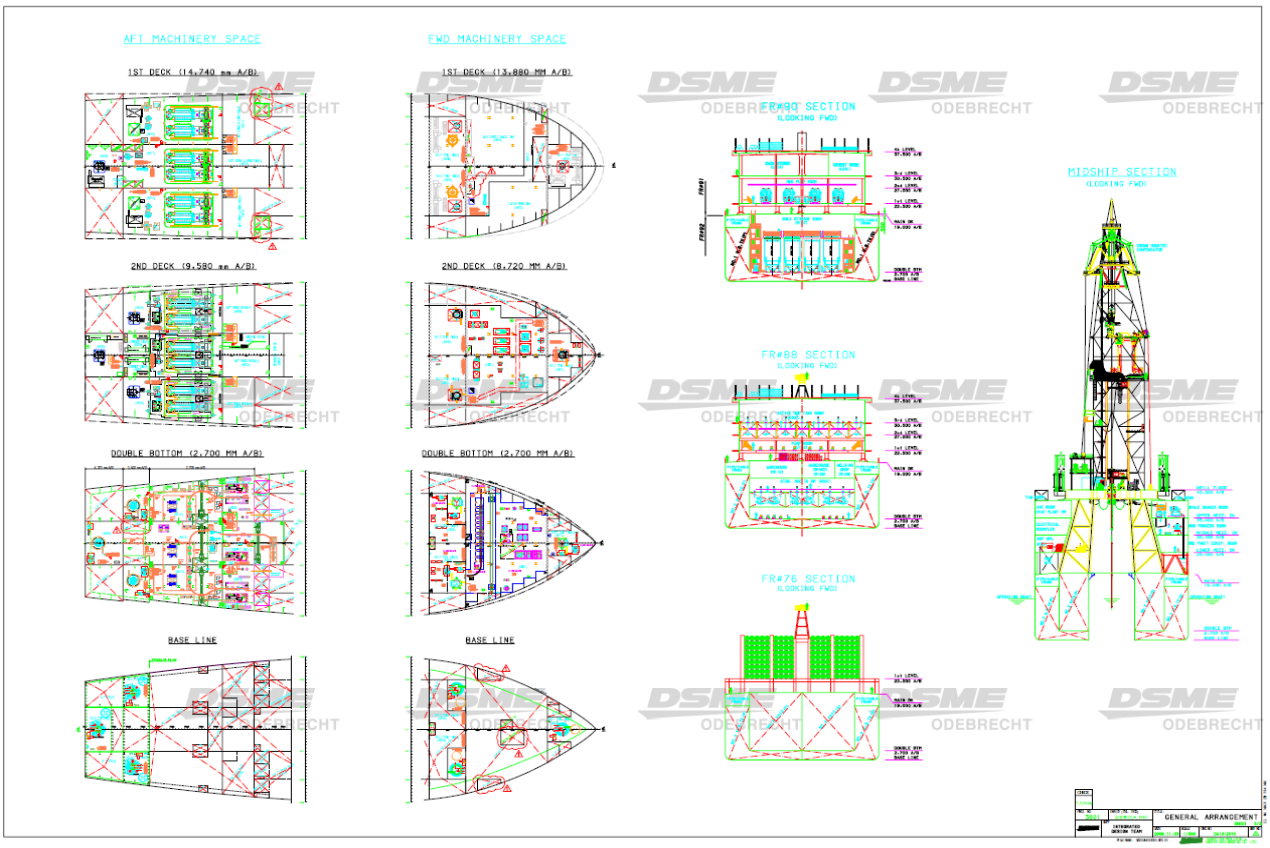
APPENDIX I – General Arrangement Plan (Platinum Explorer)






AFT MACHINERY SPACE
FWD MACHINERY SPACE
1ST DECK (14,740 mm A/B)
1ST DECK (13,880 MM A/B)
2ND DECK (9,580 mm A/B)
2ND DECK (8,720 MM A/B)
DOUBLE BOTTOM (2,700 MM A/B)
DOUBLE BOTTOM (2,700 MM A/B)
BASE LINE
BASE LINE
FR#90 SECTION
(LOOKING FWD)
FR#88 SECTION
(LOOKING FWD)
FR#76 SECTION
(LOOKING FWD)
MIDSHIP SECTION
(LOOKING FWD)
GENERAL ARRANGEMENT
DSME
ODEBRECHT

APPENDIX II – MHWirth Technical Report (Riser Feeding Machine)

mhwirth

TECHNICAL REPORT

1. Job description ***4. Parts returned to MHWirth***

2. Actions performed ***5. Further actions required, comments, or enclosure***

3. Spare parts used

Customer:	*Vantage Drilling*	MHWirth Notification no.:	*4564620*
Rig:	*Platinum Explorer*	SO/PO no.:	300533453
Country:	*Labuan / East Malaysia*	Carried out by:	[redacted]
Product:	Riser Feeding Machine	Date:	01 Mar 2016

1. Job description

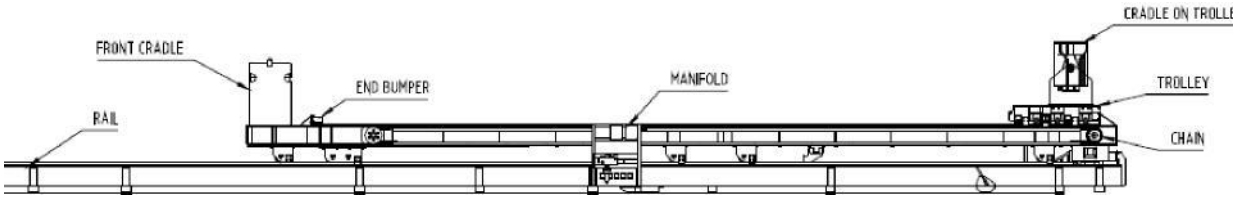
- Provide assistance for PLX to investigate Riser Feeding Machine (RFM) incident.

Actions performed

<u>01 Mar 2016 Tuesday</u>

- Travelled from Singapore to Labuan via KL
- Travelled to rig by boat
- Safety induction conducted on board the rig
- Meeting with [redacted] to have better understand our scope of work. We have discussed PLX want us to do as the following
  - Retrieve the historical alarm log file from DV and the time frame is between 25 Feb 2016, 1400hrs to 1515hrs
  - Function test on RFM according to functional description
  - Check speed and pressure setup for RFM
  - Verify RFM front cradle setup
- Retrieved the historical alarm log file as PLX requested
- Checked up the RFM trolley movement function and Constant Tension function as PLX requested, and also simulated the Constant Tension scenario that once the Constant Tension activated, the trolley with the cradle will travel forward and hit into the front cradle. The alarm log file is also requested to be retrieved for this scenario.

<u>Illustration of RFM</u>



mhwirth

02 Mar 2016 Wednesday

- Chief ET requested to have 6 alarm log files as the following time frame:
  - 2016.02.25-1400hrs-1515hrs all alarms without filter
  - 2016.02.25-1400hrs -1515hrs only RFM alarms
  - 2016.02.28-1630hrs -1730hrs all alarms without filter
  - 2016.02.28-1630hrs -1730hrs only RFM alarms
  - 2016.03.01-1730hrs -1830hrs all alarms without filter
  - 2016.03.01-1730hrs-1830hrs only RFM alarms
- Retrieved 6 historical alarm log files as PLX (chief ET) requested
- Since [redacted] come back on board, we had a meeting together with [redacted]), Dennis for further actions required from us

  Actions required from PLX
  - Send all the alarm log files to [redacted]
  - Check up if any CCTV is positioned the direction to the accident scene
  - Check up RFM trolley speed and pressure
  - Verify the installation on the RFM front cradle if it is designed according to MHWirth standard
- Sent all the alarm log files to [redacted] (MHWirth Singapore SAM)
- Checked up together with chief ET for all the CCTV cameras for the directions of its position. We did not find any one of them that the direction of the position is able to see the accident scene.
- Checked up RFM trolley speed and pressure
- Carried out RFM function test as below mentioned functions:
  - Panel enable switch – ok
  - Lamp test switch – ok
  - Emergency Stop at RCP - ok

- Direct mode switch – Occasionally mode is not selectable and/or mode reset, found it is more stable if the RCP is placed and stationed at a fix place. (recommend to replace new RCP for operations)
- Normal mode switch – Occasionally mode is not selectable and/or mode reset, found it is more stable if the RCP is placed and stationed at a fix place. (recommend to replace new RCP for operations)
- Normal mode, Skate Fwd and Aft – ok
- Direct mode, Skate Fwd and Aft - ok
- Normol mode, Trolley Fwd and Aft – Occasionally function and mode reset with an alarm "Trolley - Low Velocity or Wrong Direction"
- Direct mode, Trolley Fwd and Aft - ok
- Constant Tension function - ok

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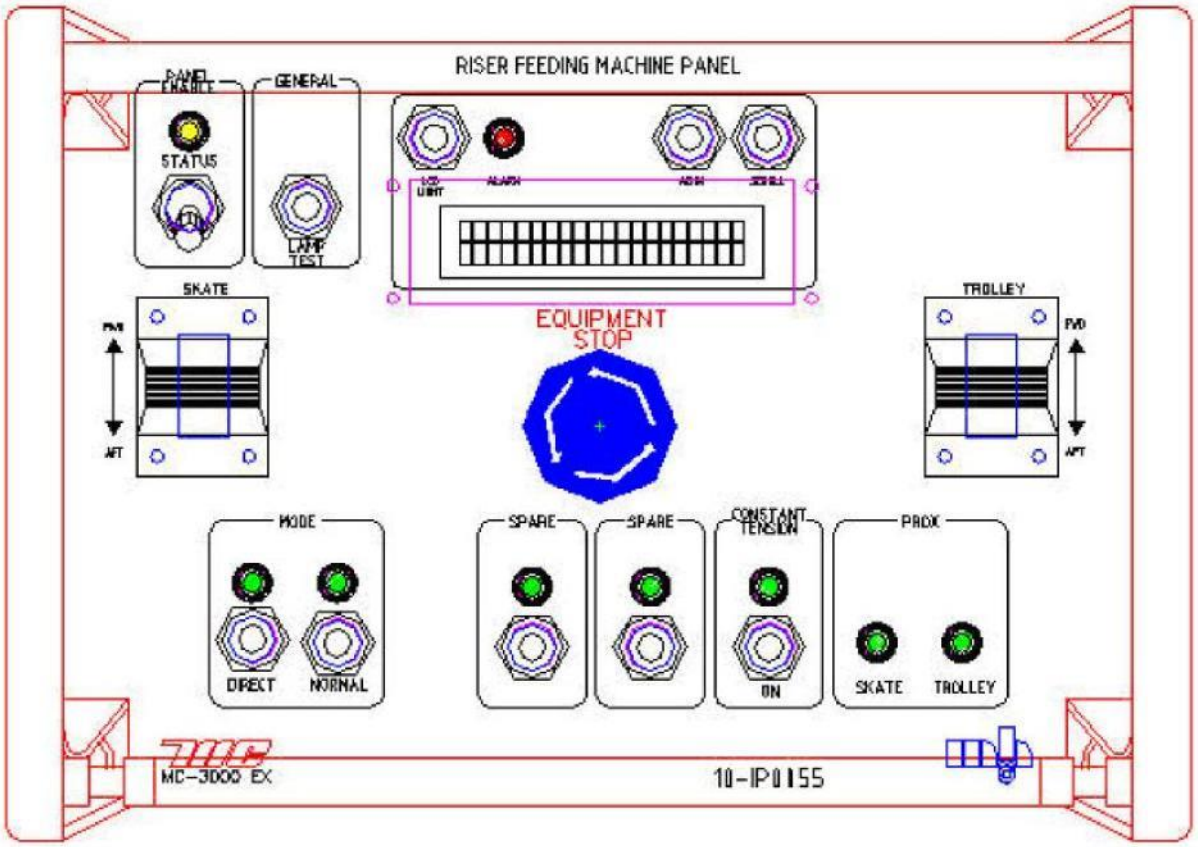
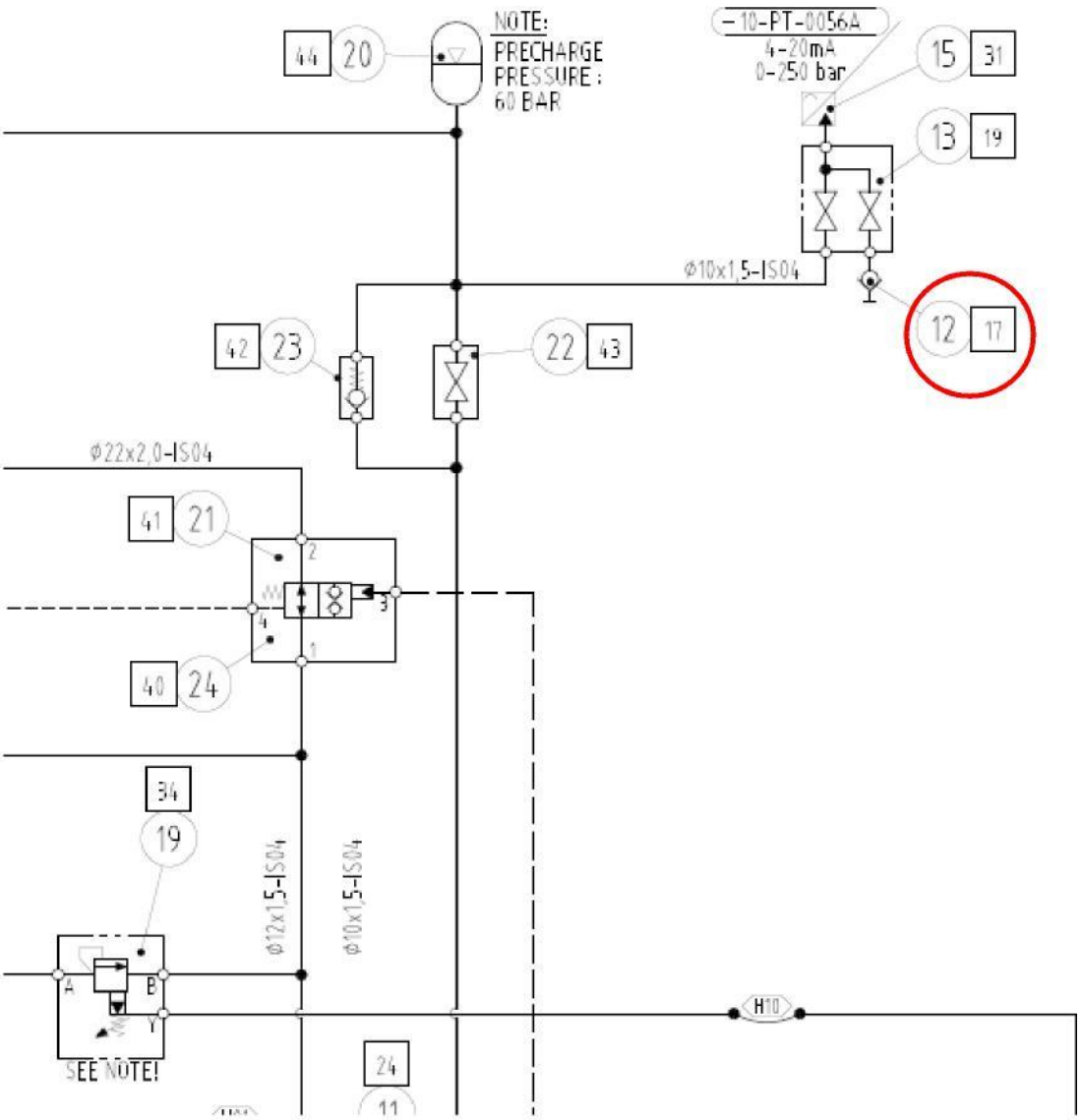
Layout of Radio Remote Control Panel (RCP) for Riser Feeding Machine



Wednesday, 02 March 2016

- Checked and verified all plumbing on the Riser Feeding Machine in accordance to these drawings.
- Function test Riser Feeding Machine, verifying pressure settings as per drawings.
- Test brake release pressure at constant tension mode from port ID 03-17. Pressure reading 125 bar. Refer to drawing 3285263.



Pressure reading 125 bar, from port ID 03-17. Refer to drawing 3285263.

Drawings referred to.

Drawing	Revision	Created by	Approved by	Released by	Released date

3285261	05	113742	219603	148548	17th Feb 2014
3285262	05	113742	159593	220009	21st July 2015
3285263	07	113742	140845	220009	21st July 2015

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2. Spare parts used
NIL

1. Parts returned to MHWirth
NIL

2. Further actions required, comments or enclosures

- Attached the 300533453 PLX-RFM incident analysis report from Product Responsible.
- Further test and verification are required for the function of RFM trolley that to eliminate the cause of the RFM alarm shows *"trolley – too low velocity or wrong direction",* we are receiving the too low velocity (low speed) scenario that causes this alarm. Initial check on the mechanical part that no significant stuck on the movement. Tuning of the valve for the trolley may require. At this moment, we were told not to change anything until further notice.
- RFM RCP needs to be verified the mode not selectable and/or the mode reset. Replace a new RFM RCP may require.

07 Mar 2016/ PLX (M'sia Labuan)		[redacted]
Date/place	Customer's sign.	MHWirth repr. sign.

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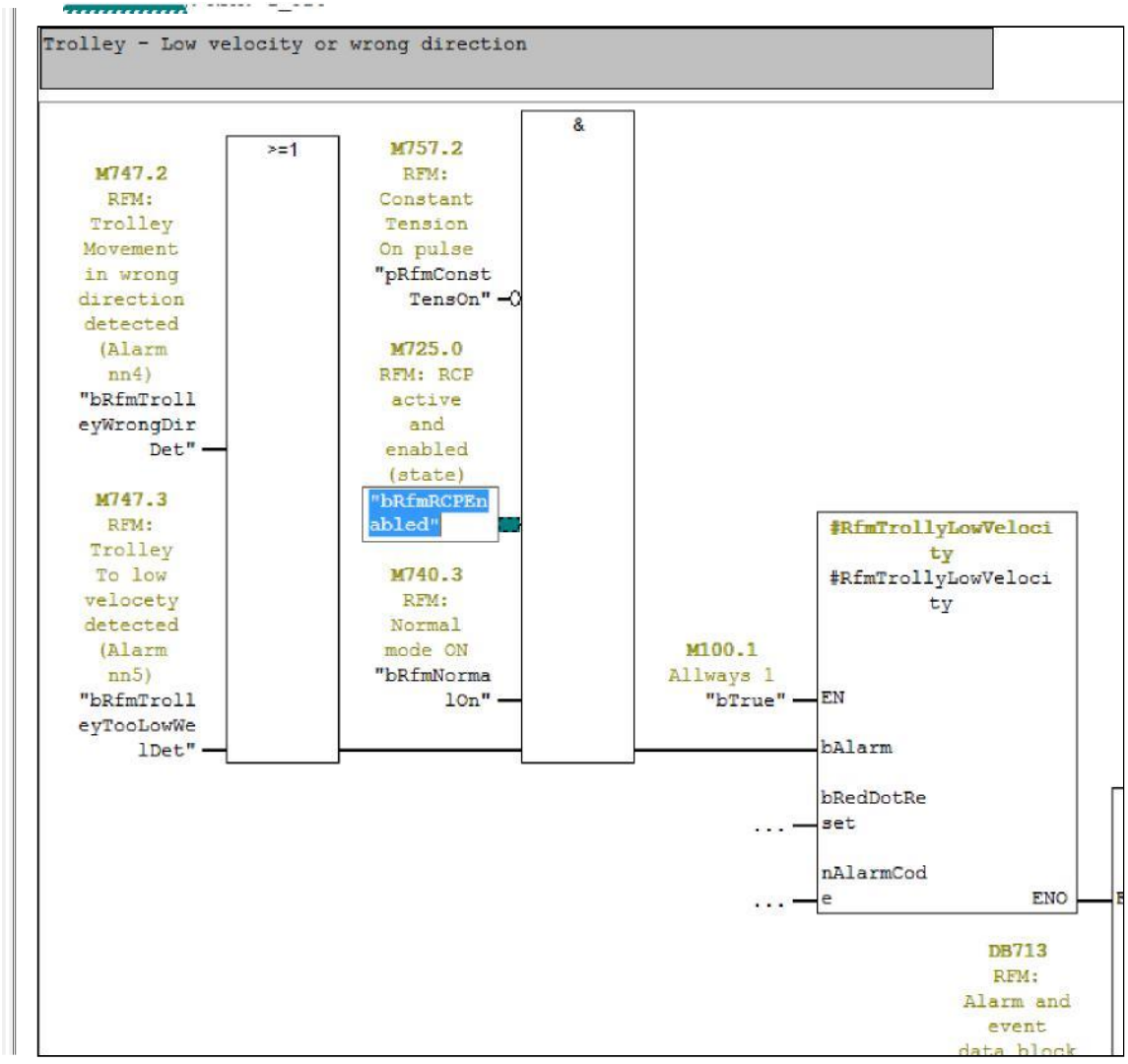
300533453 PLX-RFM incident

The latest alarm in the RFM system is the “Trolley - Low Velocity or Wrong Direction”. This alarm only occurs in Normal mode and is only active until the system is out of mode. From the alarm list we can see that the alarm is activated two times (Final state = G), and mode is reset within one second both times (Final state = R). This is according to the functionality described in the functional description for the equipment.



Coding of “Trolley - Low Velocity or Wrong Direction” alarm;

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Latest alarm in the system;

timestamp	alarm_clas	resourc	prev_state	log_action	final_stat	alarm_message
2/25/2016 2:35:19 PM	WRN	RFM	G	R	R	Trolley - Low Velocity or Wrong Direction
2/25/2016 2:35:19 PM	WRN	RFM	R	G	G	Trolley - Low Velocity or Wrong Direction
2/25/2016 2:35:01 PM	WRN	RFM	G	R	R	Trolley - Low Velocity or Wrong Direction
2/25/2016 2:35:01 PM	WRN	RFM	N	G	G	Trolley - Low Velocity or Wrong Direction
2/25/2016 2:33:32 PM	WRN	MRT	N	G	G	12-YD3610 Compressor 1 - Common Alarm
2/25/2016 2:33:32 PM	WRN	MRT	N	G	G	MRT compressor 1 fault
2/25/2016 2:33:25 PM	EVENT	SZMS	R	G	G	SZMS - Disable/Invisible Reminder Popup - Ack'ed
2/25/2016 2:30:33 PM	WRN	TFM	G	R	R	TFM Skate - Too Low Velocity or Movement in Wrong Direction
2/25/2016 2:30:33 PM	WRN	TFM	G	R	R	TFM - Common Equipment Alarm
2/25/2016 2:30:32 PM	WRN	TFM	R	G	G	TFM Skate - Too Low Velocity or Movement in Wrong Direction
2/25/2016 2:30:32 PM	WRN	TFM	R	G	G	TFM - Common Equipment Alarm
2/25/2016 2:30:28 PM	WRN	TFM	G	R	R	TFM - Supply Pressure Sensor Fault
2/25/2016 2:30:28 PM	WRN	TFM	R	G	G	TFM - Supply Pressure Sensor Fault
2/25/2016 2:30:19 PM	WRN	VPH	G	R	R	VPH Direct Mode Selectable Keyswitch has been activated
2/25/2016 2:29:39 PM	WRN	VPH	R	G	G	VPH Direct Mode Selectable Keyswitch has been activated
2/25/2016 2:29:30 PM	WRN	VPH	G	R	R	VPH Direct Mode Selectable Keyswitch has been activated
2/25/2016 2:28:53 PM	WRN	VPH	R	G	G	VPH Direct Mode Selectable Keyswitch has been activated
2/25/2016 2:28:15 PM	MSG	VPH	N	G	G	VPH System on Selected Path.
2/25/2016 2:27:54 PM	WRN	VPH	G	R	R	LGA: Guide position measurement û Did not reach target position
2/25/2016 2:27:54 PM	WRN	VPH	G	R	R	BRC: Guide position measurement û Did not reach target position
2/25/2016 2:27:54 PM	WRN	VPH	G	R	R	BRC: Grip position measurement û Did not reach target position
2/25/2016 2:26:43 PM	WRN	VPH	G	R	R	Casing FB:- Outer latch prox and pressure transm. mismatch
2/25/2016 2:26:43 PM	WRN	VPH	G	R	R	Casing FB:- Outer latch prox and pressure transm. mismatch

prev_state The previous state of the alarm before the event which caused it to be logged. This may be N (normal), G (generated), A (acknowledged), or R (reset).

log_action The trigger event which caused the alarm to be logged. This may be G (generation), A (acknowledgment), R (reset), or D (manual deletion).

final_state The final state of the alarm after the trigger event. This may be G (generated), A (acknowledged), R (reset), or D (deleted).

From Functional description(SA06);

Abbreviations

Rm	Reset mode
Ssd	Software shutdown
Hsd	Hardwired shutdown
A	Alarm
I	Interlock
(*d)	Can be overridden using "Equipment Interlock" (see chapter 2.4.6).

			Position measurement is out of range	outside its physical limits. Check the position sensor.			
2_014	Trolley - Low Velocity or Wrong Direction	Trolley - Low Velocity	The position control-monitoring program has detected a fault in the positioning control system. Cylinder or motor do not move as expected. The machine axis should move in the correct direction when commanded by the position control program.	Active mode was reset. Check if sufficient oil supply. Check position sensor and the control valve.	10- HCV-0055, 10- GT-0055		Rm Ssd A