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DYNAMIC POSITIONING CONFERENCE
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RISK

Fire and Gas Detection ESD Design Philosophy and its Impact on Asset Management

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Fire & Gas Detection – ESD Design Philosophy Changes and their impact on Asset Management

Harry van Rijswijk

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Agenda

- Introduction
- F&G systems; first alarm and monitoring systems, now more acting system, shutting down systems automatic
- Philosophy of what we do in worst case scenario
- Other threats for station keeping
  - 1 Water-mist in 11kV switch boards and DP control rooms
  - 2 Experience level going down on the bridge
  - 3 Lock to Bottom mode
  - 4 AVS to exclude or better protection
- During commissioning phase to test AVS do not kill power of the control systems (see website links)
- Request for one name for AVS

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SHI building 61 drill ships
DSME building 22 drill ships
HHI building 16 drill ships

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Introduction

Harry van Rijswijk born in 1954

- Electrical Engineering 1966 till 1977 (incl. army)
- Geology 1977 – 1979 University of Amsterdam
- Physiology 1984 – 1986 University of Utrecht
- In Brazil 10 years of operation on 3 DP vessels and 5 years as support engineer for 4 DP vessels from 1992 till 2002
- Sins 2007 working on 19 new build DP vessels and 6 older DP vessels for LR /WEST

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Seadrill
WEST GEMINI
WEST GEMINI

Comparison three accidents

- 15 Mar 2001, P36, 11 persons killed
- 28 Nov 2007, NRE, 6 persons injured
- 20 Apr 2010, Deepwater Horizon, 11 persons killed, 17 persons injured

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Case Study 1

- F&G systems; first alarm and monitoring systems, now more acting system, shutting down systems automatically
- See examples
- 1. Thrusters drives / Thrusters
- 2. Engine rooms / Engines

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Fire Zone ZP1 - Stbd Fwd Thruster Rm

EFFECT

CAUSE

Description	Sensor Tag	AIM_Tag	Common Alarms		Common Alarms	Common Alarms		Common Alarms	Common Alarms	Common Alarms		Common Alarms		Common Alarms		576GA001_S	571GB005A_S	ROD_B_ZP2	575GA003_S_GF01	575GA003_S_GF02	575GA003_E_GF01		480REHEAT_DP5		FD_B_ZP1	575GA003_E_GE01	575GA003_S_GE01		CB_TO_THR1_MCC	CB_TO_THR2_MCC	THR1_VFD48	THR2_VFD48	
		Description	SS-OS Alarm, Visual and Audible		Matrix Panels Audible Alarm	Matrix Panels F&G Alarm		Alarm Columns Strobe	Alarm Columns Fire Alarm	Alarm Columns Watermist Release		PA/GA Fire Alarms		Start Fire Pump		SCU_4 Thruster Room SF	DHU_01 Condensing Unit Compressor SF	ROD SOL Valve Block For Dehumidifier Unit 1 RODs	ROD Make Up Air Supply For Dehumidifier Unit 1	ROD Supply To Thruster Rm, Pump Rm & Column 14m SF	ROD Exhaust Fr Thruster Rm, Pump Rm & Column 14m SF		480V Reheat Dist Panel #5 SF (HSD Matrix)		FD SOL Thruster Rm SF Rm S1	FD Exhaust Fr Pump Rm S1 SF	FD Supply To Pump Rm S1 SF		Thruster 1 MCC Shutdown	Thruster 2 MCC Shutdown	Thruster 1 Drive Shutdown	Thruster 2 Drive Shutdown	
Smoke Detector Thr Rm S2 SF Pontoon	811BS_A42		X		X	X																											
Smoke Detector Thr Rm S1 SF Pontoon	811BS_A43		X		X	X																											
Confirmed Alarm			X		X	X		X	X			X		X		X	X	X	O	O	O		X		X	O	O						
Manual Call Station Thr Rms S1 & S2 SF Pontoon	811BM_A41		X		X	X		X	X			X		X		X	X	X	O	O	O		X		X	O	O						
Watermist Vent Stop MS8, Thr Rm Stbd Fwd	WM_VSTP_MS_8		X		X	X		X	X	X		X				X	X	X	O	O	O		X		X	O	O		X	X	X	X	

Legend:

Confirmed Alarm: 2 out of (n) Smoke Detectors in Alarm, or one Smoke Detector in Alarm and un-acknowledged for more than two minute.


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NOBLE
NOBLE
NOBLE DON TAYLOR

Case Study 2

- Philosophy of what do we do in worst case scenario ?
- After gas kick we need to secure the well first by actuating EDS = emergency disconnect sequence
- See example A of incident on 28-Nov-2007 on old drill ship (1977) in Brazil
- See example B of incident 28-Dec-2011 in Angola with Samsung new build (2010) HN 1702

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Accident Analysis – 28 November 2007 – Lost Time Incident (LTI)

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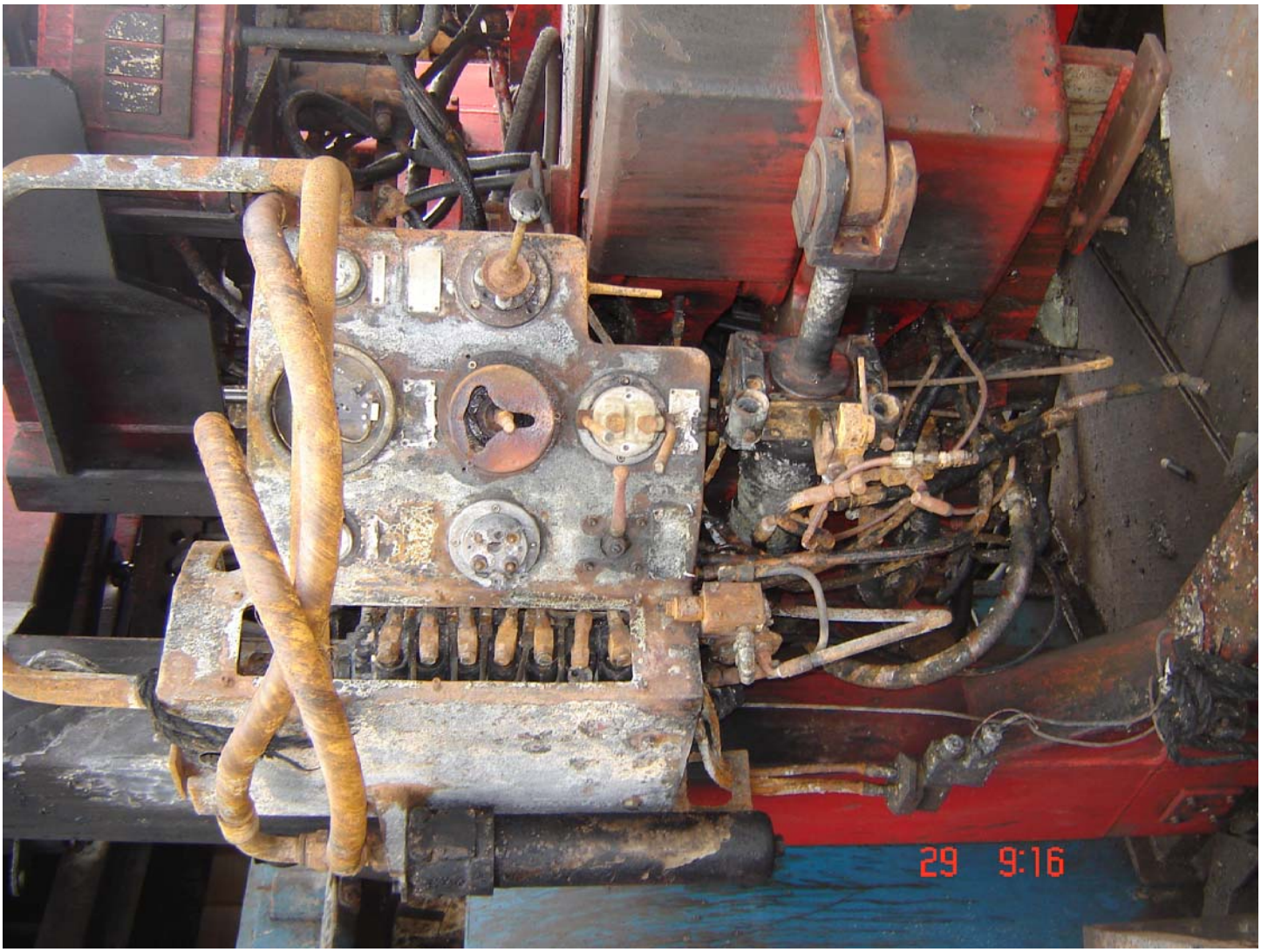
29 9:20


29 9:16

Recommendations

1. *Whenever string falls into the well, management of change may be provided, considering the possibility of loss induction by "surge" effect and hydrocarbon inflow, by reduction of the well hydrostatic.*
2. *Whenever a operation with the pipe rams closed is performed, hang off if the operation allows it. Always close the hang off ram, which must be, by preference, the upper one.*
3. *Always control the hydraulic seal pressure while circulating through the atmospheric separator, preventing it to break and gas leak. If this is not possible, reduce the gas flow rate in the separator by closing the choke, due to the formation fracture pressure, return must be aligned straight with the burner and the gas must be burned.*
4. *Whenever running the BOP, circulate fluid through the separator to check if there is any obstruction on the auxiliary line. If so, discontinuous flow will happen, type "gush", on the output.*

5. *Whenever running the BOP, carry out a test on the hydraulic seal pressure sensor of the atmospheric separator to check if it is operational.*
6. *Whenever installation change happens, provide a management of change, qualifying and quantifying the risks so that appropriate mitigate measures are adopted.*
7. *Always identify the basic cause and actuate, with the purpose of preventing repetition of the problem.*
8. *It is only possible to restart an operation where gas leak has happened after blocking the basic cause and being sure that the total dissipation of what leaked has already happened. Before complete dissipation, all possible ignition source must be neutralized.*
9. *The flow line valve, between the separator fluid line output and the gumbo box, and the trip tank intake valve must have a remote actuation in the dog house and be interlocked, so that they can be actuated in a fast way and prevent that they are open or closed at the same time.*

10. *Whenever alteration of the schedule happens or the well situation, management of change and risk analysis must be provided.*
11. *There must always be a meeting before the operation, with all the involved ones, in which a risk preliminary analysis must be done*
12. *Combustible material must not be stored inappropriately in a classified area.*
13. *Closed places in classified areas must be isolated and have positive pressure not allowing gas to enter.*
14. *In case of gas leak, the minimum it seems to be, the danger exists, the explosion risk must be considered and actions taken to eliminate the leak and reduce the explosion risk concerning the accumulated gas.*
15. *It is only possible to stay in an area where gas leak has happened if the measurement on all possible places that accumulation can happen indicates concentration lower than 10 % of LII (Inflammability Lower Limit) and all possible ignition source is neutralized.*
16. *The PPE must always be used in a correct way, in order to provide, effectively, all the necessary protection.*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Case Study 3

- Other threats for station keeping in the future
  - 1 Water-mist in 11kV switch boards and DP control rooms
  - 2 Experience level going down on the bridge
  - 3 Lock to Bottom mode (AH-Drawworks)
  - 4 AVS to exclude or better protection

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Case Study 4

- During commissioning phase to test AVS do not kill power of the control systems (see website links)

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Case Study 5

- Request for one name for AVS
- Examples of different names for AVS
  - 1 AVS = abandon vessel shutdown (ABS)
  - 2 APS = abandon platform shutdown (DNV)
  - 3 ESD = emergency shutdown zero (LR)
  - 4 CSD = catastrophic shutdown (Converteam)

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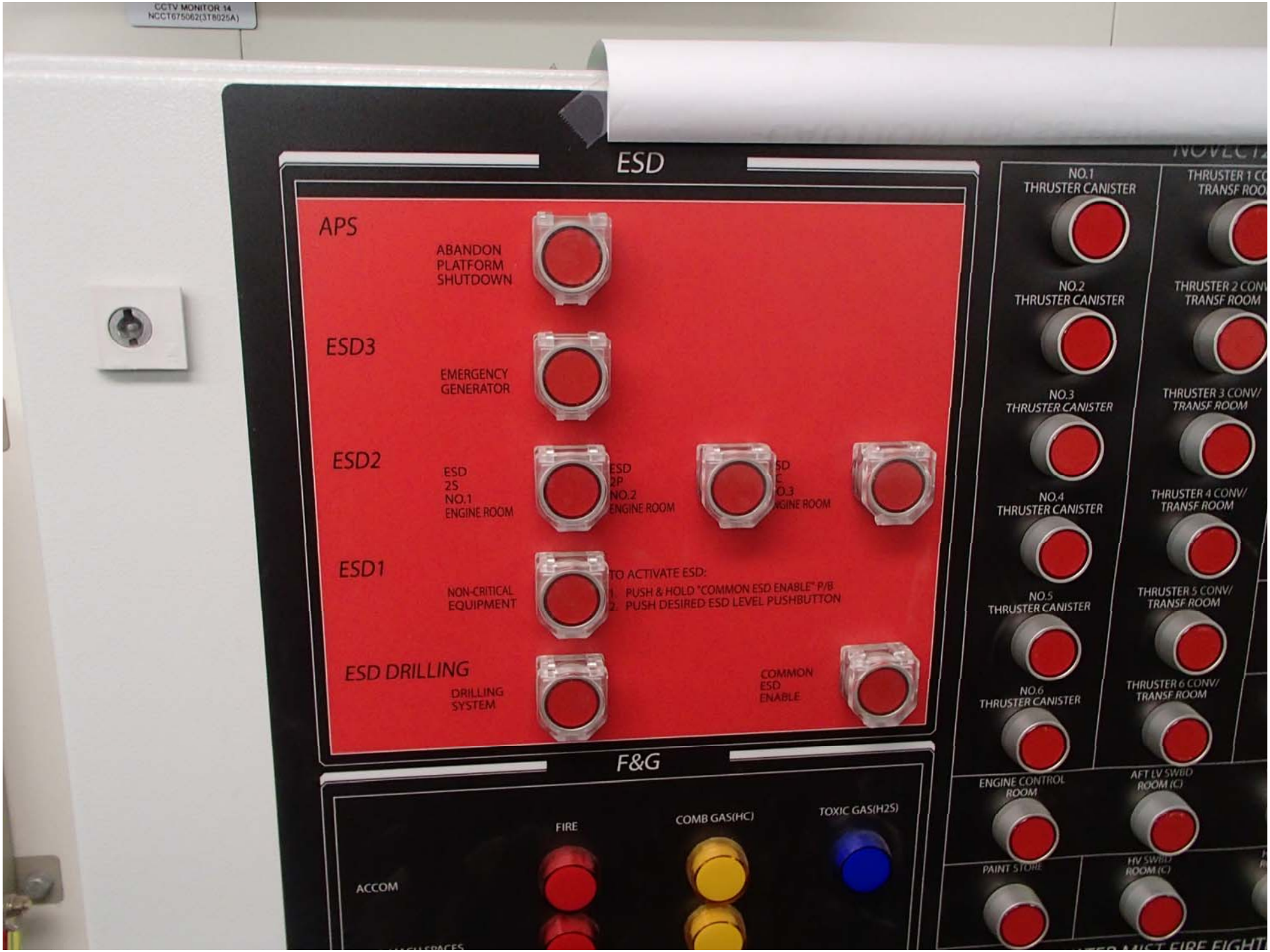
CCTV MONITOR 14
NCCT675062(3TB025A)
ESD
APS
ABANDON
PLATFORM
SHUTDOWN
ESD3
EMERGENCY
GENERATOR
ESD2
ESD
2S
NO.1
ENGINE ROOM
ESD1
NON-CRITICAL
EQUIPMENT
TO ACTIVATE ESD:
1. PUSH & HOLD "COMMON ESD ENABLE" P/B
2. PUSH DESIRED ESD LEVEL PUSHBUTTON
ESD DRILLING
DRILLING
SYSTEM
COMMON
ESD
ENABLE
F&G
FIRE
COMB GAS(HC)
TOXIC GAS(H2S)
ACCOM
NO.1
THRUSTER CANISTER
NO.2
THRUSTER CANISTER
NO.3
THRUSTER CANISTER
NO.4
THRUSTER CANISTER
NO.5
THRUSTER CANISTER
NO.6
THRUSTER CANISTER
THRUSTER 3 CONV/
TRANSF ROOM
THRUSTER 4 CONV/
TRANSF ROOM
THRUSTER 5 CONV/
TRANSF ROOM
THRUSTER 6 CONV/
TRANSF ROOM
ENGINE CONTROL
ROOM
AFT LV SWBD
ROOM (C)
PAINT STORE
HV SWBD
ROOM (C)


ABANDON PLATFORM SHUTDOWN
APS-66004
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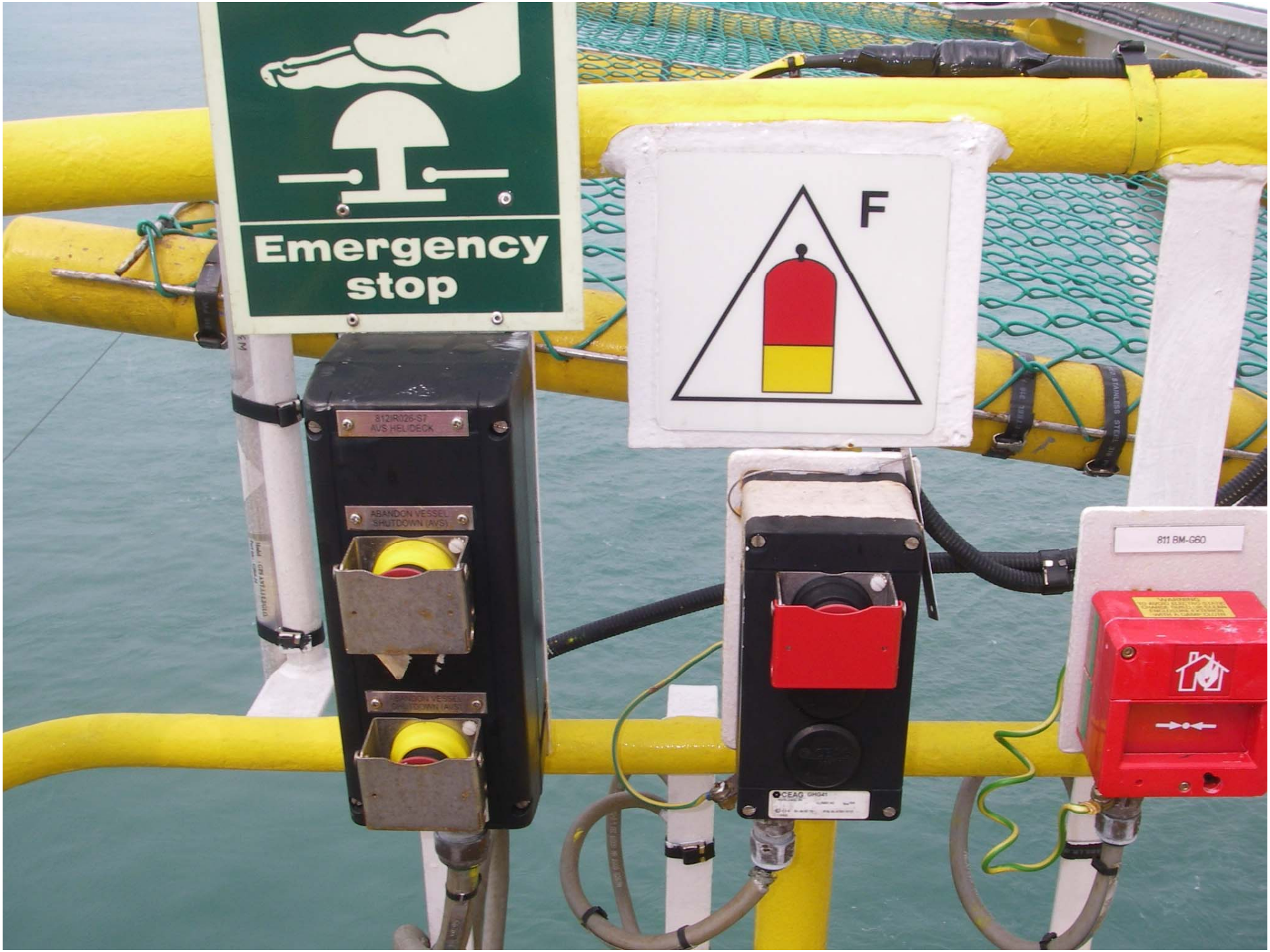
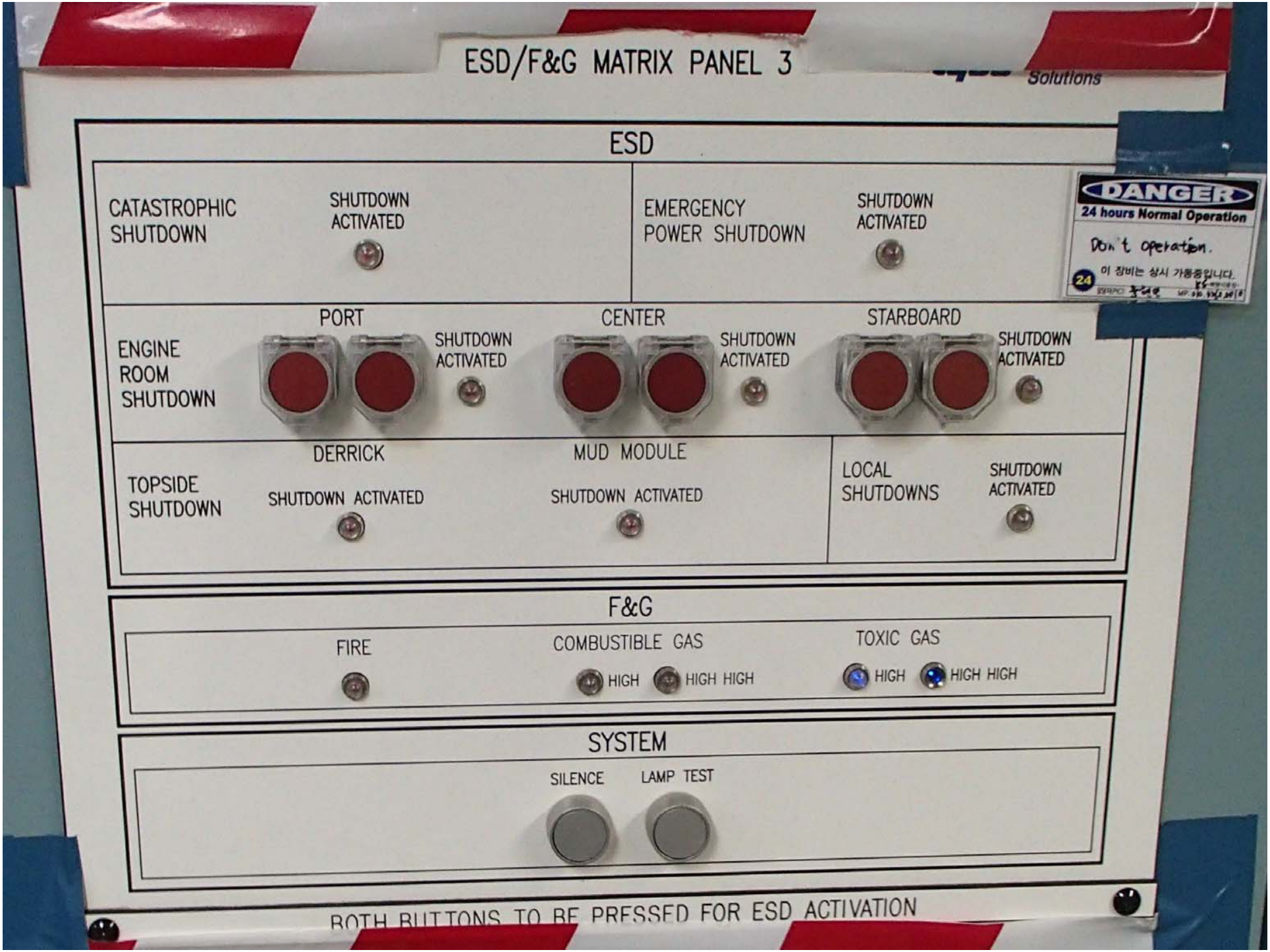
Energy


Emergency stop
F
812IR026-S7
AVS HELIDECK
ABANDON VESSEL
SHUTDOWN (AVS)
811 BM-G60


ESD/F&G MATRIX PANEL 3
Solutions
ESD
CATASTROPHIC SHUTDOWN
SHUTDOWN ACTIVATED
EMERGENCY POWER SHUTDOWN
SHUTDOWN ACTIVATED
DANGER
24 hours Normal Operation
Don't operation.
이 장비는 상시 가동중입니다.
PORT
CENTER
STARBOARD
ENGINE ROOM SHUTDOWN
SHUTDOWN ACTIVATED
SHUTDOWN ACTIVATED
SHUTDOWN ACTIVATED
DERRICK
MUD MODULE
TOPSIDE SHUTDOWN
SHUTDOWN ACTIVATED
SHUTDOWN ACTIVATED
LOCAL SHUTDOWNS
SHUTDOWN ACTIVATED
F&G
FIRE
COMBUSTIBLE GAS
HIGH
HIGH HIGH
TOXIC GAS
HIGH
HIGH HIGH
SYSTEM
SILENCE
LAMP TEST
BOTH BUTTONS TO BE PRESSED FOR ESD ACTIVATION

Conclusion

1. In 2009 in the MTS paper of Mr. Gilberto Beduln; he made an proposal for IMO to make changes in the Modu-code:In 2012 the latest Modu-code did show a different layout but no changes as above. They made the changes in 2009 but with small difference in wording.

2. Implement mandatory simulator training for DPO's and Drillers ; USCG Marine Safety Alert 17 June 2013 See

3. Operators need to demand time for the annual DP trials to implement two blackouts each year, one time for each crew a year. This will make the client and DPO's and their maintenance crew more confident with their unit. To show the automatic recovery time of the system including thrusters back in DP. (At this time we stop the time when one fwd thruster is in DP and one aft thruster is in DP. This is used to compare all DP vessels). It is used as a fitness test of all systems. Also it has nothing to do if you run in a single or double split configuration.

4. The DP alert system is also using network A and B, in the past this was always an independent hard wired system.

5. More vessels need better WSOG and training between parties involved with the WSOG.

6. More and more DP vessels installing a Weather Doppler Radar to have a better response on bad weather. It will give the DPO's an extra "eyes and ears".

7. Implement one name that is used by the complete industry and class. Now we have ESD zero or 3 (LR), Abandon Platform Shutdown (APS from DNV), Catastrophic Shutdown (Converteam) and Abandon Vessel Shutdown (AVS from ABS).

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23 new builds in 2014