



# VIKING Technical Dept.

8D report – Caribbean Fantasy

RP 2016.11.30



# 8D Introduction



- **Eight Disciplines (8D) Problem Solving is a method used to approach and to resolve problems**
- **Purpose is to identify, correct, and eliminate recurring problems**

**1 Use a team approach/form an 8D team**

**2 Describe the problem**

**3 Interim containment**

**4 Define the root cause(s)**

**5 Develop solution(s)**

**6 Implement the solution(s)**

**7 Prevent recurrence**

**8 Close the problem**



# D1: Use a Team Approach

## Problem Solving Leader:

René Pedersen, Global MES Service manager

## Problem Solving Team:

Rafael Serichol, Regional MES Surveyor

Antonio Fanelli, MES Specialist

Charles Gonzalez, Service Manager, Miami

Poul Erik Andersen, MES Engineer

Erik Pedersen, MES Specialist

## Global Support Resources (only major):

Engineering Department, Global MES Service

## Location:

San Juan, Puerto Rico

M/F Caribbean Fantasy, IMO: 8814263

## Product:

Slides: VES DD 25,5 m.

Serial no.'s:

VES 25,5 DD-H0199

VES 25,5 DD-H0299

Droprfts: 13 pcs. of 50 DKS deployed, 11 still onboard

## Component:

Slide, platform and droprfts



## D2: Describe the problem

### Observations/information:

On August 17th the U.S Coast Guard responded to a fire aboard the 561-foot passenger ferry vessel Caribbean Fantasy approximately half a mile off Punta Salinas.

The ship was carrying 511 passengers, including crew. All were successfully evacuated.

USCG have asked VIKING Life-Saving Equipment for an on-board inspection of the MES and associated liferafts onboard. The inspection took place in Puerto Rico on September 15, 2016.

Jason Yets (USCG) informed that at the time of the emergency on August 17, the wave height was 1-1,5 meters with slight wind. He proceeded to describe that at the time of the emergency crewmembers tried to deploy portside MES first; however crewmembers gave up due to buckling of the slide and they proceeded to deploy starboard side unit. After a while this unit also buckled. Time passed before the slides buckled is to our knowledge not documented.

According to Jason Yets, some of the associated drop raft were found floating around, not connected with the connection lines.

According to a USCG representative on site approximately 200 passengers were evacuated using the slides.

The service checklists from the last service in August/October 2015 have been checked and found ok. The slides were due for annual service in August/October 2016.

The systems were deployed in April 2011 and 2012, and due for next deployment in April 2017 and 2018.

### Important note:

This report is not to analyze the success of the evacuation. It is only to analyze the reason of the buckled slides in the process of the evacuation.



## D2: Describe the problem

### What seems to be the problem?

#### 1. Drop rafts:

According to Jason Yets, USCG, some of the drop rafts were found floating around not connected with the connection lines. Also he informed us that they were aware that the repair yard installed the liferafts with acceptance from the class. The liferafts were not installed by authorized VIKING service technicians.

#### 2. Slides:

According to Jason Yets, USCG, it was observed that the port slide became buckled, it is not documented at which time it became buckled. According to information from the owner, French Ferries, the main reason for switching evacuation to starboard side was due to smoke from the fire. During evacuation from starboard side it was observed that the slide became buckled.

### What is the consequence?

1. The drop rafts cannot be dragged to the platform when not connected correctly.
2. The slides were used for evacuation, but evacuation is hampered when the slide is buckled.



## D3: Implement and Verify Temporary Fix(s)

### Interim actions:

All drop rafts deployed, slides and platforms were scrapped and therefore no temporary fixes are relevant.



# D4: Root Cause Analysis – Drop Rafts

## What could cause this?:

### Observations, drop rafts:

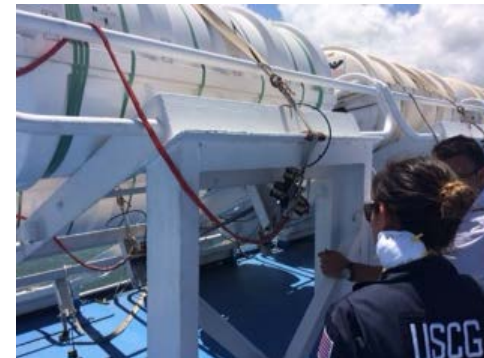
- Connection lines were out of the split tubes as expected.
- All drop rafts deployed on starboard side.
- Only one drop raft deployed on port side.
- The repair yard installed the liferafts with acceptance from the class. The liferafts were not installed by authorized VIKING service technicians.

### Conclusion, drop rafts:

The drop rafts deployed were not installed by authorized VIKING service technicians and it is not possible for us to find out why they were found floating not connected.

### Possible root causes are:

- incorrect connection during installation
- Incorrect handling by the crew during evacuation.





# D4: Root Cause Analysis – Slides – Page 1

## What could cause this?:

### Observations, slides:

- From pictures received from Jason Yets and seen in the media, we can see the slides are buckled.
- The N2 bottles were checked, they were all empty on both sides, including the 2 spare cylinders.
- On both sides, the bowing systems have not been used.
- Reduction valves dismantled for inspection.
- Pressure relieve valves dismantled for inspection.
- Slide aspirators were dismantled for inspection.
- At the time we dismantled the relief valves on site, the equipment had already been on the pier for a month which have effected the deterioration of the valves. It was not possible to check if there were any damages to the slide/platform parts that could have caused the buckled slides.
- The on-board inspection gave no immediate explanation of the buckled slides.

The following slides analyze the possible failure mode scenarios and concludes on the effect of these scenarios.





# D4: Root Cause Analysis – slides – page 2

## What could cause this?:

Failure mode	Effect	Component	Procedure	Verification Method	Conclusions	Status	CF	RC
Insufficient pressure in the N2 pressure cylinders	The slide may not be fully inflated	N2 pressure cylinders	All cylinders are inspected for correct pressure and leakage, at annual service	Investigation of checklists, which were found ok.	It is very unlikely that one of the cylinders has lost pressure. Even with a loss of pressure in one cylinder, the spare cylinder would be used as redundancy	Done	N	N
Failure in the N2 cylinder operating heads	The N2 cylinder is not activated	N2 cylinder operating head	All operating heads are inspected at annual service	All diaphragms were inspected onboard and found punctured which demonstrates the operating heads worked properly.	All diaphragms were inspected onboard and found punctured which demonstrates the operating heads worked properly.	Done	N	N

### Legend:

CF = Contributing Factor

RC = Root cause



# D4: Root Cause Analysis – slides – page 3

## What could cause this?:

Failure mode	Effect	Component	Procedure	Verification Method	Conclusions	Status	CF	RC
N2 reduction valves leaking during inflation of the slide	The slide may not be fully inflated	N2 reduction valves	The reduction valves are checked during annual service	All reduction valves were shipped to Denmark and checked.	Inspection and testing of the reduction valves showed that the valves were leaking during inflation due to leaking gaskets, which is concluded to be a contributing factor At the time we dismantled the relief valves on site, the equipment had already been onboard for a month which could have effected the deterioration of the valves, and our analyzes	Done	Y	N
Slide aspirators not working correctly	The slide may not be fully inflated	Slide aspirators	The aspirators are checked during annual service	All aspirators were shipped to Denmark and checked.	Aspirators were checked, and they all work correctly. At the time we dismantled the relief valves on site, the equipment had already been on the pier for a month which could have effected the deterioration of the valves, and our analyzes	Done	N	N

Legend:

CF = Contributing Factor

RC = Root cause



# D4: Root Cause Analysis – slides – page 4

## What could cause this?:

Failure mode	Effect	Component	Procedure	Verification Method	Conclusions	Status	CF	RC
Slide platform relief valves opening at a too low pressure	The slide may not be fully inflated	Relief valves	The aspirators are checked during annual service	All relief valves were shipped to Denmark and checked.	It was found that 2 out of 8 relief valves had a opening pressure of 290 mbar, which is slightly below the acceptable limit of 294 mbar. At the time we dismantled the relief valves on site, the equipment had already been on the pier for a month which could have effected the deterioration of the valves, and our analyzes.	Done	Y	N
Bowsing system not used correctly	The slide may become buckled due to lack of pull from the bowsing lines.	Bowsing system, crew handling	As described in the crew manual, the bowsing winch must be used during launching of the system in order to position the slide and platform.	During our on-board inspections it was identified that the bowsing winches have not been used. From videos it is also seen that the bowsing lines are slack.	The crew have not handled the bowsing winches correctly and the bowsing lines are slack. This will have an effect on the position of the slide, as the bowsing lines will help keeping the slides straight.	Done	Y	N

Legend:

CF = Contributing Factor

RC = Root cause



# D4: Root Cause Analysis – slides – page 5

## What could cause this?:

Failure mode	Effect	Component	Procedure	Verification Method	Conclusions	Status	CF	RC
The vessel was doing speed through the water during evacuation or during part of the evacuation.	The slides may become buckled.	Crew handling	According to information from French Ferries, the vessel sailed 2-3 knots at the beginning to avoid smoke, and later if drifted.	Information from French Ferries	Based on the information we have received, it is concluded that the vessel was doing speed through the water which is at least a contributing factor to the buckled slides, as the bowing winches have not been used.	Done	Y	N
The vessel have been aground at some point during evacuation	The slides may become buckled.	NA	According to information from French Ferries, the vessel might have been aground at some point of time during evacuation.	Information from French Ferries	It is concluded, that if the vessel have been aground at some point of time during evacuation, this could be a contributing factor to the buckled slides, due to current in the water, as the bowing winched have not been used.	Done	Y	N
Slide or platform exposed to an accidental tear, caused by the assisting rescue boats.	The slide will become buckled	Crew handling and handling by the assisting rescue boats	A small tear could have been made by an accidental collision between the recue boat and platform during handling of the rafts	The rough recovery/handling of the slide and platform on the pier, and the duration on the pier makes it impossible to verify the parts.	It is a possible scenario, that a small tear could have been made by an accidental collision between the recue boat and platform during handling of the rafts	Done	Y	N

Legend:

CF = Contributing Factor

RC = Root cause



# D4: Root Cause Analysis – Slides – Page 6

## Conclusion, slides:

As seen on the above tables in our root cause analysis, several factors have – or may have - contributed to the buckled slides. It has not been possible to identify a root cause.



# D5: Develop Permanent Solution

## D6: Implement and Validate Solution(s)

### Permanent solution:

The slides, platform and liferafts deployed are condemned and should be replaced.



# D7: Prevent Recurrence

## How will we prevent recurrence?

As there is no root cause, we can address the contributing factors in our efforts to prevent recurrence. We will have a dialog with our suppliers regarding the service processes of the mentioned components. Regarding the crew handling we will discuss training with the owner.



# D8: Close Problem

