

Attachment 7

Attachment 7 (Deck 2)

[illegible]

Fig. 25 Pre-work risk assessment table : Deck (Attachment 7)

In the example, eight risks have been identified, and we will now compare two of them with a significantly lower risk level.

If there is no countermeasure:

① Possible hazards and risk assessment					
Possible hazard (because of~, by doing~, (causing specific trouble))	Frequency of occurrence (a)	Severity (b)		Risk (a × b)	Risk Level
		Accident involving people	Other		
1 Failure to plan for evacuation in a rough sea area, and failure to inform relevant parties of estimated arrival delays, resulting in confusion in rescheduling	2	—	4	8	M
(Hazard) No review of the voyage plan					



With an email or telephone call:  

② Prevention/mitigation measures and post-measure risk assessment					
Prevention/mitigation measures	Frequency of occurrence (a)	Severity (b)		Risk (a × b)	Risk Level
		Accident involving people	Other		
1 (a. Essential measures)					
(b. Physical countermeasures)					
(c. Administrative countermeasures) If there is a significant change in estimated time of arrival, this is to be reported immediately	2	—	1	2	LL
(d. Use of personal protective equipment)					

Fig. 26 Risk assessment regarding countermeasures for rough weather on Deck
(Example 1) (Extracted from Attachment 6 and 7)

Failure to plan for evacuation in a rough sea area, when the vessel actually enters a rough sea area, causing a significant delay to the estimated time of arrival (ETA), or where the vessel has made an evacuation plan but has not informed the related parties such as charterers etc. of the revised ETA, its failure to share information can cause confusion on shore, because it is assumed that the vessel will arrive as originally scheduled, and arrangements are made for entering port and cargo handling.

This may result in Off Hire Cases. If this were left as it is, the ship would need to be

contacted, so this is rated under Frequency as “2: infrequent”, and Severity as “4” as it would interfere with the ship’s operations. Multiplied by this, the risk level becomes **8:M**. If this is communicated by email or phone call, the shore side will know what is going on and will be able to plan countermeasures in advance. This has been assessed as a reduction in severity to “2” with a risk level of **2 : LL**. It shows the importance of communication between ship and shore.

If there is no countermeasure:

① Possible hazards and risk assessment						
Possible hazard (because of~, by doing~, (causing specific trouble))	Frequency of occurrence (a)	Severity (b)		Risk (a × b)	Risk Level	
		Accident involving people	Other			
4 Failure to close watertight doors, through which water can enter and cause wet damage, or, fractures caused from being caught in a watertight door. (Hazard) Watertight doors	4	5	4	20	HH	



With just a simple effort:

② Prevention/mitigation measures and post-measure risk assessment						
Prevention/mitigation measures	Frequency of occurrence (a)	Severity (b)		Risk (a × b)	Risk Level	
		Accident involving people	Other			
(a. Essential measures)						
(b. Physical countermeasures) Watertight doors are always to be securely closed and, if necessary, locked	2	1	1	2	LL	
(c. Administrative countermeasures)						
(d. Use of personal protective equipment)						

Fig. 27 Risk assessment regarding countermeasures for rough weather on Deck
(Example 2) (Extracted from attachment 7)

Also, if the watertight doors at the entrance to the accommodation area are left open (or not closed properly), there is a possibility that water will enter through them. It is also possible that a person could get caught in a door and break a bone in the rush to close it in rough weather.

By identifying these risks, it is possible to avoid inadvertent memory lapse (errors in the memory process) by appointing (specifying) who is responsible for closing watertight doors (e.g. Boatswain (Bsn)) and having them report back explicitly when the work is completed.

Therefore, the risk level is assessed as **20 : HH** because of the potential for serious injury if left unattended. However, the risk level can be reduced to **2 : LL** by ensuring that the watertight doors are closed and reported, and that a supervisor, such as a Master or Chief Officer (C/O), visually inspects the site.

The closing work of watertight doors is one of the countermeasures for rough weather that we take for granted, but by practising a risk assessment and sharing the information with the crew, we can ensure that we don't carelessly forget to do it.

The vessel's pre-work risk assessment table is reported to the ship management company's responsible department, which reviews the ship's report and re-evaluates it each item. The results are then posted on the risk assessment table (Fig. 28) and fed back to the vessel with a decision on whether or not to proceed. In this example, the risk level has been reduced from **HH** to **M**, and although it is in the ALARP region, it has been determined a tolerable area.

XXX	Safety management system	SMS-1301
-----	--------------------------	----------

Risk assessment form (Ref. No.)

Scenario	Title:
Study of countermeasures for rough weather	
Risk assessment regarding countermeasures for rough weather on the Deck	

Participants	Capt., C/O, 2/O and 3/O Bsn. AB x 3, OS x 2 10 personnel in total
---------------------	---

① Assessment of initial frequency and severity of occurrence prior to implementation of countermeasures

Initial frequency of occurrence Select A to E with reference to the frequency of risk in Table 1 of the risk management procedure.
Selected frequency of occurrence: **3**

Initial severity Select 1 to 4 with reference to the level of severity in Table 2 of the risk management procedure.

1) Impact on health and safety 2) Environmental impact 3) Media impact 4) Financial impact 5) Impact on the Safety Management System	4 -- -- 4 --
Assessment average of ①~⑤: 1	

② Study of countermeasures
Consideration of alternative methods, preventive/mitigation measures with reference to the procedure manual.

Alternative means	Fixing of moving objects
Prevention countermeasures	Strengthening of communication between the charterer and the ship management company
Mitigation measures	Fixing of moving objects
	Strengthening of communication between the charterer and the ship management company

Date and time of assessment: _____

Vessel name: _____

Master: _____

③ Assessment of frequency and severity of occurrence after implementation of measures and actions

Last recorded frequency of occurrence: Select A to E with reference to the frequency of risk in Table 1 of the risk management procedure.
Selected frequency of occurrence: **3**

Last recorded level of severity: Select 1 to 4 with reference to the level of severity in Table 2 of the risk management procedure.

1) Impact on health and safety 2) Environmental impact 3) Media impact 4) Financial impact 5) Impact on the Safety Management System	2 -- -- 1 --
Assessment average of ①~⑤: 2	

Initial risk assessment
Based on the results of ③, input "X" for the initial risk.

Final risk assessment
Based on the results of ③, input "Y" for the final risk.

		Frequency of occurrence					
		5	4	3	2	1	
Severity	1						<div style="background-color: red; color: white; padding: 2px;">Risk: High level</div> <div style="background-color: orange; color: white; padding: 2px;">Risk: Medium level</div> <div style="background-color: yellow; color: black; padding: 2px;">Risk: Low level</div> <div style="background-color: lightblue; color: black; padding: 2px;">Initial assessment: "X"</div> <div style="background-color: lightgreen; color: black; padding: 2px;">Final assessment: "Y"</div>
	2			Y			
	3						
	4			X			

④ Verification of final assessment
Are the countermeasures and actions taken appropriate and has the level of risk been reduced?

YES Implementation of the proposed countermeasures will reduce the level of risk to a low level.

Revised date: YYYY/MM/DD	Rev. XX	No. of years to be filed for: XX years
--------------------------	---------	--

Fig. 28 Risk assessment regarding countermeasures for rough weather on Deck

Engine department (Figs. 29,30,31 and 32 Attachments 9, 10 and 11)

As with the Deck, a total of 8 risks were identified and the change in risk level between before and after measures are implemented is shown below. The severity of Personal injury has reduced from **12(H)** to zero and Non-personal injury severity has reduced from **12(H)** to **6(M)**.

- Mean value in Frequency of occurrence

:

3
- Mean value in Severity (Personal injury)

:

4
- Mean value in Severity (Non-personal injury)

:

4
- Risk level (Personal injury)

:

12 (H)
- Risk level (Non-personal injury)

:

12 (H)

Before measures are implemented	After measures are implemented
3	3
4	-
4	2
12 (H)	-
12 (H)	6 (M)

Attachment 10

Occupation

Pre-work risk assessment table (Reference No.)

Serials : 1 Rough weather suitable countermeasures

Participant : Deck - Bridge - Catering

Safety management system

Date and time of assessment : 1 April 2021 to MM DO

Phase and name of work :

Reference No.

Work category : Routine work

Non-routine work

Possible hazards and risk assessment (because of-- by doing-- (causing specific trouble))	Severity (S)				Risk level (SXS)	Risk level	Prevention/relief measures and post-measures risk assessment				Company assessment						
	Frequency of occurrence (A)	Accident resulting injury	Other	Severity (S)			Frequency of occurrence (A)	Accident resulting injury	Other	Risk level (SXS)	Risk level	Frequency of occurrence (A)	Accident resulting injury	Other	Risk level (SXS)	Risk level	Measure status
5 Fuel consumption increases due to increased navigation distance caused by give-way manoeuvres, resulting in fuel shortages. Hazard: Fuel Oil	3		4	12	H												
6 Failure to inform crew not to use the lifts, following the triggering of safety devices caused by hull rotation led to crew being confined. Hazard: Lifts	1		2	2	LL												
7 Overboard operation of the main engine, surging and icing of the supercharger (turbocharger) were not considered, so the main engine stopped. Hazard: Supercharger (turbocharger)	3		3	9	M												
8 Chopping of the fuel system strainers due to hull rotation caused by rough weather, resulting in tripping of the main engine or generator. Hazard: Fuel system strainers	4		5	20	H+1												
Total (1~8)	23	7	23	82													
Risk level prior to countermeasures (Avg)	8	2	8	8													
Risk level after countermeasures (Avg)	23	3.5	23	10.3													
Level (See the criteria)	3	4	3	12	H												

Final status

Risk level change

H → M

Yes

No

The risk after implementing countermeasures must be less than or equal to 3

The risk assessment was carried out as described above.

Signature of the person responsible for the operation:

As a result of the risk assessment, we herewith confirm that safe work is possible.

Master's signature:

As assessed as above, it is our hope that countermeasures be implemented.

Affiliation and full name:

Level assessed: LL 1~2 (Very low)

L 3 (Low)

M 4~9 (Medium)

H 10~18 (High)

H+1 18~20 (Very high)

Date reviewed: 1/05/2021

Rev. No. XX

No. of years to be filed for: 3 years

Fig. 29 Risk assessment regarding countermeasures for rough weather effect on Engine (Attachment 10)

As with the Deck, two items are extracted from the eight risks and compared.

Extracted from Attachment 9

If there is no countermeasure:

① Possible hazards and risk assessment					
	Possible hazard (because of~, by doing~, (causing specific trouble))	Frequency of occurrence (a)	Severity (b)		Risk Level
			Accident involving people	Other	
2	Inadequate lubrication of main engine, generator and other equipment, and hull agitation causing low level alarm and tripping (emergency stop).	4	—	4	16
	(Hazard) Lack of lubricant				HH



With just a simple effort:

② Prevention/mitigation measures and post-measure risk assessment					
	Prevention/mitigation measures	Frequency of occurrence (a)	Severity (b)		Risk Level
			Accident involving people	Other	
2	(a. Essential measures)				
	(b. Physical countermeasures) Check lubricant level and top up if necessary. Cleaning of strainer (including that of fuel system)	4	—	1	4
	(c. Administrative countermeasures)				
	(d. Use of personal protective equipment)				

Fig. 30 Risk assessment regarding countermeasures for rough weather effect on Engine (Example 1)

Extracted from Attachment 10

If there is no countermeasure:

① Possible hazards and risk assessment						
	Possible hazard (because of~, by doing~, (causing specific trouble))	Frequency of occurrence (a)	Severity (b)		Risk (a × b)	Risk Level
			Accident involving people	Other		
8	Clogging of the fuel system strainers due to hull agitation caused by rough weather, resulting in tripping of the main engine or generator.	4	-	5	20	HH
	(Hazard) Fuel system strainers					



Conduct watch more carefully;

② Prevention/mitigation measures and post-measure risk assessment						
	Prevention/mitigation measures	Frequency of occurrence (a)	Severity (b)		Risk (a × b)	Risk Level
			Accident involving people	Other		
8	(a. Essential measures)					
	(b. Physical countermeasures)					
	(c. Administrative countermeasures) Frequent strainer switching and cleaning before being exposed to rough weather and manoeuvring in rough weather.	4	-	2	8	M
	(d. Use of personal protective equipment)					

Fig. 31 Risk assessment regarding countermeasures for rough weather effect on Engine (Example 2)

According to accident investigations by the Transport Safety Board, for example, cases of low lubricant levels being detected due to insufficient lubricant caused by hull movement in rough weather, or main engine tripping due to a clogged strainer, leading to accidents, have been reported. (See Loss Prevention Bulletin Vol.49 “Tips for Effective Engine Management and Maintenance”)

In engineering departments on most vessels, these countermeasures are a normal part of an engineer’s work when rough weather is expected. However, when a change in risk level is assessed numerically by risk assessment, the importance of the operation

becomes all the more apparent.

The company also receives the risk assessment reports from the Engineering Department. After re-evaluating them, they approve the implementation of all countermeasures and feed them back to the vessel (Figure 39).

Also in this example, the risk level has been reduced from **HH** to **M**, and although it is in the ALARP region, it has been determined a tolerable area.

Attachment 11

XXX	Safety management system	SMS-1301
-----	--------------------------	----------

Risk assessment form (Ref. No.)

Scenario	Title:
Study of countermeasures for rough weather	
Risk assessment regarding countermeasures for rough weather affect on the engine	

Participants	C/E, 1/E, 2/E and 3/E
	FTR, OLRs x 3 and a WPR
	9 personnel in total

① Assessment of initial frequency and severity of occurrence prior to implementation of countermeasures

Initial frequency of occurrence	Select A to E with reference to the frequency of risk in Table 1 of the risk management procedure.														
	Selected frequency of occurrence 3														
Initial severity	Select 1 to 4 with reference to the level of severity in Table 2 of the risk management procedure.														
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>① Impact on health and safety</td><td style="text-align: center;">4</td></tr> <tr><td>② Environmental impact</td><td style="text-align: center;">-</td></tr> <tr><td>③ Media impact</td><td style="text-align: center;">-</td></tr> <tr><td>④ Financial impact</td><td style="text-align: center;">4</td></tr> <tr><td>⑤ Impact on the Safety Management System</td><td style="text-align: center;">1</td></tr> <tr><td colspan="2" style="text-align: center;">Assessment average of ①~⑤</td></tr> <tr><td colspan="2" style="text-align: center;">4</td></tr> </table>	① Impact on health and safety	4	② Environmental impact	-	③ Media impact	-	④ Financial impact	4	⑤ Impact on the Safety Management System	1	Assessment average of ①~⑤		4	
① Impact on health and safety	4														
② Environmental impact	-														
③ Media impact	-														
④ Financial impact	4														
⑤ Impact on the Safety Management System	1														
Assessment average of ①~⑤															
4															

② Study of countermeasures
Consideration of alternative methods, preventive/mitigation measures with reference to the procedure manual

Alternative means	Fixing of moving objects
	Reinforce lubricants management
Prevention countermeasures	Fixing of moving objects
	Strengthening of communication between the charterer and the ship management company
Mitigation measures	

Date and time of assessment: _____

Vessel name: _____

Master: _____

③ Assessment of frequency and severity of occurrence after implementation of measures and actions

Last recorded frequency of occurrence	Select A to E with reference to the frequency of risk in Table 1 of the risk management procedure.														
	Selected frequency of occurrence 3														
Last recorded level of severity	Select 1 to 4 with reference to the level of severity in Table 2 of the risk management procedure.														
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>① Impact on health and safety</td><td style="text-align: center;">2</td></tr> <tr><td>② Environmental impact</td><td style="text-align: center;">-</td></tr> <tr><td>③ Media impact</td><td style="text-align: center;">-</td></tr> <tr><td>④ Financial impact</td><td style="text-align: center;">1</td></tr> <tr><td>⑤ Impact on the Safety Management System</td><td style="text-align: center;">2</td></tr> <tr><td colspan="2" style="text-align: center;">Assessment average of ①~⑤</td></tr> <tr><td colspan="2" style="text-align: center;">2</td></tr> </table>	① Impact on health and safety	2	② Environmental impact	-	③ Media impact	-	④ Financial impact	1	⑤ Impact on the Safety Management System	2	Assessment average of ①~⑤		2	
① Impact on health and safety	2														
② Environmental impact	-														
③ Media impact	-														
④ Financial impact	1														
⑤ Impact on the Safety Management System	2														
Assessment average of ①~⑤															
2															

Initial risk assessment
Based on the results of ③, input "X" for the initial risk.

Final risk assessment
Based on the results of ③, input "Y" for the final risk.

Severity	Frequency of occurrence					<table style="width: 100%; border-collapse: collapse;"> <tr><td style="background-color: #d9534f; color: white;">Risk High level</td></tr> <tr><td style="background-color: #f1c40f; color: white;">Risk Medium level</td></tr> <tr><td style="background-color: #5bc0de; color: white;">Risk Low level</td></tr> <tr><td style="background-color: #fff2cc; color: black;">Initial assessment: "X"</td></tr> <tr><td style="background-color: #d9ead3; color: black;">Final assessment: "Y"</td></tr> </table>	Risk High level	Risk Medium level	Risk Low level	Initial assessment: "X"	Final assessment: "Y"
	Risk High level										
	Risk Medium level										
	Risk Low level										
	Initial assessment: "X"										
Final assessment: "Y"											
5	4	3	2	1							
1											
2			Y								
3											
4			X								

④ Verification of final assessment
Are the countermeasures and actions taken appropriate and has the level of risk been reduced?

YES. Implementation of the proposed countermeasures will reduce the level of risk to a low level.

Revised date: YYYY/MM/DD	Rev. XX	No. of years to be filed for: XX years
--------------------------	---------	--

Fig. 32 Risk assessment regarding countermeasures for rough weather effect on Engine
Risk assessment table (Attachment 11)

Catering department (Figs. 33,34,35 and 36 Attachments 12, 13 and 14)

A total of seven risks were identified. The change in risk level between before and after measures are implemented is shown below. The severity of Personal injury has reduced from 15(H) to 4(M) and Non-personal injury severity has reduced from 15(H) to 4(M).

	Before measures are implemented	After measures are implemented
• Mean value in Frequency of occurrence :	5	4
• Mean value in Severity (Personal injury) :	3	1
• Mean value in Severity (Non-personal injury) :	3	1
• Risk level (Personal injury) :	15(H)	4(M)
• Risk level (Non-personal injury) :	15(H)	4(M)

Attachment 13

[illegible]

Fig. 33 Risk assessment regarding countermeasures for rough weather: Catering department
(Attachment 13)

Now we compare the top two with a significant reduction in risk level out of the seven risks, as well as with Deck and Engine.

Extracted from Attachment 12

If not always behaving appropriately:

① Possible hazards and risk assessment					
	Possible hazard (because of~, by doing~, (causing specific trouble))	Frequency of occurrence (a)	Severity (b)		Risk Level
			Accident involving people	Other	
1	By forgetting to turn off the cooking apparatus, a fire was caused by moving objects falling.	5	—	4	20
	(Hazard) Cooking utensil and moving objects				HH



✓ By checking twice:

② Prevention/mitigation measures and post-measure risk assessment					
	Prevention/mitigation measures	Frequency of occurrence (a)	Severity (b)		Risk Level
			Accident involving people	Other	
1	(a. Essential measures)				
	(b. Physical countermeasures)				
	Fixing of moving objects	5	—	1	5
	(c. Administrative countermeasures)				
	Always turn off cooking apparatus after use, not just in rough weather.	2	—	1	2
	(d. Use of personal protective equipment)				

Fig. 34 Risk assessment regarding countermeasures for rough weather: Catering department (Example 1)