

**Attachment 18 Maritime Accident Accident Cause (Unsafe conditions):
Vessel A Quay collision accident**

Attachment 18

Maritime Accident Accident Cause (Unsafe Conditions): Vessel A Quay collision accident

Cause (Unsafe behaviour)	Man						Necessity of re-investigation														
	Human factor (The vessel, shipowner and ship management company)																				
	1 Psychological		2 Emotional		3 Organizational																
	1-3 Psychological	4-5 Psychological	1-3 Emotional	4-5 Emotional	1-3 Organizational	4-5 Organizational															
	8 Management factors such as machinery not working properly or being used incorrectly																				
	Mechanical factors not working properly or being used incorrectly																				
	4-1 Inadequate knowledge		4-2 Inadequate skills		4-3 Poor work ethics																
	1-2 Inadequate knowledge	3-4 Inadequate skills	1-2 Poor work ethics	3-4 Poor work ethics	1-3 Management factors such as machinery not working properly or being used incorrectly	4-5 Management factors such as machinery not working properly or being used incorrectly															
	6 Lack of machinery and facility maintenance, etc.																				
	Mechanical factors not working properly or being used incorrectly																				
	Media																				
	Media connecting Man with Machinery																				
	Management factors and organization																				
	On the vessel			Shipowner and ship management company																	
	6 Inadequate supervision of his/her subordinates																				
	Management factors and organization																				
<p>In ①, write down a direct cause which was investigated based on the facts. After ②, write down the root cause using the Why-Chain. Regarding items other than Man (Human factors), enter the Classification List.</p>	①						1 Inadequate management/organization														
	②							2 Inadequate/incomplete regulations and procedure manual													
③								3 Inadequate safety management planning													
④								4 Lack of education and training													
⑤								5 Inadequate layout arrangement													
⑥								6 Inadequate supervision of his/her subordinates													
⑦																					
⑧																					
⑨																					
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Attachment 19 Maritime Accident Analysis using 4M5E and Countermeasure List
(Unsafe behaviour): Vessel A Quay collision accident

		Attachment 19		
	Man	Machine	Media	Management
	The vessel, shipowner and ship management company	Mainly on the vessel	The vessel, shipowner and ship management company	On the vessel Shipowner and ship management company
Risk factors (Direct cause and indirect/root cause)	<p>All three of the Master's unsafe behaviours have a common direct cause.</p> <ol style="list-style-type: none"> 1) Impulsive action (single-minded focus on the vessel speed and distance to the quay) 2) Forgetful (Unable to multi-task) 3) Habituation behaviour bad habit (Human beings have moments of inattention) 4) Unconscious acts 5) Sense of urgency and sensitivity 6) Mental shortcuts (Human beings are sometimes in a hurry) 7) Overconfidence (Human beings are sometimes overconfident) 8) Judgment based on speculation, subjective decision and wishful observation (Human beings sometimes make assumptions) 9) Habituation phenomenon: false success experience (Human beings have moments of neuroplasticity) 	No warning for incorrect operation		Inadequate handling instructions for critical equipment Inadequate handling instructions for critical equipment
Education and training Knowledge, skills, consciousness, being given information, etc.	As an experienced specialist, he is to be well aware of the importance of complying with work procedures. Therefore, he needs to be trained to recognize psychological factors.			
Engineering and engineering Technological countermeasures		Adjust the device so that a lamp lights up when the device is operated incorrectly Equipment is installed to assist human characteristics: Human beings sometimes make mistakes and forget		
Enforcement Through guidance and enforcement Standardization, proceduralization, alerting, reward and punishment KYT, campaigns etc.				Creation of manuals and procedures in each vessel Develop written procedures, such as on-site instructions for important equipment. Also, incorporate them into Safety Management (SMS).
Examples Case studies, countermeasures and rules Lead by example, experience of success Introduce model cases, "Hiyer-Hito" (near misses), etc.	Get involved with creating procedure manual. Also, he will become an instructor for training based on his own experience to teach other Masters and other related audiences.			The carrying out of training on occurrence prevention countermeasures
Environment Working environment, office internal management, on-board organization, etc.				

Attachment 20 Maritime Accident Analysis using 4M5E and Countermeasure List (Unsafe conditions): Vessel A Quay collision accident

				Attachment 20	
				Management	Management
Risk factors (Direct cause and indirect/root cause)	Man	Machine	Media	On the vessel	Shipowner and ship management company
	The vessel, shipowner and ship management company	Mainly on the vessel	The vessel, shipowner and ship management company	Inadequate handling instructions for critical equipment	Inadequate handling instructions for critical equipment
Education and training		No warning for incorrect operation			
Knowledge, skills, consciousness, being given information, etc.					
Engineering Technology and engineering		Adjust the device so that a lamp lights up and a warning is sounded if it is operated incorrectly.			
Technological countermeasures		Equipment is installed to assist human characteristics. Human beings sometimes make mistakes and forget.			
Enforcement				Creation of manuals and procedures in each vessel	The carrying out of training on recurrence prevention countermeasures
Thorough guidance and enforcement					Develop written procedures, such as on-site instructions for important equipment, and refer them into Safety Management Code (SMS).
Standardization, proceduralization, alerting, reward and punishment. KYT, campaigns etc.					
Examples					
Case studies, countermeasures and rules					
Lead by example, experiences of successes, introduce model cases, "Hiyari-Hiatio" (near misses), etc.					
Environment					
Working environment, office internal management, on-board organization, etc.					

Attachment 21 Human characteristics, Human error and Psychology: Vessel A Quay collision accident

Human characteristics, Human error and Psychology: Vessel A Quay collision accident

Date and time	Movement	Who?	Human error	Human characteristics	Psychological factors
12:00	Before passing breakwater No. 5	Master	<p>The Master intended to use the joystick device to control the VecTwin Rudder system to manoeuvre the vessel to the berth, and switch the rudder control to remote control.</p> <p>However, he did not realise that the rudder switch was stuck in the non-follow-up position (not switching to remote rudder) and moved to the port side of the bridge in front of the control stand.</p>	<p>① Human beings sometimes make mistakes: A mistake is apparent.</p> <p>② Human beings sometimes do not notice: Switch position</p> <p>③ Human beings are sometimes only able to see one thing at a time: Moved without checking</p> <p>⑦ Human beings are sometimes in a hurry: He was distracted by the berthing manoeuvre</p>	<p>④ Normalcy Bias: Human beings ignore information that is inconvenient for him or her.</p>
12:08	At approximately 160m from the quay	Master	<p>At 100m before the quay, he thought he had tipped the joystick backwards as he made a sternway manoeuvre, but in fact it was in neutral (forward).</p> <p>He was too preoccupied with the distance to the quay that he did not look at the rudder angle indicator on the VecTwin rudders to notice that the rudders were heading sternway.</p>	<p>④ Human beings sometimes do not notice: Rudder indicator</p> <p>⑧ Human beings are sometimes only able to see one thing at a time: Moved without checking</p> <p>⑦ Human beings are sometimes in a hurry: He was distracted by the berthing manoeuvre</p> <p>⑨ Human beings sometimes make assumptions: Thought he had tipped the joystick backwards and made a sternway manoeuvre</p>	<p>③ Normalcy bias: "I'm special, nothing can hurt me"</p> <p>④ Normalcy Bias: Human beings ignore information that is inconvenient for him or her.</p>
12:09	Accident occurs	Master	<p>At a speed of 4.3 knots, the ship hit the quay at almost a right angle.</p>	<p>④ Human beings sometimes do not notice: Rudder indicator</p> <p>⑥ Human beings are sometimes only able to see one thing at a time:</p> <p>Tried to make sternway by increasing engine speed</p> <p>⑩ Human beings sometimes panic</p>	<p>④ Normalcy Bias: Human beings ignore information that is inconvenient for him or her.</p>

Organization		Safety management system		Reference No.																					
Pre-work risk assessment table (Reference No.)		Date and time of assessment:		Work category : Positive work • Non-routine work																					
Small work to be carried out		Place and name of work		Vessel A																					
Participants : Δ, Δ, Δ, XXX, □□□		Vessel A Quay collision accident																							
① Possible hazards and risk assessment																									
Possible hazard (describe it - by doing - , (making specific trouble))	Frequency of occurrence (1-5)	Severity (S)		Risk Level	Risk (a x b)																				
		Lack of knowledge / Inexperienced people	Other																						
1 The joystick of the remote control unit moves even when the vessel is in the "stop" position, causing human characteristic error such as: Human beings sometimes make assumptions.	5	4		HH	20																				
Hazard: Rudder control switch for remote control and joystick																									
2 Three human errors occurred: incorrect rudder control switch, moving in front of the remote control on the port side of the bridge without checking the steering mode indicator, and the indication on the rudder angle indicator.	5	4		HH	20																				
Hazard: Human characteristics and Psychological factors																									
3 Hazard: Human characteristics and Psychological factors																									
4 Hazard: Human characteristics and Psychological factors																									
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Total</td> <td>10</td> <td>0</td> <td>8</td> <td>40</td> </tr> <tr> <td>Risk level prior to countermeasures (Avg.)</td> <td>No. 1</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td></td> <td>Avg. 10.0</td> <td>0.0</td> <td>8.0</td> <td>20.0</td> </tr> <tr> <td colspan="5" style="text-align: center;">Level (See the criteria)</td> </tr> </table>						Total	10	0	8	40	Risk level prior to countermeasures (Avg.)	No. 1	0	1	2		Avg. 10.0	0.0	8.0	20.0	Level (See the criteria)				
Total	10	0	8	40																					
Risk level prior to countermeasures (Avg.)	No. 1	0	1	2																					
	Avg. 10.0	0.0	8.0	20.0																					
Level (See the criteria)																									
② Prevention/mitigation measures and post-measure risk assessment																									
Prevention/mitigation measures	Frequency of occurrence (1-5)	Severity (S)		Risk Level	Risk (a x b)																				
		Lack of knowledge / Inexperienced people	Other																						
1 Warning sound when switching modes Making the switch to remote mode a 2-stage operation Failure to complete both stages will freeze the joystick centering L mode. Administrative countermeasure) Repeat training to be carried out	5	2	10	M	5																				
2 Physical countermeasures) Administrative countermeasure) Administrative countermeasure) Use of personal protective equipment)	5	1	5	M	5																				
3 Administrative countermeasure) Use of personal protective equipment)	5	2	10	H	5																				
4 Administrative countermeasure) Use of personal protective equipment)	5	1	5	M	5																				
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Total</td> <td>25</td> <td>0</td> <td>7</td> <td>35</td> </tr> <tr> <td>Risk level after countermeasures (Avg.)</td> <td>No. 5</td> <td>0</td> <td>5</td> <td></td> </tr> <tr> <td></td> <td>Avg. 5.0</td> <td>0.0</td> <td>14</td> <td>7.0</td> </tr> <tr> <td colspan="5" style="text-align: center;">Level (See the criteria)</td> </tr> </table>						Total	25	0	7	35	Risk level after countermeasures (Avg.)	No. 5	0	5			Avg. 5.0	0.0	14	7.0	Level (See the criteria)				
Total	25	0	7	35																					
Risk level after countermeasures (Avg.)	No. 5	0	5																						
	Avg. 5.0	0.0	14	7.0																					
Level (See the criteria)																									
③ Company assessment																									
Frequency of occurrence (1-5)	Severity (S)		Risk Level	Risk (a x b)	Risk Level																				
	Lack of knowledge / Inexperienced people	Other																							
5	1	5	M	5	M																				
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Total</td> <td>5</td> <td>0</td> <td>2</td> <td>10</td> </tr> <tr> <td>Risk level after countermeasures (Avg.)</td> <td>No. 5.0</td> <td>0.0</td> <td>14</td> <td>7.0</td> </tr> <tr> <td colspan="5" style="text-align: center;">Level (See the criteria)</td> </tr> </table>						Total	5	0	2	10	Risk level after countermeasures (Avg.)	No. 5.0	0.0	14	7.0	Level (See the criteria)									
Total	5	0	2	10																					
Risk level after countermeasures (Avg.)	No. 5.0	0.0	14	7.0																					
Level (See the criteria)																									
④ Final risk level change																									
Final risk level change	H	H	H	H	H																				
(Don't possible or uncertain)	Yes	No	No	No	No																				
The risk after implementing countermeasures must be less than or equal to "3".																									

The risk assessment was carried out as described above.

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

Signature of the person responsible for the operation: LL Level assessed : L (Low) 1~2 (Very low)

Signature of the person responsible for the assessment: M Level assessed : M (Medium) 4~9 (Medium)

Affiliation and full name : H 10~15 (High) 16~20 (Very high)

No. of years to be filed for: X years



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