NYK Maritime College

NYK SHIPMANAGEMENT

NMC 03 N

Risk Management, Incident Investigation and Safety Officer's Training

6th Edition (Feb'22)
Revision Mar'22

NMC 03N

COURSE SCHEDULE

NMC 03 N- RISK ASSESSMENT, INCIDENT INVESTIGATION AND SAFETY OFFICERS TRAINING

DAY	0900 - 1015	*1015 - 1030*	1030 - 1200	*1200-1300*	1300-1515	*1515 - 1530*	1530-1700
1	Introduction, **Risk Management Module:** Risk Assessment – An introduction; Hazards v/s Risk, Hazard Identification, Regulatory requirements, Benefits of Risk Management.	*Tea Break*	Job Hazard Analysis, Job-Step-Tasks, Exercise on Bunkering, Hazid Card, Risk Perception, Factors affecting Risk Perception, Risk Control methods.	*Lunch*	RA Form, Older and New version, Frequency and Consequence, Residual Risk, Additional Control measures, ALARP, NiBiKi Risk Assessment Video.	*Tea Break*	Daily Job Order, Tool box Meeting, Exercise, Remaining in Control, Case Study, Health RA, Summary of RA.
2	Final Exercise Risk Management **Incident Investigation Module:** Objectives and Contents, Core Principle		Lifeboat Hoisting Video, Leading Causes of Accidents, Human Factors, Regulatory requirements, How to carry out Incident Investigation, Exercise on definition of Terms		Accidents v/s Incidents, Near misses in NYK, Case Study Eboy, Immediate and Underlying Causes, Root Cause, Accident weed, Active and Latent Errors, Accident Trajectory		RCAT Form, Final Exercise. **Safety Officers Training Module:** Introduction, Regulatory Reqts, Understanding Safety Culture, NYKSM QSHE Policy,

DAY	0900 - 1015	*1015 - 1030*	1030 - 1200		*1200-1300*	1300-1515	*1515 - 1530*	1530-1700
3	**Safety Officers Training Cont'd….** Qualifications of Shipboard Safety Officers, Duties, Passive and Active Training, Procedure for conducting Safety Inspections on board, Case Study, Inspections of PPE, LSA/FFA, Safe Access, Gas Detectors, Safety during Dangerous Works as per SMS, Enclosed Space Entry Exercise, Use of Hazid Card, Daily job Order, Onboard Safety and Sanitary Committee Meeting	*Tea Break*	Case Study of Serious Accident on board	**Behavior Based Safety Module** Conscious Competence Model, The Four stages of Learning. Incidents in NYK fleet.	*Lunch*	Non directive Coaching, workshop. Fatigue, Fatigue from a Seafarers context, understanding fatigue, Effects of fatigue, my responsibilities in managing fatigue on board Movie Clip, Bradford Stadium Fire, Workshop, Stress releasing Mechanisms, Workshop,	*Tea Break*	Understanding Behavior – ABC Analysis, Use of Techniques to affect the Consequence, Workshop Final Workshop/Assessment

Risk Management, Incident Investigation, Safety Officer's and Behaviour Based Safety Training

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General Safety Instructions

- Smoking : NO SMOKING BUILDING
- Course timing : 0900-1700
- Course Schedule : Refer schedule
- Lunch timing : 1200hrs -1300hrs
- Emergency Alarm : Continuous ringing of alarm bells
- Muster Station : Outside building, Main Gate
- Access Card : To main door Level 4 only

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Ice Breaker!

Tell us about **Yourself**.....

3

Risk Management Training

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Training Objectives

- Regulatory Requirements
- Concept of Risk Management
- Benefits of Risk Management
- Job Hazard Analysis
- Risk Assessment
- ALARP
- Onboard Implementation of RA as per NiBiKi requirements

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When was the last time you did a Risk Assessment?

Photo Courtesy: Photo by Oleg Magni from Pexels

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Was the Risk Management Procedure complicated?

Photo Courtesy: Photo by energepic.com from Pexels

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So, What's cooking?

Photo courtesy: http://www.peakpx.com/597966/korean-food

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Hazards v/s Risk

Knife

Wet Floor

Cuts

Cigarettes

Alcohol

Electricity

Electric Shock

Cancer

Liver Damage

Slips, falls

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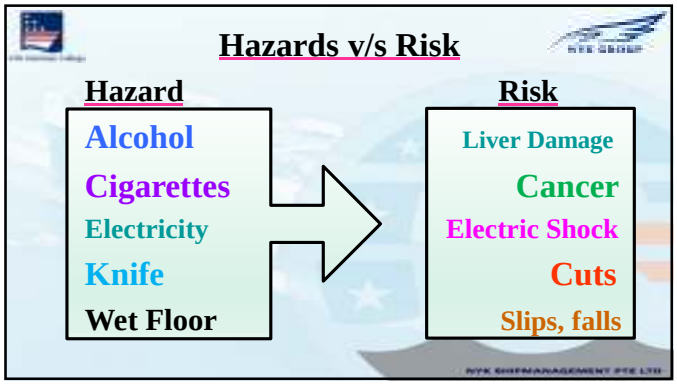
Hazards v/s Risk
Hazard
Alcohol
Cigarettes
Electricity
Knife
Wet Floor
Risk
Liver Damage
Cancer
Electric Shock
Cuts
Slips, falls

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Photo courtesy: Photo by D'Vaughn Bell from Pexels
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Photo Courtesy: Dino Kuzmik from Ljubljana, Slovenia [CC BY 2.0 (https://creativecommons.org/licenses/by/2.0)]
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EXERCISE #1
HAZARDS & RISKS IDENTIFICATION

- On the sheet provided, please list the Hazards and Risks you encountered en-route from the Hotel/Residence to the Training Centre today.

Exercise: 10 minutes

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EXERCISE #1
HAZARDS & RISKS IDENTIFICATION

HAZARDS	RISKS
Wake up call delayed; hurrying to Office	Slip, trip, fall, accident;
Fatigue due to late night	Injury due to lack of conc.
Walking in vicinity of construction site	Personal injury
Driver using cell phone while driving	Car accident; Injury

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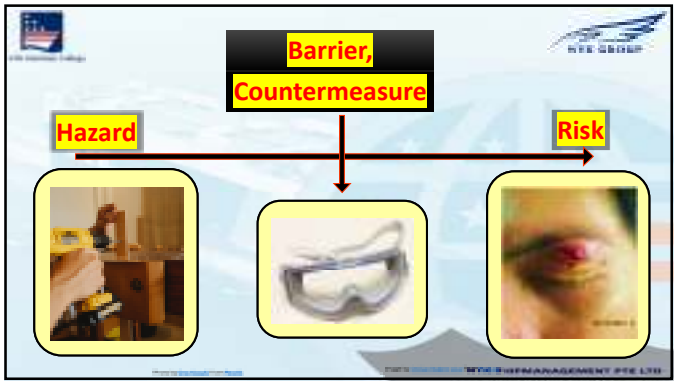
Barrier,
Countermeasure
Hazard
Risk

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What prevents hazards developing into Risks?
The reason that above undesired & unplanned accidents do not happen more frequently is the use of Barriers or Risk Control measures.
Lack of these Barriers may lead to accidents.
Placing and Use of Barriers in Corporate Terms is - RISK MANAGEMENT!

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These Barriers are specified in SMS

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Some Existing Barriers and Safeguards within SMS

- Defined PPE for specific tasks as per SMS
- 3.5m UKC or more for Singapore Straits transit
- Max bunker intake 90% of tank design capacity
- Daylight transit of Singapore Strait by VLCC, LNG
- Watch levels on Bridge, Engine Room, CCR & deck during cargo operations
- Alcohol policy

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Exxon Valdez – Aground

24th March 1989, Alaska

Clean up/Compensation/Restoration costs – USD 3.8 bn

Image Courtesy: By: NOAA's National Ocean Service - Exxon Valdez OilSpill[Original Photo source and more information: NOAA Office of Response and Restoration Website, CC BY 2.0, https://commons.wikimedia.org/w/index.php?curid=43213003

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2019 Fortune Global 500

Rank	Company	Industry	Revenue (USD)
1	Walmart	Retail	514 bn
2	Sinopec Group	Petroleum	415 bn
3	Royal Dutch Shell	Petroleum	397 bn
4	China National Petroleum	Petroleum	393 bn
5	State Grid	Energy	387 bn
6	Saudi Aramco	Energy	356 bn
7	BP	Petroleum	306 bn
8	ExxonMobil	Petroleum	290 bn

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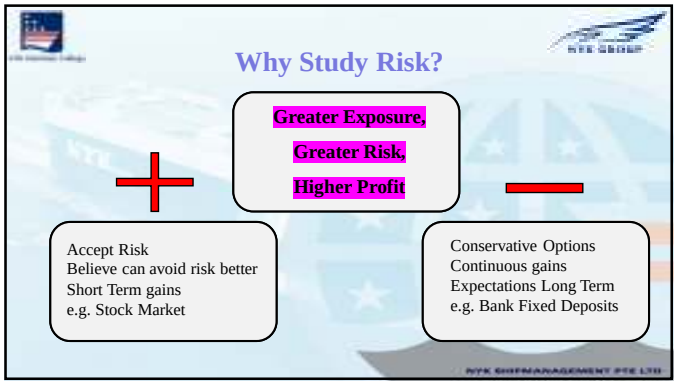
Why Study Risk?
Greater Exposure,
Greater Risk,
Higher Profit
Accept Risk
Believe can avoid risk better
Short Term gains
e.g. Stock Market
Conservative Options
Continuous gains
Expectations Long Term
e.g. Bank Fixed Deposits

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Why Risk Management?
Mandatory?

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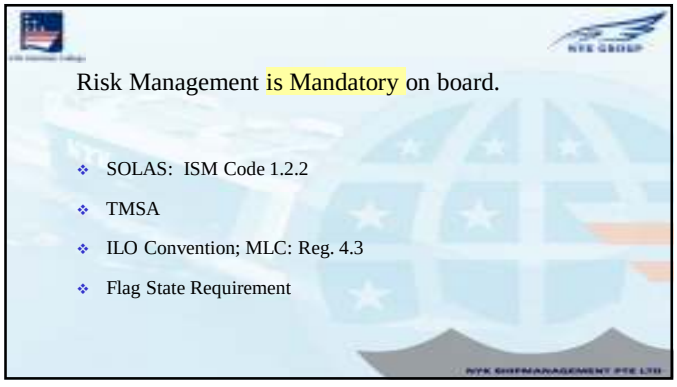
Risk Management is Mandatory on board.
SOLAS: ISM Code 1.2.2
TMSA
ILO Convention; MLC: Reg. 4.3
Flag State Requirement

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ISM Code

- 1.2.2 Objectives – Company's Responsibility
- The Backbone of the e-SMS

"Safety management objectives of the Company should assess all identified risks to its ships, personnel and the environment and establish appropriate safeguards"

- SMS / Z-M-01.00.00 4.6 Safety of Ships and Environmental Protection

Ref. ISM Code 1.2 "Objectives" as Amended by Resolution MSC.273(85)

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MLC Reg. 4.3

- Regulation 4.3 - Health & safety protection & accident prevention
- Purpose: To ensure that seafarers' work environment on board ships promotes occupational safety and health

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Who is responsible?

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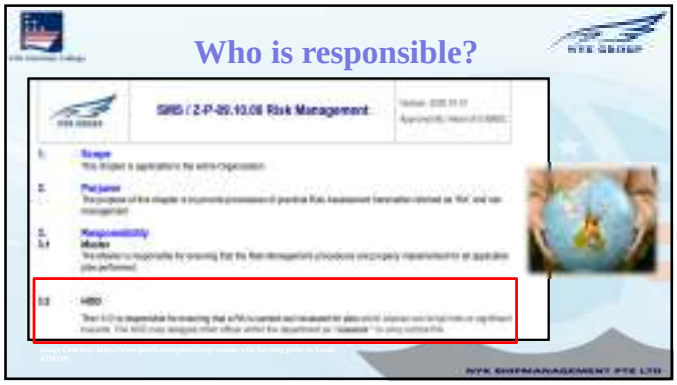
Who is responsible?



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Benefits of Risk Management

- Reactive measures prevent recurrence, whilst Proactive measures prevent occurrence !
- An alternative to 'Risk Management' is 'Crisis Management' which is much more time consuming & EXPENSIVE!

The choice is obvious…

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Case Study :- Costa Concordia

Intended Track and Unplanned Deviation

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Exercise # 2
Hazard Identification - Bunkering

- On your notebook, enlist Hazards routinely encountered with a Bunkering Operation aboard!

Exercise: 15 minutes

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Steps for preparing a JHA / RA

1. Identify the **Job** to be carried out.
2. Break down the job into **Steps.**
3. Note the **Tasks** involved in each step.
4. Identify the **hazards** for each Task.
5. Determine the **Barriers/Risk Control measures** for each hazard.
6. Additionally for RA, Determine **Additional Risk Control measures** to reduce risk

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Job → Steps → Tasks → Hazards → Barriers

- Limit the number of steps that are recorded.
- If too many steps, consider breaking down the job into two jobs.
- Keep the steps in correct sequence.
- Steps out-of-order will miss serious potential hazards or introduce non-existent hazards.

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Jobs → Steps → Tasks

Job	Steps	Tasks
Ballast Tank Entry	Ventilation	Open Manholes/Hatches
		Numbers of Open manholes
		Placing of the ventilation fan
		Placing of blowers
		Status of ventilation
	Illumination	
	Access (Ladder)	
	Entry	
	Inspection	
	Drill	
	Debarking Point	

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Job: Bunkering

Steps:

1. Coming Alongside
2. Mooring
3. Transfer of Personnel
4. Hose Connection, Line-up
5. Oil Transfer
6. Completion and Calculation of Oil Quantity,
7. Disconnection of Hose
8. Unmooring and maneuvering

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Step 1. Coming Alongside

Tasks:

Maneuvering, Use of engines, making contact

Hazards:

1. Inadequate ship-barge compatibility study
2. Inexperienced Master
3. Incorrect maneuvering
4. Hard contact with own vessel
5. Inadequate fendering
6. Unfavorable Weather conditions

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Step 2. Mooring

Tasks:

Passing of lines, making fast

Hazards:

1. Deteriorating mooring ropes from vessel
2. Inexperienced Crew on bunker barge
3. Deteriorating mooring ropes from barge
4. Inadequate people on board on vessel for mooring operations
5. Unfavorable Weather conditions

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Step 3. Transfer of Personnel

Tasks:

Securing accommodation ladder, boarding of personnel

Hazards:

1. Improper securing of ladder
2. Inexperienced personnel
3. Freeboard Difference between ship and barge – working at height
4. Uncertified means of transfer
5. Use of Uncertified cranes
6. Unfavorable weather conditions

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Step 4. Hose Connection

Tasks:

Lifting Hose, Connection of Hose, Securing of Hose

Hazards:

1. Improper SWL of lifting appliance
2. Lack of experienced crew
3. Improper connection of flanges
4. Defective gaskets
5. Integrity/Leakage check not done after connection
6. Unfavorable weather conditions

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Step 5. Transfer of Oil

Tasks:

Opening of Vessel tanks, Lining up, Opening of manifold valves, Start of transfer.

Hazards:

1. Improper line up
2. Leaking pipelines, connections
3. Excessive loading rate
4. Inadequate monitoring of tanks
5. Hydraulic system failure
6. Sub-standard hose

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Step 5. Transfer of Oil

Tasks:

Opening of Vessel tanks, Lining up, Opening of manifold valves, Start of transfer.

Hazards:

7. Cappuccino effect
8. Co-mingling of bunker due to incorrect line up
9. Overfilling bunker tanks
10. High H2S content
11. Internal communication failure
12. Malfunctioning level & pressure gauges

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Step 5. Transfer of Oil

Tasks:

Opening of Vessel tanks, Lining up, Opening of manifold valves, Start of transfer.

Hazards:

13. Crew & Officer fatigue
14. Night time operation
15. VHF/UHF interference
16. Pressure surge
17. Overflow due to valve mis-operation
18. Unfavorable Weather conditions

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Step 6. Completion and Calculation of Oil Quantity

Tasks:

Stopping of bunkering, gauging of tanks, calculation of quantity.

Hazards:

1. Failure to stop in time
2. Loss of communication
3. Overflow from tanks
4. Excessive Air blow
5. Excessive rolling during ullaging
6. Error in calculations
7. Unfavorable weather conditions.

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Risk Perception

What causes more injuries/deaths in a year?

Shark Attacks OR Falling Coconuts

Photo courtesy: https://pixabay.com/photos/coconut-tree-coconut-palm-tree-3703529/

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Risk Perception

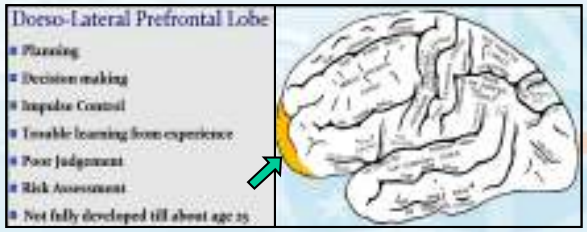

Photo courtesy: By Gray, vectorized by Mysid, colourd by was_a_bee. - File:Gray726.svg, Public Domain, https://commons.wikimedia.org/w/index.php?curid=9661443

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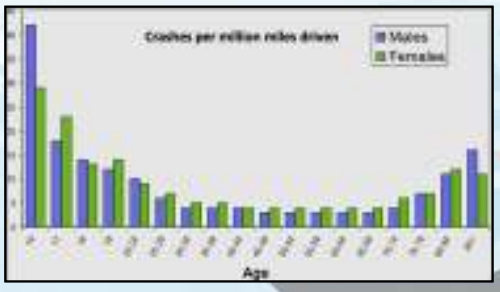
Risk Perception



Data Courtesy: https://www.flickr.com/photos/jurvetson/8052092808

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Factors Affecting Risk Perception

1. Fear of Consequences (Publicity): Fear of certain outcomes may make us assess risks as higher.

Eg. Lowering of lifeboat is considered high risk and generally feared, but statistically, death by Heart attacks is almost double that from lifeboat incidents.

2. Control: Higher Control over an operation is considered less risky than over one with lesser control.

Eg. Risk perception of an Airline Pilot vs a passenger in the aircraft.

Photo courtesy: https://www.pexels.com/photo/anonymous-pilots-in-aircraft-cockpit-flying-over-sea-4260517/

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Factors Affecting Risk Perception

3. Risk Normalisation (Normalisation of deviance): A prolonged exposure to high risks may result in a lower percept of the job as dangerous.

Eg. A Cadet v/s a Bosun Lowering a lifeboat

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Factors Affecting Risk Perception

Some Other Factors:

- Age – Seniors vs Juniors
- Personality Type – Egocentric, Team player, etc
- Knowledge/Experience of past incidents – Hands on experience, skills
- Individual beliefs – Culture, etc
- Physical/Environmental factors – Restricted Visibility, Rain, unable to see things clearly
- Proximity – A person performing a job versus someone delegating from the office
- Choice – Lower perception if choice is given, rather than one with no choice

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Perception of Risks

Case Study !!

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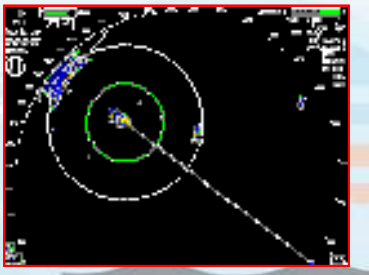
What did the 3/M see?

Fully Laden Product Tanker
18:36 – Sunset
23:28 – Moonrise
Hdg x Spd – 130 x 12.7Kts
18:37 – Target detected
104.4 x 2.77'
18:39 – Brg 105 x 2.49',
CPA -0.34' BCR – 0.70'
18:51 –



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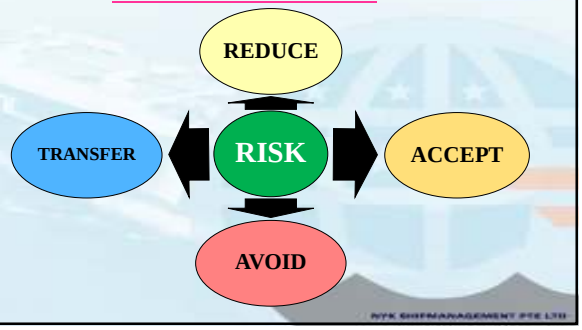
Risk Control Methods



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Risk Control Methods

- **Avoidance:** - After a Cost Benefit Analysis, if the risks seem still significant to Senior management, the jobs are rejected. (Ex. M/E immobilization jobs at Port Headland Anchorage and A/S being disallowed due to high risk in Channel)
- **Transfer:** - Direct hazards associated with the job will remain and cannot be transferred.

  But sometimes, some jobs are sublet to Shore Contractors, the associated risk is then transferred to a third party.

  At the Investment/Monetary Level, the Risk of Loss of Investment can be transferred to Insurance Companies.

  But deductibles will always remain.

Image by OpenClipart-Vectors from Pixabay

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Avoidance & Transfer

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Risk Control Methods

- **Accept: -** Doing the job with the existing Risk Level is not permitted, as it has a high chance of hazards materializing into undesired consequences. Usually used in jobs involving Micro risks, where the impact from an occurrence will not have a large effect.
- **Reduce: -** The Most preferred means of Risk management, wherein risk is reduced by applying appropriate safeguards and cost beneficial options to get the best possible result.

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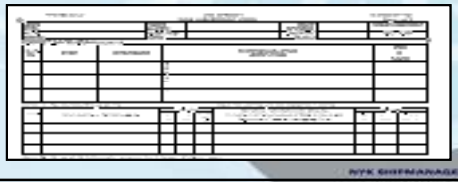
Introduction of RA Form

Click on form to view



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Terminology Simplified

Technical term in Formal Risk Assessment	Practical shipboard pre-operational question
Hazard Identification	What can go wrong?
Hazard Analysis or Consequence Analysis	How bad can it get?
Frequency Estimation	How often can or does it go wrong?
Risk Assessment	So what will happen?
Risk Mitigation	How can we counteract this?
Cost Benefit Analysis	Will mitigating efforts be cost justified?
Risk Management	Can we proceed with this job?

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Frequency and Consequence

Hazard → **Risk**

Frequency – How often can it go wrong?

Consequence – How serious can it get?

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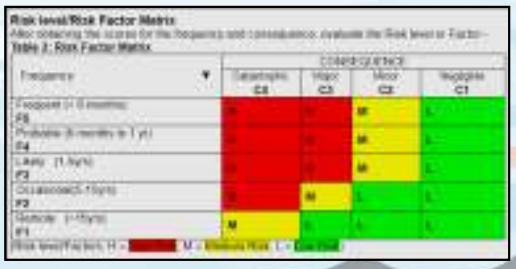
SMS Risk Factor Matrix



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Frequency

Frequency shall be **estimated** as per job assignment based on ship-board and industry practices.

- **F1** More than 15 years → Remote
- **F2** Every 5 to 15 years → Occasional
- **F3** Every 1 to 5 years → Likely
- **F4** Every 6 months to 1 year → Probable
- **F5** Less than 6 months → Frequent

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Deciding Frequency

Quantitative

Data
For Projects
Probabilistic
Time consuming
Require special tools

Qualitative

No Data
Good for Task Level
Subjective
Easy
No Special Tools reqd.

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Consequence

Consequence may affect :

Crew/Personnel
Environment
Vessel/Cargo/Property
Business/Reputation

But, to what extent?

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Consequence

Degrees of Consequence may be assigned as per guidelines in SMS:

- C1 : Negligible
- C2 : Minor
- C3 : Major
- C4 : Catastrophic

Refer to SMS for details.

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Would this be good Risk Management?

Eyes are a very precious and important organ.
…they can be easily hurt by pointed objects;
…therefore, pointed objects are a hazard;
…the consequence can be blindness;
…School kids always use pointed pencils;
…each kid is exposed to pencils 260 days/year
…therefore, the frequency is 71% - almost ¾!!!
…the risk is very high (you love children, don't you?)

Risk Management result?

BAN USE OF PENCILS IN ALL SCHOOLS!

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Additional Control Measures

Fully Laden Vlcc passing Singapore Straits
Under/Above water dangers – Risk of Grounding!
Ideal solution – **Remove/Dredge the rocks? – Cost?**

Photo Courtesy: Photo by Artist Creathrive from Pexels

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Additional Control Measures

Option #1 – Reduce Speed

Reduce Consequence, from
C4 = major shell damage to
C1 = negligible shell scratches

Photo Courtesy: Photo by Artist Creathrive from Pexels

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Additional Control Measures

Option #2 – Follow recommended routes and keep clear of well marked No-Go Areas.

Photo Courtesy: **Photo by Artist Creathrive from Pexels**

Reduce Frequency, from

F5 = frequent contacts to

F1 = very rare contacts

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Additional Control Measures

Best Option:

Combine both measures – Reduce speed + Follow best BRM practices

Photo Courtesy: **Photo by Artist Creathrive from Pexels**

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Frequency v/s Consequence

Do Control measure reduce Frequency or Consequence?

Control measures, usually result in reducing Frequency.

For reduction of Consequences, Physical barriers are usually required. These are usually the last safeguards between the danger and the activity/person. The first barriers being SMS procedures.

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Risk Assessment

Case Study

Company has documented procedure for given work activity

Work Activity	Greasing cargo crane head blocks Job site height 8m
Hazard	Working at a height, Falling, Slipping
Existing controls and safeguards-	Work planning, Safety harness, Supervision, Working aloft checklist.
Frequency	Greasing every month but with existing control measures there was one accident in past 15 years. i.e. F2
Consequence	Minor injury i.e. C2 (with existing measures)
Initial Risk	level (F2 x C2) = LOW

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Case Study

Click on the Memo to open link

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Mitigating Risk

A. Reduce Frequency - Supply good quality grease

B. Reduce Consequences – Install safeguard e.g. fixed piping from lower level for greasing, Safety harness

C. Reduce both Frequency and Consequence – e.g. A+B

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Risk Acceptance Matrix

Category of Risk	Evaluation of Tolerability
Low (L)	Tolerable or Trivial Risk - Acceptable situation, no additional measures are required, work can be started in the situation as it is.
Medium (M)	Moderate Risk - Work can be started, but additional efforts to reduce the risk shall be considered
High (H)	Intolerable or Substantial Risk - Work cannot be carried out in the present conditions. Reduce the risk before starting the work.

Safety does not mean the Hazard does not exist, or ceases to exist from danger, but rather the overall Final Risks are As Low As Reasonably Practicable (ALARP).

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NiBiKi Risk Factor Matrix

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Risk Acceptance & Final/Residual Risk

- The decision whether to accept the risk or not, is based on the Risk Factor Matrix.
- Acceptance and Execution of tasks should be based on the Final/Residual Risk Levels.
- Final/Residual Risk Levels should be ALARP.
- Various legislations require employers to reduce RISKS to ALARP.

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Scientific & Practical Risk Acceptability

ALARP: As Low As Reasonably Practicable

Risk = ALARP when it can be proved that the cost involved in reducing the risk further would be grossly disproportionate to the benefit gained.

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ALARP
Cost Benefit Assessment

The Scientific Approach to Cost Benefit Assessment

- Can the risk (consequence and/or frequency) be reduced
- Are there practical means of reducing the risk.
- How much will it cost?
- What benefits will the costs bring?

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Cost Benefit Assessment

Benefits gained from the Risk **V/S** **Additional cost incurred**

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Gross Disproportion!

Security Risk

Advanced Surveillance System 50,000 $

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Limitation of Liability from Oil Spill in US ports

- West Coast – Unlimited Liability
- East Coast – Limited Liability as governed by CLC and Limitation Convention.
- In case a laden tanker runs aground and spills oil on the US West Coast there is a high chance the Company may go Bankrupt paying for Unlimited Oil Pollution Claims, a common feature in the USA.

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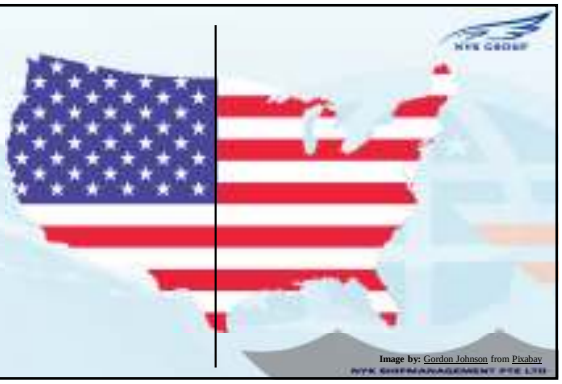

Image by: Gordon Johnson from Pixabay

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How has NYK handled this situation?

Risk v/s Control Measures

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Activities for Risk Assessment

The following activities require mandatory completion of an RA as per Nibiki

- Company Minimum Criteria for conducting Risk Assessment Z-091000-03FIG
- Critical Equipment Standard List S-101004-02 FIG
- **The above Lists need to be made Ship Specific and Approved by Company.**
- Applicable GI Letters or Company requiring an RA for certain tasks
- Any occasion, in judgement of Master or C/E requiring an RA.

89

Exception Jobs in NiBiKi!

Jobs which:

Need a Risk Assessment to be compulsorily carried out

Need Risk Assessment to be sent for Office Approval

Even though Final Risk is LOW

as per Company Minimum Criteria, Critical Equipment Standard List, GI Letters, Master's, C/E discretion or Company Special requirement

90

Exception Jobs in NiBiKi!

91

Implementing an RA

- When Daily Job Order is planned, identify tasks requiring RA or review existing RA
- Unplanned repair, maintenance or operations are developed, identify tasks requiring RA or review existing RA

92

Job Hazard Analysis

- JHA is basically **an Initial RA** wherein the assessor judges that the hazards identified pose risks that are trivial in nature therefore a more detailed RA is not required.
- Vessel to use the pictorial JHA's provided in the Booklet. (Update in Nibiki to follow)
- JHA's designed for easy understanding by crew members, hazards and control measures are provided to the actual on-site worker in a **basic manner.**

93

Self Assessment - Hazid Card

- Self Asessment
- Hazard Identification Cards:
- Used as a quick referencing tool for easy **identification** of unsafe conditions and unsafe acts.

94

If you identify any of the below hazards;

- Slip, Trip, Fall
- Injury, Electric Shock, Burns
- Fatigue
- Inadequate Lighting
- Lack of Oxygen
- Exposure to Toxic or hazardous gases
- Fire, Pollution or any damage.

Stop the member

Inform your HOD

95

NiBiKi Risk Assessment

Training Video

Risk Assessment
Follow link in footnotes

96

Risk Management and NiBiKi
Z – P – 09.10.00

- Z-091000-01 FRM Risk Assessment Form
- S-091000-02FRM Risk Assessment Review Log

97

Daily Job Order

- Beginning each month or voyage, the HODs shall prepare a maintenance plan basis jobs due in the PMS, operational requirements, etc.
- Basis the plan, daily job orders shall be made.
- SIMOPS(Simultaneous Operations) Plan for Tankers and Gas carriers
  - Jointly prepared by HODs and discussed during the daily job order meeting and Toolbox meeting.

98

Daily Job Order – Before the Meeting

Chief Officer / Chief Engineer

- Using Nibiki Criteria, confirm whether a RA is necessary. If so confirm whether approved by Master, Company or need Review of an existing one.

99

Daily Job Order – During the Meeting

Master

- Confirms proper closing out of all jobs and permits from previous DJO.

Ship Management Team

- Discuss each planned job, requirements of RA, JHA, Permits, Special instructions, special tools required, job completion checks, interdepartmental jobs, etc

Master

- Logs into Nibiki, approves RA's, Reviews previous RA's (presently only Master can Review)
- Familiarises HOD's with procedural requirements for all Planned jobs.

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Toolbox Meetings

- Chaired by the HOD, a meeting with the crew before start of the day's work.
- The jobs in the Daily Job Order / SIMOPS Plan are discussed in the meeting.
- Discuss matters related to Fatigue Management S-094003-05FIG Fatigue Management
- JHA cards should be used for effective understanding of hazards and countermeasures.
- All applicable risks and hazards are discussed pertaining to each job on the agenda

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Exercise # 3

Preparation of Daily Job Order - Individual

- Sounding of Bilges, Ballast and Fresh Water Tanks
- Cleaning and Detergent Washing Port Side Main deck
- Greasing of Accommodation W/T doors, vents and dampers
- Inventory of refrigerated stores in Galley
- Inspection of 5P Ballast Tank.
- Renewing of fused navigation lamps on Main Mast
- Weekly Inspection of Lifejackets & Immersion suits
- Painting Accommodation superstructure with a white coat
- Investigating and fixing leakage in under deck passage (there is no prior RA/JHA for this job, leakage was just detected)
- Anchoring

Exercise: 30 minutes

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Exercise # 4
Individual

Vessel is planning to launch and maneuver its lifeboats. Please prepare a RA on the form supplied for this activity.

Exercise: 30 minutes

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Remaining in Control

Responsible Officers should be vigilant to

- any unplanned occurrence taking place or
- any latent hazard becoming alive or
- any new hazard developing during the work activity.

Appropriate Safeguards should be implemented immediately, or the job called off, till it can be done safely

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Case Study !!

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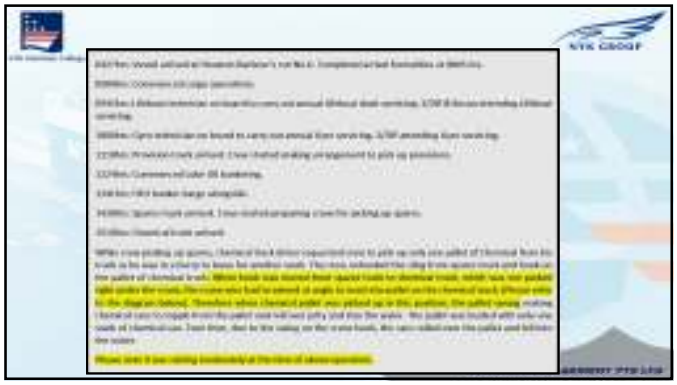
105



106

Photo courtesy:By Malarky at English Wikipedia - Own work, Public Domain, https://commons.wikimedia.org/w/index.php?curid=2367268

107

108

Health RA

- Carried out at least annually on board.
- Any other occasion when a health hazard suspected.
- Prior arrival/departure areas with significant health hazards
- When company requests
- A Standard Health RA has been carried out by the company and is available as a standard RA template

109

Health RA

Health RA should be inclusive of

- monitoring of physical hazards such as noise levels,
- inventories of hazardous materials,
- hygiene and sanitary matters,
- food poisoning,
- quantity of medicines
- assessing human factors etc

110

Summarizing

- RA is a **pro**-active safety measure of assessing hazards and risks prior conducting an operation.
- Risk is the product of frequency and consequence of a hazard materializing into an accident.
- Risk must be brought to “A-L-A-R-P”.
- Preparation of Daily Job Order necessitates a diligent compliance with RA.
- After completion of Risk Assessment, vessel management must remain alert for any new hazard developing or any latent hazards cropping up.

111

Final Training Assessment Exercise #5 Group

- The vessel is due to carry out an inspection of a Fuel oil Tank. The Tank has been cleaned and Gas Freed and the inspection is to be done by Ships Staff.
- Prepare an RA for the safe conduct of the Entry and Inspection identifying the hazards, their effects, existing control measures and safeguards. Evaluate the initial control measures, invoke additional control measures, if required, and reduce the final risk.
- Seek company approval if deemed necessary.

Exercise: 30 minutes

112

Steps in Lifeboat Lowering

1) Remove lashings, prepare for lowering – Actions – Identify hazards
2) Lower to deck level and heave up again to test
3) Boarding lifeboat, lowering to deck level, Lower to 1 meter above water level
4) Unhook, maneuver, try out sprinkler, engines, etc
5) Position under hook, hook back, heave up to 1 meter above water level.
6) Heave-up until deck level, till stowage position, crew disembark
7) Secure, take lashings, release weight on the falls

113

Incident Investigation Training

NMC 03N

1

Training Objectives

This course will introduce trainees to a systematic approach of:

- Understanding the aims & objectives of an incident investigation process;
- Collecting different kinds of evidence; Interviewing;
- Organize evidence effectively;
- Analyze information so as to determine immediate & root cause
- Prepare concise report;
- Recommend effective action to prevent reoccurrence;
- Understand SMS procedure of Incident Investigation.

2

Core Principle of Operations

Continuous Improvement of SMS

PROACTIVE
Risk Assessment
Proactive, avoiding accidents before occurrence, through proper planning / preparation

REACTIVE
Incident Investigation
Reactive, learning from incidents to ensure not repeated

3

Video

Access 'Video' link from footnotes below

Lifeboat Launching Accident

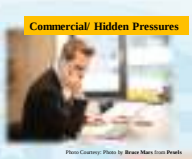
What went wrong?

4

Leading Causes of Accidents

Fatigue/Workload

Equipment Design



Commercial/ Hidden Pressures

Improper Training / Human Error

Unclear confusing instructions

5

Case study

Fatigue / Workload

Only AIS monitoring of target

Fatigue does not always mean noncompliance with work rest hours
Rather … even during work hours, am I overworked?

e.g – How many jobs were you doing at that time?

Jingu – Case Study –

- 0805- Vis. less than half mile. Master informed. Spd 18.4 kts
- 0850- Master on bridge, did not take over con from 3rd Officer
- 1130- rpm reduced to 96 due to delay in berthing
- 1135- noted a stationary fishing boat starting to move, CPA 0.2'
- 1156- Fishing boat 2.0 Nm stbd bow CPA 0.2Nm, Master attended a phone call from agent.
- 1200- 3/M handed over watch to 2/O,
- 1203- Vessel collided with FV.

6

Commercial / Hidden Pressure

Commercial/ Hidden Pressures

Photo Courtesy: Photo by **Bruce Mars** from **Pexels**

- Does not mean Personal domestic problems
- Rather … a self-imposed pressure even when not required
- e.g – Sometimes, VM may propose a certain number of jobs to be done at this port call
- Master/CE have the liberty to reject jobs they find to be unmanageable
- A proposal does not mean an express order.

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7

Human element in the Maritime Industry

- Human Error accounts for 75% of Marine Losses(Allianz Global Corporate & Specialty)
- Deadly Dozen – 12 most common, people related factors leading to accidents (UKMCA)

Photo by Gwen Barris from Freeimages

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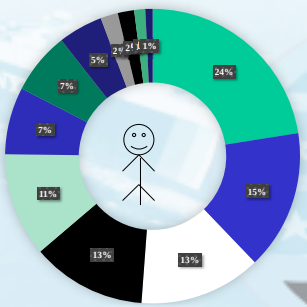
8

Human Element



- SA
- Alerting
- Communication
- Complacency
- Culture
- Local Practices
- Teamwork
- Capability
- Pressure
- Distraction
- Fatigue
- Fit for Duty

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9


SITUATIONAL AWARENESS
Do You REALLY know What's happening?
Ask Input from Team members.
Communicate Effectively
Try and grasp the BIG picture and the FINE details.
Focus on creating a COMPETENT Team
ALERTING
Do You REALLY speak up When you should?
Being Assertive is of utmost importance
Try and Reduce power distance among team members
Encourage challenges by team members
Its not a threat – Its good Teamwork
COMMUNICATION
Do You REALLY understand everyone?
Message understood? – Don't assume - Confirm
Use Closed Loop Communication
Words are only 30% of the message
Consider Tone and Body language also
COMPLACENCY
Is everything REALLY ok?
Usually stems from habitual, routine activities
Use checklists effectively, follow procedures
Seek inputs from others, Chronic Unease
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10


Incident Investigation
The Why and How of II?
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11


Regulatory Requirements for II
ISO 9001
ISO 14001
MARPOL
United Nations Convention on the Law of the Sea
SOLAS
STCW
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12

Safety Management System
Safety Culture

13

Forming the Team

- Depending on the severity of the incident the MD / COO / CEO and DPA shall decide if a formal incident investigation is required.
- If required, an Incident Investigation Committee shall be established
- Members; DPA, GM(FS), GM(MTD and HR), DGM(Applicable Fleet), DGM(HSEQ), CSO, VM(s) and HSEQ Manager(s),3rd party personnel viz. Class Surveyors, Underwriter Surveyors, Legal experts etc may be included.
- Other personnel if so required by the Owners, Charterers or Authorities

14

Choosing the Lead Investigator

- Master and/or the C/E can be appointed as investigators in Minor incidents, incl. minor injuries and potential serious near misses.
- For all other categories of incidents, the Incident Investigation Committee shall appoint the investigator as per following:
  - Suitably trained in II by external agencies
  - Not connected with the Incident (Conflict of Interest)
  - Can fulfill more than one role in the committee
  - DPA will decide if more than one shore person will be needed to lead the investigation on board.

15

Skills required of the Investigation Team

- Trained
- Subject Matter Experts
- Conflict of Interest (In the Analysis Stage- The VM may have a conflict of Interest in the outcome of the investigation)
- Total members – More than 5
- Required Soft Skills
- Talkative people, Need to do brainstorming
- Curious
- Not hesitant to accept and challenge decisions

16

The Incident Investigation Process

- Take Control of the Scene
- Allocate resources
- Collect evidence
- Organize the data
- Analyze the causes (M-SCAT)
- Findings and Report
- Follow-up

17

Take control of the scene

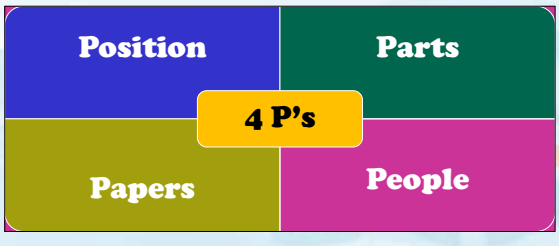
- Allow essential access only
- Minimize disturbance – preserve the scene
- Control the removal of equipment or materials
- Identify witnesses
- Gather and record evidence from the scene

18

A Good Tool – Timeline of Sequence of events

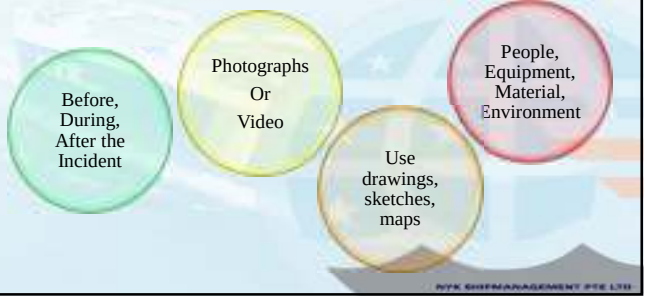
19

Collecting Evidence



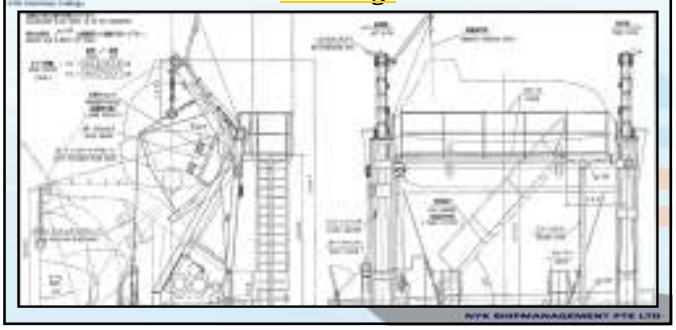
20

Position



21

Drawings



22

Pictures

View from 4 points of the Image/Site

23

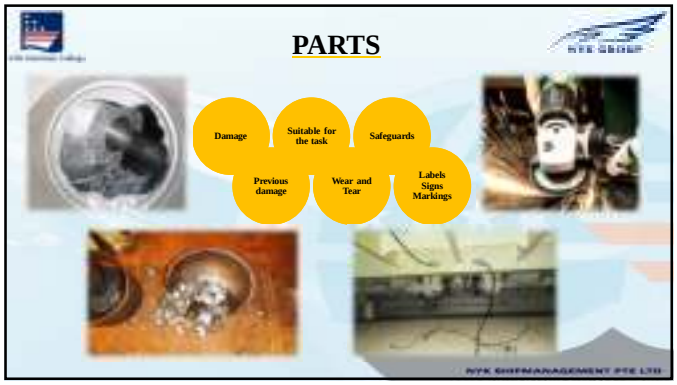
Photos: 3 Ranges

Long

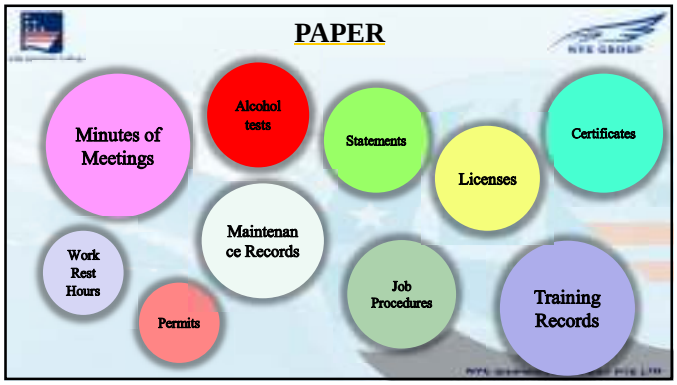
Medium

Close-Up

24


PARTS
Damage
Suitable for the task
Safeguards
Previous damage
Wear and Tear
Labels Signs Markings

25


PAPER
Minutes of Meetings
Alcohol tests
Statements
Licenses
Certificates
Maintenance Records
Work Rest Hours
Permits
Job Procedures
Training Records

26

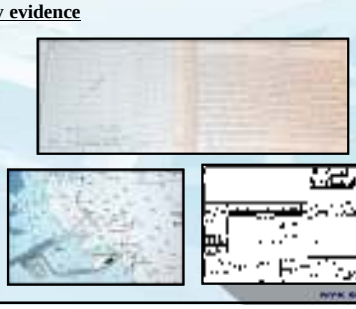

PAPER
Voyage Data Recorder
Date & Time
Position, Heading
Speed
Bridge Audio, VHF
Main Alarms
Radar
Echo Sounder
Photo Courtesy: Hervé Cozanet [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0/)](Cropped)

27

PAPER

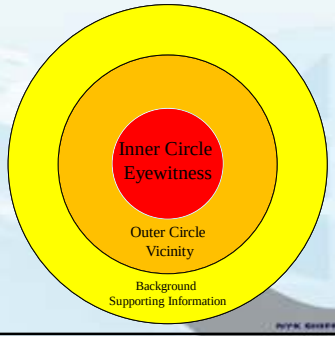
Documentary evidence

- Charts
- Checklists
- Records
- Logbooks
- Bell books
- Emails
- User Manuals



28

PEOPLE - Interviews



29

PEOPLE

Interview Location

Masters Office
C/E Office
Ships Office
==========
Too formal space, Lower ranks will be defensive

Site
==========
Pro – easy to remember details,
Con – Can be emotionally disturbing

Crew Cabin
==========
Private space

Crew Smoke Room
==========
Neutral space, place to relax, No challenge seen, even if uncooperative will talk.

30

PEOPLE -Interviews

Witnesses

Advisable to have a single witness interviewed at a time, if in a team, the lower rank will tend to be silent.

Interviewers

Preferably not more than two – will be intimidating to the witness.

Dressing as interviewer

Dressing down is a better option. If in a 3-piece suit, can be quite intimidating for the witness.

31

PEOPLE -Interviews

Sitting Posture

Sit at a low level, if possible, slightly lower than the witness. Try to mirror the Body Posture of the interviewee.

Translators

May need, if language barrier exists.

Write or Record

Need to take permission of witness, but recording is preferable.

32

PEOPLE - Interviews

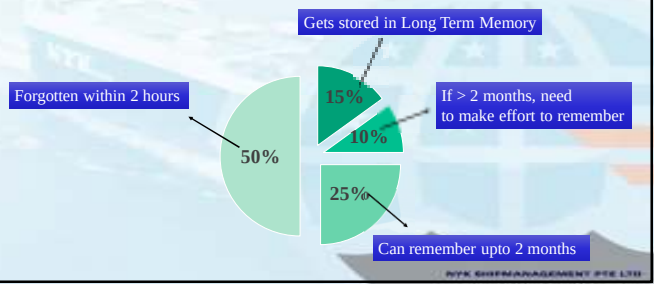
V/S

Interview
Empathize with the Witness
More preferable

Interrogation
Can be Intimidating
Mostly by Police

33

PEOPLE – How much do people remember?



34

PEOPLE – Interviews – Questioning Techniques

Open – What did you observe when you arrived at the scene of the incident?

Closed – Did you see the O/S at the scene of the incident?

Analyzing – What could be a possible reason for the connection to leak? Why did the connection leak? – Facts v/s Opinion

Clarifying – Are you sure the line was tested after repairs?

Probing – How did you determine that the risk of collision existed?

Critical thinking – Why did you choose to use the radar and not the GPS as a basis for the alteration of course?

Leading – Did the Master advise you to keep 0.5 NM as CPA?

Non Leading – What was Masters advise in keeping clear of the fishing boat?

35

Exercise # 1

Write down the definitions of below terms in your notebook!!

Incident	Accident	Near Miss	Unsafe Act	Unsafe condition
Immediate Cause	Basic Cause / Root Cause	Contributing Factors	Corrective Action	Preventive Action

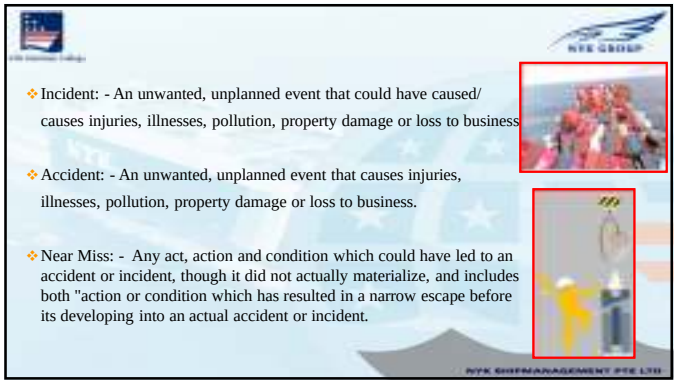
Exercise: 15 minutes

36

37


Unsafe condition + Unsafe act + Near miss = Accident

38


Incident: - An unwanted, unplanned event that could have caused/ causes injuries, illnesses, pollution, property damage or loss to business
Accident: - An unwanted, unplanned event that causes injuries, illnesses, pollution, property damage or loss to business.
Near Miss: - Any act, action and condition which could have led to an accident or incident, though it did not actually materialize, and includes both "action or condition which has resulted in a narrow escape before its developing into an actual accident or incident.

39

- Unsafe Act: - At risk behaviour of a person
- Unsafe Condition: - Physical circumstances that may be pre-existing or may occur later and that have the potential to cause an incident.
- Immediate Cause: - These are the unsafe acts and conditions that resulted in an incident.
- Basic Cause/Root Cause: - Personal Factors, Jobs or System Factors
- Control Areas for Improvements Actions: - – Inadequate system, standards or compliance

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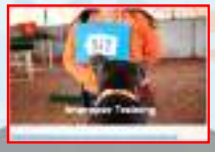
- Contributing Factors: - These include immediate and basic/root causes leading to an incident.
- Corrective Action: - An action taken subsequent to an incident with an aim to preventing Recurrence.
- Preventive Action: - An action taken subsequent to an incident with an aim to prevent Occurrence.



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Accidents v/s Incidents

Do **serious accidents / injuries** have the same **Root / Basic Causes** as **minor incidents / injuries / near misses?**

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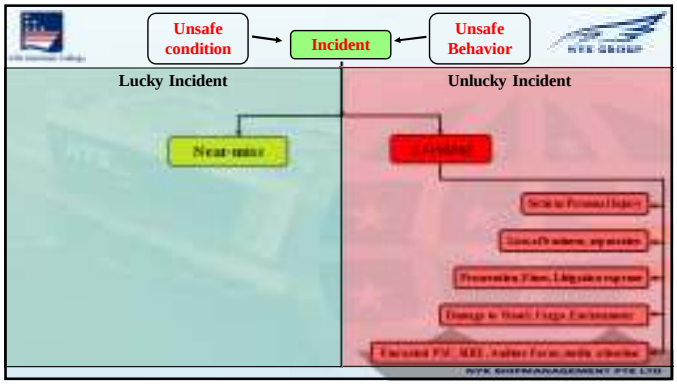
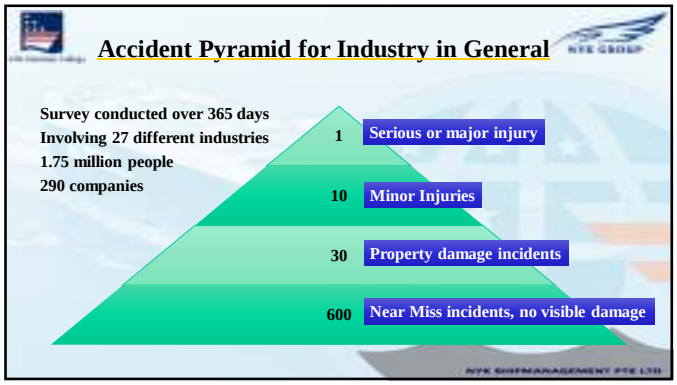
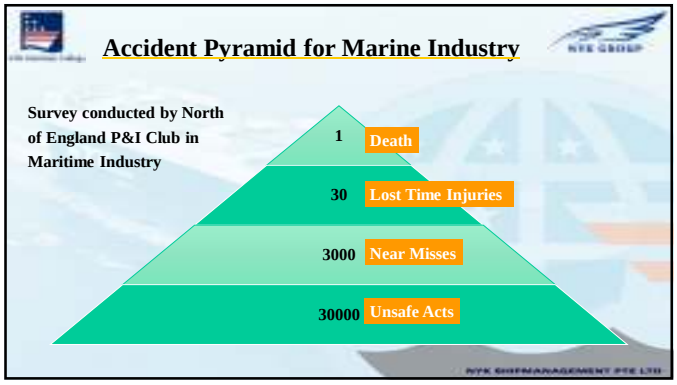

Unsafe condition
Incident
Unsafe Behavior
Lucky Incident
Unlucky Incident

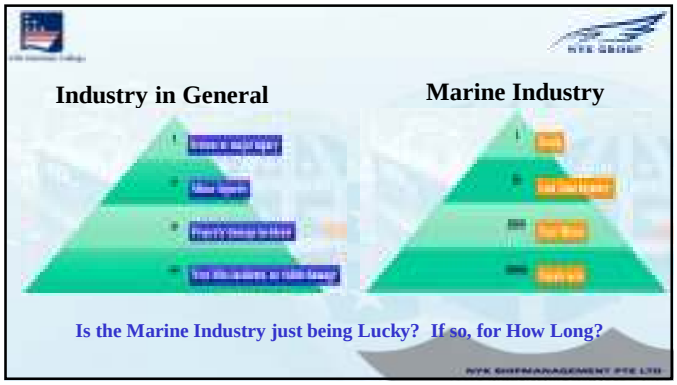
43


Accident Pyramid for Industry in General
Survey conducted over 365 days
Involving 27 different industries
1.75 million people
290 companies
1
Serious or major injury
10
Minor Injuries
30
Property damage incidents
600
Near Miss incidents, no visible damage

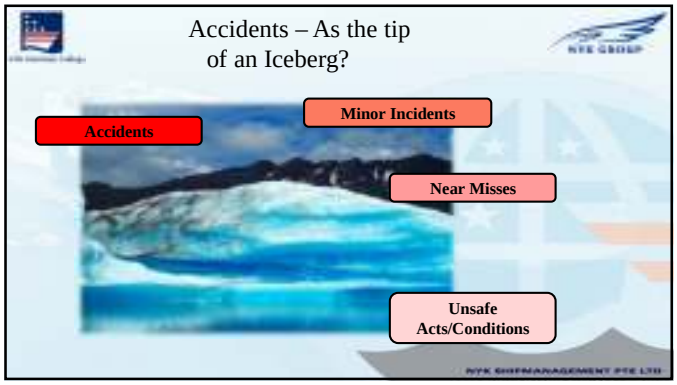
44


Accident Pyramid for Marine Industry
Survey conducted by North of England P&I Club in Maritime Industry
1
Death
30
Lost Time Injuries
3000
Near Misses
30000
Unsafe Acts

45


Industry in General
Marine Industry
Is the Marine Industry just being Lucky? If so, for How Long?

46


Accidents – As the tip of an Iceberg?
Accidents
Minor Incidents
Near Misses
Unsafe Acts/Conditions

47


Understanding Near Misses and Unsafe Acts/Conditions in NYK
4.2
4.2.1
Reporting of Near Misses

48

Understanding Near Misses and Unsafe Acts/Conditions in NYK

- Although the industry considers Near Misses and Unsafe Acts and Conditions as separate matters NYK considers all Unsafe Acts and Conditions as Near Misses.
- Hence the reporting of Monthly Near misses also includes Unsafe Acts and Conditions
- Z-095000-02FRM Near Miss report

49

Case Study Exercise # 2

E-boy – Incinerator Repair

Exercise: 15 minutes

Identify the Unsafe act, Unsafe Condition, Immediate Cause, Root / Basic Cause, Corrective Action, Preventive Action

50

The Incident Investigation Process: M-SCAT

Marine Systematic Cause Analysis Technique (M-SCAT).

This tool is simple yet an effective tool for investigation of causation of loss events.

Can be used to identify the corrective actions necessary to prevent similar events happening in the future.

Can be used to learn from accidents and near-misses to prevent further human injury, environmental damage and quality losses.

51

M-SCAT

Type of Loss – People, Asset, Business, Reputation etc.
Risk Evaluation – Low / Medium / High

Type of Event – Incident or Unintended Harm or Damage

Immediate Cause – Unsafe Acts or practices and Unsafe conditions

Basic Cause – Personal Factors, jobs or system factors

Control Areas for Improvements Actions – Inadequate system, standards or compliance

52

M-SCAT

Type of Event:

1. Fall from Elevation (Person/Equipment/Material)
2. Fall on Same Level (Slip and Fall/Trip Over)
3. Struck against (bump into / run into)
4. Struck by (Hit by Moving Object)
5. Caught In, On, Between or Under
6. Contact with Temperature Extremes (Heat/Cold)
7. Contact with Electricity
8. Exposure to Noise
9. Exposure to Vibration
10. Exposure to Radiation
11. Contact with Hazardous Substance/Dose (Toxic/Corrosive/Carcinogenic/ Biological/Viral)
12. Overstress by Overexertion, Overload, Ergonomic Factors
13. Ship Collision
14. Ship Grounding
15. Ship Contact Damage (Docks, Locks, Buoys, etc.)
16. Fire
17. Explosion
18. Loss of Ship Hull/Watertight Integrity
19. Failure of Mechanical Equipment
20. Failure of Electrical
21. Failure of Instrumentation/Logic/Loop
22. Cargo Damage and/or Loss
23. Environmental Release (to Air/Water/Soil)
24. Loss of Ship Stability
25. Customers/Stakeholders Complaints
26. Acts of Violence

53

M-SCAT

Immediate Cause – Substandard Acts

1. Under the Influence of Medicine/Alcohol/Drugs
2. Failure to Follow Procedure/Instruction
3. Failure to Secure
4. Failing to use Personal Protective Equipment Properly
5. Failure to Inform/Warn
6. Improper Lifting
7. Improper Loading
8. Improper Placement
9. Improper Position for Task
10. Incorrect Navigation or Ship Handling
11. Making Safety Devices Inoperable
12. Operating at Improper Speed
13. Operating Equipment Without Authority
14. Removing Safety Devices
15. Inadequate Servicing of Equipment/Machinery in Operation
16. Using Defective Tool/Equipment/Machinery/Device
17. Improper Operation of Tool/Equipment/Machinery/Device
18. Foul Play/Sabotage
19. Substandard Act by External Party (Not Under Own Control)
    - 19.1 Pilots
    - 19.2 Boatman
    - 19.3 Terminal Personnel
    - 19.4 local Authorities
    - 19.5 Incorrect Supply of Documents/Information
    - 19.6 Other External Party Not Under Control of Company / Shipboard Management
20. Failure to Comply with Customers/Stakeholders Requirements
21. Civil Disturbance (Riot, Unrest, Warfare)
22. Criminal Activities

54

M-SCAT

Immediate Cause – Substandard Conditions

23. Cargo
24. Congestion/Restriction Space for Action
25. Defective Tool/Equipment Incorrect
26. Materials
27. Electric Current Hazards
28. Exposure to Chemicals
29. Exposure to High Temperature
30. Exposure to Low Temperature
31. Noise Level Over Threshold
32. Radiation Hazard Over Threshold
33. Presence of Flammable/Explosive Atmosphere
34. Exposure to Dangerous Atmosphere Causing Suffocation or Poisoning
35. Inadequate Guard/Barrier
36. Insufficient/Excessive Illumination
37. Inadequate/Improper Personal Protective Equipment
38. Inadequate Ventilation
39. Inadequate Warning Systems
40. Incorrect/Inadequate Tool/Equipment
41. Outdated Charts, Publications and Other Documentation
42. Poor Housekeeping/Order
43. Inadequate Condition of Floor / Surface
44. Exposure to Adverse Weather Condition
45. Extreme Adverse Sea Condition
46. Inadequate Port and Berthing Facilities

M-SCAT

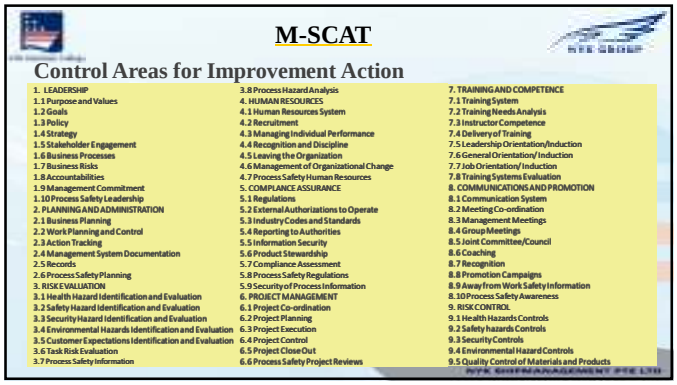
Basic Cause - Personal Factors

1. Inadequate Physical/Physiological Capability
   - 1.1 Inappropriate height/weight/size/strength/reach, etc.
   - 1.2 Restricted range of body movement
   - 1.3 Limited ability/inability to sustain body positions
   - 1.4 Substance sensitivity/allergy
   - 1.5 Sensitivities to sensory extreme (temperature/sound/etc.)
   - 1.6 Vision deficiency
   - 1.7 Hearing deficiency
   - 1.8 Other sensory deficiency (touch/taste/smell/balance)
   - 1.9 Respiratory incapacity
   - 1.10 Other permanent physical disability
   - 1.11 Temporary disability
2. Inadequate Mental/Psychological Capability
   - 2.1 Fears and phobias
   - 2.2 Emotional Disturbance
   - 2.3 Mental illness
   - 2.4 Intelligence level
   - 2.5 Inability to comprehend
   - 2.6 Poor coordination
   - 2.7 Slow reaction time
   - 2.8 Low mechanical aptitude
   - 2.9 Low learning aptitude
   - 2.10 Memory failure/lapse
3. Physical/Physiological stress
   - 3.1 Injury or Illness
   - 3.2 Fatigue due to task load or duration
   - 3.3 Fatigue due to lack of rest
   - 3.4 Fatigue due to sensory overload
   - 3.5 Exposure to health hazard
   - 3.6 Exposure to temperature extreme
   - 3.7 Oxygen deficiency
   - 3.8 Atmospheric pressure variation
   - 3.9 Constrained movement
   - 3.10 Blood sugar insufficiency
   - 3.11 Alcohol/Drugs/Other Self-Imposed Stress
4. Mental/Psychological Stress
   - 4.1 Emotional Overload
   - 4.2 Fatigue due to mental task load or speed
   - 4.3 Extreme judgment/decision demands
   - 4.4 Routine/monotony/boredom/overly routine tasks
   - 4.5 Extreme concentration/perception demands
   - 4.6 Meaningless/degrading activities
   - 4.7 Confusion directions/demands
   - 4.8 Conflicting demands/directions
   - 4.9 Preoccupation with problems/distraction by concern
   - 4.10 Frustration
   - 4.11 Mental illness
5. Lack of Competence
   - 5.1 Inadequate Experience
   - 5.2 Inadequate orientation/induction
   - 5.3 Inadequate initial training
   - 5.4 Inadequate update/refresher training
   - 5.5 Inadequate Misunderstood instruction/information
   - 5.6 Lack of situational awareness/risk perception/risk awareness
   - 5.7 Inadequate initial instruction/skill training
   - 5.8 Inadequate practice
   - 5.9 Infrequent performance
   - 5.10 Inadequate coaching
   - 5.11 Inadequate review instruction
6. Improper Motivation
   - 6.1 Improper performance/behavior is tolerated / rewarded
   - 6.2 Proper performance /behavior is discouraged/punished
   - 6.3 Lack of Incentive
   - 6.4 Improper production incentive
   - 6.5 Improper Cost Reduction Incentive
   - 6.6 Excessive frustration
   - 6.7 Inappropriate aggression
   - 6.8 Improper attempt to save time/effort
   - 6.9 Improper attempt to avoid discomfort
   - 6.10 Improper attempt to gain attention
   - 6.11 Inadequate discipline
   - 6.12 Inappropriate peer pressure
   - 6.13 Improper leadership example
   - 6.14 Inadequate performance feedback
   - 6.15 Inadequate reinforcement of proper behavior
   - 6.16 Abuse (intentionally)
   - 6.17 Misuse (unintentionally)

M-SCAT

Basic Cause - Job / System Factors

7. Unclear organizational Structure
   - 7.1 Unclear/conflicting reporting of relationship
   - 7.2 Unclear/conflicting assignment of function/role
   - 7.3 Unclear/conflicting accountability/responsibility/task
8. Inadequate Leadership
   - 8.1 Inadequate HSEQ/asset strategy
   - 8.2 Inadequate leadership development
   - 8.3 Inadequate delegation
   - 8.4 Inadequate standards
   - 8.5 Inadequate communication/implementation of policy/procedure/practice
   - 8.6 Conflicting policy/procedure/practice
   - 8.7 Inadequate work/process planning/programming
   - 8.8 Condone deviation from policy/procedure/practice
   - 8.9 Condone misuse of equipment/tool
   - 8.10 Condone improper/inappropriate behavior
   - 8.11 Inadequate management information
   - 8.12 Inadequate monitoring/closure of audit actions
9. Inadequate Supervision/Coaching
   - 9.1 Inadequate instruction/orientation/training
   - 9.2 Inadequate information documents in supervision / coaching
   - 9.3 Lack of supervisory/management job knowledge
   - 9.4 Inadequate match between qualifications and job/task requirements
   - 9.5 Inadequate performance measurement and evaluation
   - 9.6 Inadequate performance feedback
10. Inadequate Management of Change
    - 10.1 Inadequate hazard identification/risk evaluation in design
    - 10.2 Inadequate identification of failure mode
    - 10.3 Inadequate evaluation of customer/stakeholder requirement
    - 10.4 Inadequate identification of legal requirement
    - 10.5 Inadequate consideration of human/ergonomic factor in design
    - 10.6 Inadequate design process / standard / specification / criterion
    - 10.7 Inadequate process control automation
    - 10.8 Inadequate (technical) standard/specification or absence thereof
    - 10.9 Inadequate review of project risks
    - 10.10 Inadequate monitoring of construction / fabrication / assembly
    - 10.11 Inadequate assessment of operational readiness
    - 10.12 Inadequate commissioning/handover process
    - 10.13 Inadequate of initial operation
    - 10.14 Inadequate management of change process
11. Inadequate Supply Chain Management
    - 11.1 Inadequate specification on requisition / purchase order
    - 11.2 Inadequate research on material / equipment / tool / supply, etc.
    - 11.3 Inadequate specification to vendor
    - 11.4 Inadequate mode/route of shipment
    - 11.5 Inadequate receiving inspection/acceptance
    - 11.6 Inadequate communication of information about hazards
    - 11.7 Improper handling of material
    - 11.8 Improper storage of material
    - 11.9 Improper transporting of material
    - 11.10 Inadequate shelf life/validation for re-use of materials / equipment
    - 11.11 Inadequate identification of material
    - 11.12 Improper salvage/waste disposal
    - 11.13 Inadequate selection of contractor/supplier
12. Inadequate maintenance/inspection
    - 12.1 Inadequate assessment of preventive maintenance needs
    - 12.2 Inadequate preventive lubrication and servicing
    - 12.3 Inadequate adjustment/assembly
    - 12.4 Inadequate preventive cleaning/resurfacing
    - 12.5 Inadequate communication of corrective maintenance needs
    - 12.6 Inadequate scheduling of maintenance work
    - 12.7 Inadequate assessment of repair needs
    - 12.8 Inadequate parts substitution/replacement
    - 12.9 Inadequate inspection method/interval
    - 12.10 Unable to inspect
13. Excessive wear/tear
    - 13.1 Inadequate planning of use
    - 13.2 Improper decision on extension of service life


M-SCAT
Control Areas for Improvement Action
1. LEADERSHIP
1.1 Purpose and Values
1.2 Goals
1.3 Policy
1.4 Strategy
1.5 Stakeholder Engagement
1.6 Business Processes
1.7 Business Risks
1.8 Accountabilities
1.9 Management Commitment
1.10 Process Safety Leadership
2. PLANNING AND ADMINISTRATION
2.1 Business Planning
2.2 Work Planning and Control
2.3 Action Tracking
2.4 Management System Documentation
2.5 Records
2.6 Process Safety Planning
3. RISK EVALUATION
3.1 Health Hazard Identification and Evaluation
3.2 Safety Hazard Identification and Evaluation
3.3 Security Hazard Identification and Evaluation
3.4 Environmental Hazards Identification and Evaluation
3.5 Customer Expectations Identification and Evaluation
3.6 Task Risk Evaluation
3.7 Process Safety Information
3.8 Process Hazard Analysis
4. HUMAN RESOURCES
4.1 Human Resources System
4.2 Recruitment
4.3 Managing Individual Performance
4.4 Recognition and Discipline
4.5 Leaving the Organization
4.6 Management of Organizational Change
4.7 Process Safety Human Resources
5. COMPLIANCE ASSURANCE
5.1 Regulations
5.2 External Authorizations to Operate
5.3 Industry Codes and Standards
5.4 Reporting to Authorities
5.5 Information Security
5.6 Product Stewardship
5.7 Compliance Assessment
5.8 Process Safety Regulations
5.9 Security of Process Information
6. PROJECT MANAGEMENT
6.1 Project Co-ordination
6.2 Project Planning
6.3 Project Execution
6.4 Project Control
6.5 Project Close Out
6.6 Process Safety Project Reviews
7. TRAINING AND COMPETENCE
7.1 Training System
7.2 Training Needs Analysis
7.3 Instructor Competence
7.4 Delivery of Training
7.5 Leadership Orientation/Induction
7.6 General Orientation/ Induction
7.7 Job Orientation/ Induction
7.8 Training Systems Evaluation
8. COMMUNICATIONS AND PROMOTION
8.1 Communication System
8.2 Meeting Co-ordination
8.3 Management Meetings
8.4 Group Meetings
8.5 Joint Committee/Council
8.6 Coaching
8.7 Recognition
8.8 Promotion Campaigns
8.9 Away from Work Safety Information
8.10 Process Safety Awareness
9. RISK CONTROL
9.1 Health Hazards Controls
9.2 Safety hazards Controls
9.3 Security Controls
9.4 Environmental Hazard Controls
9.5 Quality Control of Materials and Products

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M-SCAT
Basic Cause and Control Areas for Improvement Action
Basic Cause
1. Inadequate Physical/Physiological Capability
2. Inadequate Mental/Psychological Capability
3. Physical/Physiological stress
4. Mental/Psychological Stress
5. Lack of Competence
6. Improper Motivation
7. Unclear organizational Structure
8. Inadequate Leadership
9. Inadequate Supervision/Coaching
10. Inadequate Management of Change
11. Inadequate Supply Chain Management
12. Inadequate maintenance/inspection
13. Excessive wear/tear
14. Inadequate Tool/Equipment/Machinery/Device
15. Inadequate Product/Service Design
16. Inadequate Work/Production Standards
17. Inadequate Communication/Information
Control Areas for Improvement Action
1. Leadership
2. Planning and Administration
3. Risk Evaluation
4. Human Resources
5. Compliance Assurance
6. Project Management
7. Training and Competence
8. Communications and Promotion
9. Risk Control
10. Asset Management
11. Contractor Management / Purchasing
12. Emergency Preparedness
13. Learning from Events
14. Risk Monitoring
15. Result and Review

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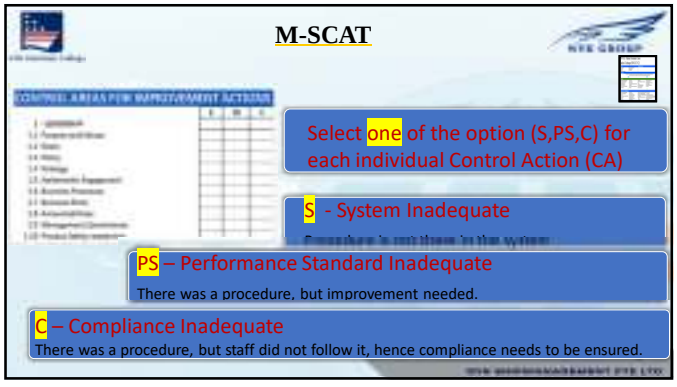
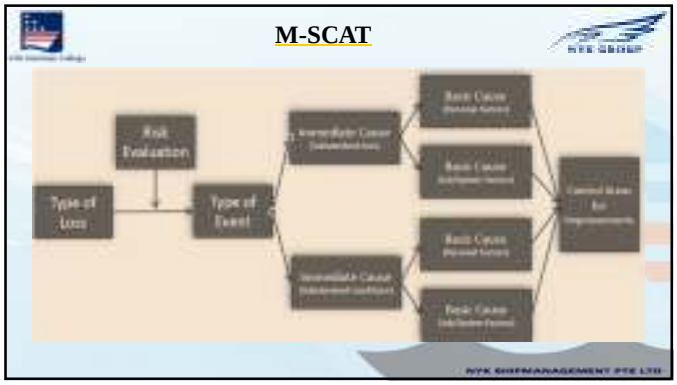
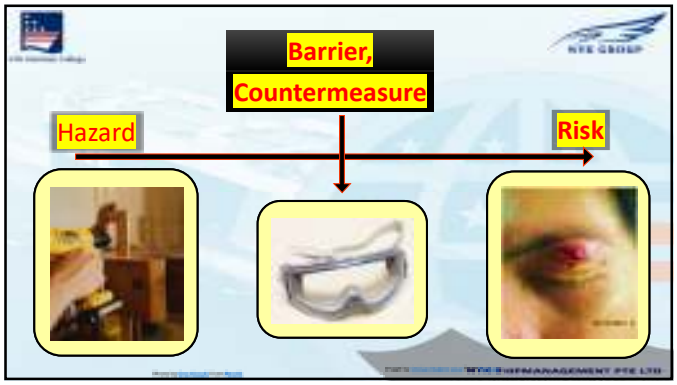

M-SCAT
Select one of the option (S,PS,C) for each individual Control Action (CA)
S - System Inadequate
PS – Performance Standard Inadequate
There was a procedure, but improvement needed.
C – Compliance Inadequate
There was a procedure, but staff did not follow it, hence compliance needs to be ensured.

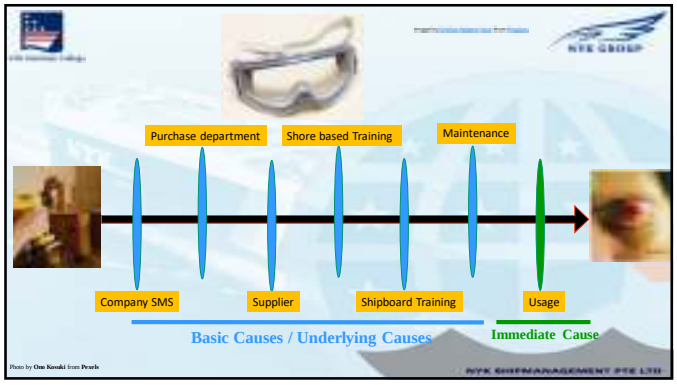
60


M-SCAT
Risk Evaluation
Type of Loss
Type of Event

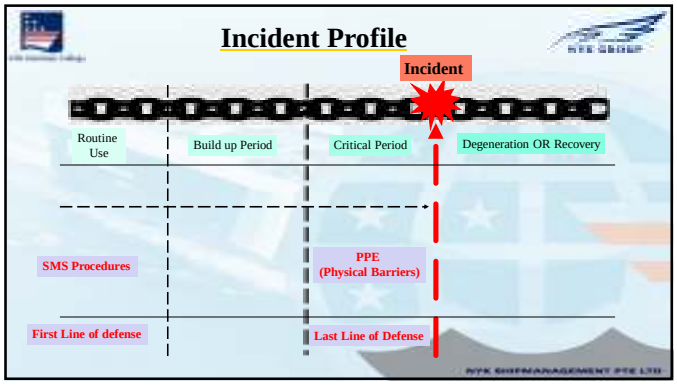
61


Barrier, Countermeasure
Hazard
Risk

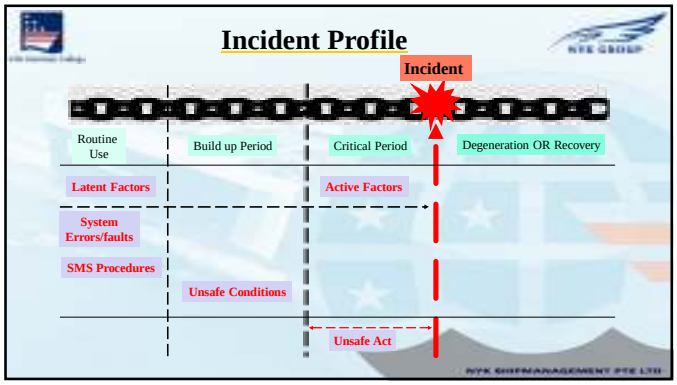
62


Purchase department
Shore based Training
Maintenance
Company SMS
Supplier
Shipboard Training
Usage
Basic Causes / Underlying Causes
Immediate Cause

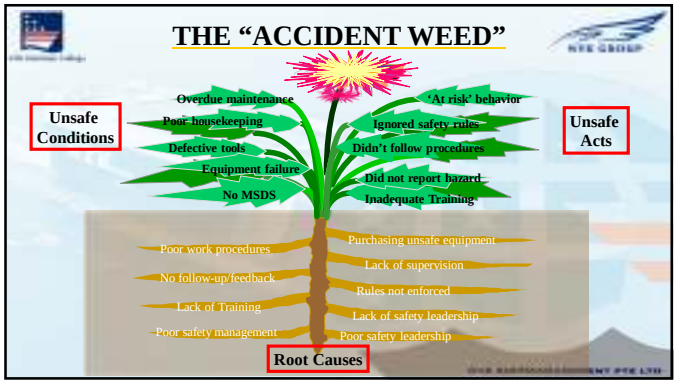
63


Incident Profile
Incident
Routine Use
Build up Period
Critical Period
Degeneration OR Recovery
SMS Procedures
PPE (Physical Barriers)
First Line of defense
Last Line of Defense

64


Incident Profile
Incident
Routine Use
Build up Period
Critical Period
Degeneration OR Recovery
Latent Factors
Active Factors
System Errors/faults
SMS Procedures
Unsafe Conditions
Unsafe Act

65


THE "ACCIDENT WEED"
Unsafe Conditions
Overdue maintenance
Poor housekeeping
Defective tools
Equipment failure
No MSDS
Unsafe Acts
'At risk' behavior
Ignored safety rules
Didn't follow procedures
Did not report hazard
Inadequate Training
Poor work procedures
No follow-up/feedback
Lack of Training
Poor safety management
Purchasing unsafe equipment
Lack of supervision
Rules not enforced
Lack of safety leadership
Poor safety leadership
Root Causes

66

Immediate Causes

Unsafe Conditions

20%

80%

Unsafe Acts

Unsafe Acts/Practices Unsafe Conditions

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Accident Trajectory

LEARNING FROM INCIDENTS

MOVIE 1

MOVIE 2

MOVIE 3

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Final Assessment
Exercise # 3 - Individual

Using the LNGSMSMUK circular gi/flt/001/13, fill out an incident investigation report on SMS form <S-044000-02 FRM> detailing the injury incident sustained by the app. 3/A/E due to fall down the boiler platform gratings.

Exercise: 30 minutes

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Safety Officer's Training

NMC 03N

1

Objectives

Trainees shall be able to:

- Understand the role, significance, duties and responsibilities of a Shipboard Safety Officer including effective execution;
- Understand the significance of Work Instructions, Effective Daily Job Order and Toolbox Meetings, Permit to Work System, Lock-out Tag-out Procedure, Safety Committee.
- Understand the meaning and significance of "Safety Culture"
- Understand the theory and practices associated with Behavior Based Safety Program including its incorporation in SMS.

2

Who was **responsible** for safety on your last vessel?

- **All Ship Staff shall be responsible for:-**
  - Own Safety and Health
  - Safety of other workers around
  - Issuing Z-091003-02CHK STOP and HAZID Card
  - Reporting Near miss
  - Observe personal hygiene and cleanliness at all time

3

Duties of Officers

Competent Persons: Master, C/O, or C/E. Have sufficient theoretical knowledge and practical experience to make an informed assessment of the likelihood of a dangerous condition being present or subsequently arising from the space.

Responsible person/officers: It is the duty of the responsible officer to ensure safeguards in place for all identified hazards, appropriate controls for the work are in place. They are responsible for ensuring the safety of work and must instruct the crew on proper work methods. The Chief Officer and/or Chief Engineer Authorize the work.

Personnel: Carry out the work and are responsible for following the procedures and for using the safety equipment specified.

4

Regulatory Requirement for Safety Officers

1) Flag State – MS Acts Requirement.
   - ❖ E.g. MS (Health and Safety at Work) Reg. 1997 SI No.2962
     i. Reg 15 - Appointment of Safety officer
     ii. Reg 16. -(1)(b) – Incident Investigation
   - ❖ Regulation for Labor Safety and Health, Japan Flag
2) ISM code?
3) Industry Requirement (SIRE VIQ), Best practice ?

5

Industry Culture

In a systematic analysis of the current industry attitude toward proactive safety and environmental concerns undertaken by DNV, the following was noted.

Evasion Culture: International Standards Not taken seriously / Take pride in circumventing the law

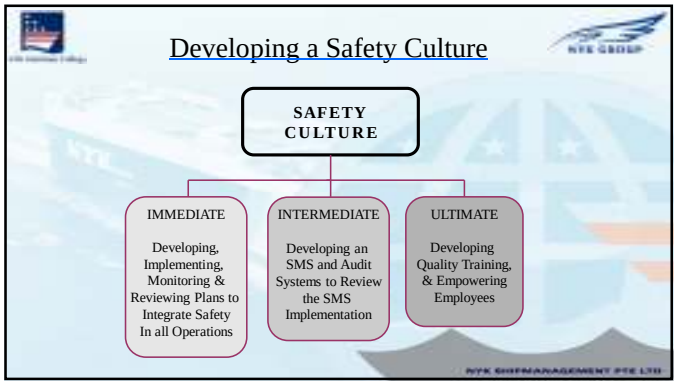
Compliance Culture: Compliance with the bare minimum regulatory International Standards

Safety Culture : Companies believe in a continuous safety improvement process to promote productivity and profitability.

6


SAFETY
FIRST
"Safety culture reflects the common attitudes, beliefs, perception and values that employees (from highest to lowest) share in relation to safety".

7


Developing a Safety Culture
SAFETY CULTURE
IMMEDIATE
Developing, Implementing, Monitoring & Reviewing Plans to Integrate Safety In all Operations
INTERMEDIATE
Developing an SMS and Audit Systems to Review the SMS Implementation
ULTIMATE
Developing Quality Training, & Empowering Employees

8


Developing a Safety Culture
Strong Commitment, Leadership And Involvement
Good inter-department COMMUNICATION
Greater HAZARD CONTROL and housekeeping
Mature and stable workforce
Good induction and follow-up Safety TRAINING
WORLD NAVIGATOR

9


Environment Protection
Safety of Life at Sea
Quality, Safety, Health Environment Protection Policy
Customer Satisfaction
Employee Satisfaction
Safe Operation of Ships

10


Summarizing ….SAFETY CULTURE
Safety culture reflects the attitudes, beliefs, perception and values that Employees share in relation to safety
Real purpose: To make health and safety a truly dynamic and continuous concern for the well-being of every person.
3 stages to Developing a Safety Culture
Develop a Safety Culture on board
Winning over the hearts and minds of employees towards the Safety Cause

11


Safety Officer's Qualifications
Who should be the Shipboard Safety Officer?
Attended a Safety Officer's training course
Familiar with the Company SMS, Industry Regulations and Guidelines
Familiar with the principles & practice of Risk Assessment and Incident Investigation
Preferably other than the Master.

12

Safety Officer's Qualities

- Lead by example
- Knowledge and experience
- Calm and Proactive
- Sensitive to Cultural diversity
- Recognize crew limitations
- Motivating personality

13

Appointment of Shipboard Safety Officers

- The C/O shall be appointed as the Safety Officer for the Deck, Radio and Catering Departments, and the C/E as the Safety Officer for the Engine Department.
- However, if it is not considered appropriate for the C/O or the C/E to perform the duties as a Safety Officer, the Master shall nominate a suitable person, indicate the nominated person in writing, and promptly notify the Company of this fact.

14

Duties of Safety Officer

Duties of Safety Officers

The Safety Officer shall confirm the fact that the operations related to the following matters are performed.

a) Maintaining work facilities and tools

b) Maintaining safety equipment, detectors, firefighting facilities, lifesaving appliances and arrangement, protection gear, and other facilities and tools for preventing hazards

15

Duties of Safety Officer

Duties of Safety Officers…..contd

c) Adopting appropriate emergency measures or preventive measures in case a dangerous or harmful situation has arisen or may arise, during work

d) Investigating the cause of an incident

e) Carrying out safety inspection of vessel and training in work safety (Make effective use of meetings before work.).

f) Preparing and retaining records related to safety management

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16

Safety Induction and Training

Why do we need Safety Induction and Training?

- Statistics indicate a high risk of incidents in the first period of work (hour-day-week)
- ISM Code 6.3

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17

Conducting Training on board

- Passive / Active
- Safety related campaigns
- Effective / Ineffective Training

Photo Courtesy: SuperJet International [CC BY-SA 2.0 (https://creativecommons.org/licenses/by-sa/2.0)]

Photo courtesy: AlfvanBeem [CC0] https://commons.wikimedia.org/wiki/File:Front_Chief_p2_Bridge_29-Nov-2006.jpg

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Safety Induction and Training

Education and Training for Newly Joined Crew Members

Education and Training for All Members of Crew

- Basic Training and Familiarization Training
- S-032000-02 FRM New Joiners Training & Familiarization Program.doc

This program shall be used to carry out familiarization training before being assigned to any shipboard duties.
All training shall be completed in a time frame not exceeding 2 weeks.

19

Safety Induction and Training

Education and Training for Newly Joined Navigating watch-keepers.

- Bridge Familiarization Check list (S-032000-05CHK) and
- ECDIS Familiarization Checklist (S-032000-06CHK)

All certified Bridge watch keepers shall be familiarized using the above Checklists prior being assigned to watch keeping duties.

20

Safety Induction and Training

Case Study – First hour of Work Injury

21

Safety Inspections

- Vessel divided into 12 areas.
- Each area inspected weekly with PIC
- Complete full Vessel inspection in 3 months
- Inspection to focus on: Safe access, Environment, Working conditions.
- Safety Officer can accompany during Master's Weekly Inspection.
- S-092001-01CHK Safety Officers Inspection Checklist.
- Dedicated Safety Inspections
- Maintaining Records

Image by Manfred Antranias Zimmer from Pixabay

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22

Safety Inspections

- Inform Master
- Discuss at Onboard Safety Committee Meetings
- Report any NC/Defect to VM/DPA

- Monthly appointment of Safety Observers from each department. S-091003-01CHK Safety Observers Checklist

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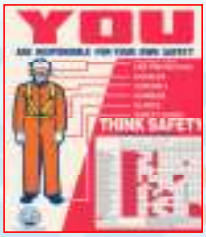
23

Personal Protective Equipment

DOES WEARING PPE REDUCE HAZARD?

- Formal Training in use of PPE;
- Periodic inspection of PPE;
- Inspecting PPE prior use.
- Refer PPE Matrix for latest requirements



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PPE Red flags

- Old or Painted helmets without chinstraps
- Loose fitting safety goggles, gloves, earmuffs
- Cracked Safety goggles
- Uncertified safety harnesses
- Missing manufacturers instructions
- No PPE in chemical store, paint store
- No Ear protection in Emergency Generator Room




25

Posting Safety Signs

- Hazard warnings
- Escape routes
- LSA FFA
- Periodic condition check
- List of Shipboard Signs and Notices (S-096000-01FIG）
- List of Minimum Required Symbols and Signs S-096000-02FIG)
- NYK Standard Piping Color code (S-096000-03FIG)
- MSDS Paint, Sample & Chemical Store



26

Lifting Appliances

- Pallets and cargo slings not to be used for lifting

– Only cargo nets to be used



27

Means of Access

How is the access to vessel?

Markings, Safety Net, Operating angle, Illumination, Gangway safety?

28

Means of Access

How is the access to vessel?

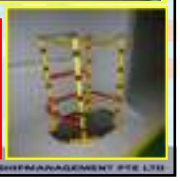
Periodic checks and condition of gangway

29

Safe Movement

Do's and Don'ts

- Clean Safe walkways, Non-skid paint
- Rigging of lifelines in heavy weather
- Photo luminescent Escape Routes
- Signs
- Highlight tripping hazards
- Secure loose gear
- Illumination
- Condition of Gratings



30

Care of Work equipment

Discard damaged tools and ensure no unauthorized modification made to tools provided.

- Tools and equipment
- No un-authorized modification
- No by-passing of safety parameters
- No by-passing alarm systems

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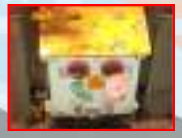
Care of Work Equipment

- Adequate insulation
- Appropriate PPE at hand
- Safety guards in place
- Emergency STOP highlighted
- Electrical safety maintained



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32

Gas Detector Safety

What are the requirements for inspection, calibration, spares?

- Critical to Safety in Enclosed spaces and Fire Safety
- Periodic Inspection and Calibration
- Follow manufacturers instructions
- Maintain Spare filters, sensors, calibration gas

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Fire Safety

- Identify, Eliminate sources of ignition
- Enforcing Smoking regulations
- Galley uptakes cleaning and Firefighting
- Spontaneous combustion precautions
- Thermal cut out on Deep Fat Fryers

34

Fire Safety

- Explosion proof equipment
- Intrinsically safe equipment
- Flammable materials
- Protection against Static discharge
- Fire patrols

35

Safety Inspection LSA/FFA

- Confirm the condition of L/boats, Rescue boats and L/rafts
- Lifebuoys, SI lights, and other signals
- Fire mains, hoses and nozzles
- Fixed & portable FFE
- Fire doors and dampers
- Fireman's outfits, SCBA sets

36

LSA Red Flags

- L/B engine inoperative, Markings illegible, movable parts stuck in stowed position, release hooks incorrectly reset
- Limit switch of L/B davit inoperative
- Lifebuoy cracked
- Incorrect connection of Life-raft Weak link,
- Transportation bands still left after securing on board

37

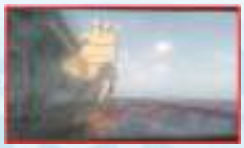
LSA Red Flags

- SI Light not intrinsically safe [Tankers]
- Launching instructions not posted under emergency lights
- Rescue boat seating arrangement not marked
- Crew unfamiliar with L/B engine starting procedure
- SOLAS Training Manuals not ship specific

38

Case Study - LSA

- Class Surveyor noticed a crack in the lifeboat window glass during annual survey and refused to endorse the safety equipment certificate.
- Company supplied a replacement glass prior to expiry of the survey window and obtained flag state dispensation in the interim.
- Lesson learnt:-
  - Importance of effective Safety Inspection by Safety Officer and thorough weekly/monthly inspection by PIC as required by SMS.
  - Reporting defects and other findings to company for timely follow up and action.



39

Ensuring Safety at Work
Work Instructions

- Detailed, easy to understand, simple step by step, ship specific and standardized.
- Include applicable "Cautions" for each step of the Process
- Issued by HOD, approved by Master and VM
- Change as per Change Management Process.
- Safety Officer to ensure WI's are safe to execute.

40

Case Study – Missing WI

During USCG Inspection, the inspector asked PIC to test ODME. USCG inspector insisted to check the familiarity of PIC for the said equipment. The PIC was not clear in showing the operation of ODME as well as Fixed gas detection system due to unfamiliarity with the equipment.

After that Inspector requested for established approved procedure to use both equipment. The PIC could not show the procedure as same were not available that time. The PIC informed USCG inspector that he had worked on similar equipment on other ships in NYK fleet for which he had work instructions in his portable hard drive. He then printed the work instructions from his portable hard drive and showed to the inspector. USCG inspector pointed out that same should be available for this ship as well. And marked as a deficiency.

41

HOD Work - Rounds

Before Work

- Conduct a detailed RA / JHA, as applicable
- Take measures to preclude risk
- Applicable work permits and lock out /tag out measures etc.
- Confirmation of work procedures, tools, and materials fit for the task.

42

Slide 40

A1 Author, 12/11/2021

HOD Work - Rounds

After Work

- Review and confirm the progress and completion of work
- Confirm completion of work, such as stopping equipment, closing valves, storing tools, restoring lock out/ tag out etc.
- Job Over Check to be endorsed in Daily Job Order form

43

Permit to Work Systems - PtWS

- **Consists of an organized and pre-defined safety procedure.**
- **A Permit to Work System DOES NOT MAKE THE JOB SAFE - it only introduces safe working measures.**
- **Not a mere paper exercise!**

44

Principles of a Permit to Work

- Relevant and accurate
  - State location and work details
  - Nature and results of preliminary tests
  - Measures to ensure safety
- Validity (e.g Hot Work, Enclosed SE)
- Signed
- Authorized
- Cancelled

45

Exercise # 1

"Pacific Blue" has planned and completed an Inspection in 1S WBT. The Inspection team comprising of Chief Officer, 2nd Officer and Bosun made the entry at 10:02 and exited at 11:07 am on 26th Jan 2021. The space was secured after the completion of the job.

Complete the Enclosed Space Entry Permit.

Exercise: 30 minutes

46

Enclosed Space Entry - Guidance

Enclosed Space Entry Guidance Revision-2

47

Case Study

SIRE Rejection, Loss of Credibility and Reputation due to incorrect Enclosed Space Entry Procedures

- Enclosed Space Entry Checklist
- Erroneous Checklist 1

48

Case Study – Bulk Carrier

(reconstructed timings – roughly approximate)

08:00 – 08:15 – Toolbox meeting conducted

Around 08:45 – D/Boy and OS entered Cargo Hold 4 for cleaning bilges, testing bilge alarms and inspecting dewatering tunnel. Personal gas meters were not carried.

Around 9:00 – 09:15 – Deck boy collapsed inside the 'Aft dewatering tunnel'.

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Case Study – Bulk Carrier

(reconstructed timings – roughly approximate)

- OS called for help, Chief Officer and Bosun entered with EEBD, and EEBD used on D/Boy also. D/Boy confirmed feeling better.
- D/Boy assisted by Chief Officer came out on his own after feeling better.
- Around 1230 – D/Boy was called from his cabin to ships office for signing the Enclosed Space entry permits. D/boy stated that after some time the documents were given to the Master for signing.

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Enclosed Space Campaign Posters

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Whistle Blowing

52

Pump Room / Cargo Compressor Room
S-P-09.30.03 Enclosed/Confined Spaces

Procedures for Entry in Cargo Pump Room on board Oil Tankers

S-093003-02CHK Pump Room Entry Permit

Procedures for Entry in Gas Compressor Room/Cargo Machinery Room/Motor Room on Gas Carriers

S-093003-03CHK Controlled Entry Space Permit

53

Hot Work Permit

- The effective period of a "Hot Work Permit shall not exceed 12 hours under any conditions.
- A risk assessment shall be carried out for any hot work outside the engine room workshop

54

S-P-09.30.01 Hot Work for Dry Vessels

S-093001-01FRM Hot Work Permit Dry vessels - Except PCCs

- No Company approval for hot work is needed during Ballast or empty passage (expect for LFV).
- During Loaded Condition or in Ballast Condition with Cargo Residues – If HW is planned in cargo holds or spaces connected to cargo holds (including hatch covers, hatch coaming, manholes or doors etc.), the Company shall be informed, and approval taken.

55

S-P-09.30.01 Hot Work for Dry Vessels

S-093001-01FRM Hot Work Permit Dry vessels – PCCs

- As a Company policy, no hot work is allowed on the car decks of PCC / PCTC, vessels during loaded passage.
- This includes hot work on any opening directly connected to car decks e.g ventilators, doors, etc.
- Hot work is permitted during loaded passage with Company Approval in spaces which are NOT directly connected to car decks e.g. Bosun Store, E/R outside workshop.
- No Company approval for hot work is needed during Ballast or empty passage (expect for LFV).

56

S-P-09.30.01 Hot Work for Dry Vessels –

For LFV only

- Machinery Space Outside E/R workshop – Valid Hot Work Permit required (S-093001-02FRM Hot Work Permit -For LFV Only)
- Gas Safe Area – Valid Hot Work Permit and RA required – Other requirements as mentioned in SMS
- Gas Hazardous Area: Company approval is required (S-093001-03FRM Hot Work Company Approval - For LFV Only)
- Master shall update company regarding progress of hot work within last 12 hours and obtain separate approval for next 12 hours if necessary.

57

S-P-09.30.02 Hot Work for Tankers/ Gas Carriers

S-093002-01FRM Hot Work Permit Tankers & Gas Carriers

- Hot work performed in designated area inside E/R workshop – follow normal SMS procedure
- Hot work outside engine room workshop on board tankers and gas carriers shall be prohibited unless under the strict control of the Company.
- Before undertaking any hot work, Master is required to obtain company approval for hot work planned outside E/R workshop.
- Hot work approval for each hot work on different locations shall be obtained separately.

58

S-P-09.30.02 Hot Work for Tankers/ Gas Carriers

S-093002-01FRM Hot Work Permit Tankers & Gas Carriers

- Hot Work in Gas Safe Area
  - Any hot work intended at Gas Safe Areas shall be subject to a full RA.
- Company Approval of Hot Work S-093002-02FRM
- Posting and Validity of Hot Work Permits
- Confirmation of Completion of Work
- Report of Completion to Company

59

S-P-09.30.02 Hot Work for Tankers/ Gas Carriers

S-093002-01FRM Hot Work Permit Tankers & Gas Carriers

- Hot Work Precaution and Testing of Fuel Valve in Engine Room
  - Fix permanent arrangement for drawing fire curtain around Fuel valve testing station.
  - Post a placard in place "No Hot work during Fuel Valve testing".

60

S-P-09.30.04 Permits to Work (Dangerous Work)

De-scaling Work and Work Using Machine Tools

Applicable to all ships

- For any de-scaling work or work using machine tools, including use of Grinder On deck, Chipping, Grit Blasting , Hydro blasting etc.
- S-093004-07CHK De-scaling (Chipping) Work & Work using Machine Tools Permit shall be used.
- Grinder Safety Poster - S-096000-10FIG Grinder Safety Poster
- Gas Carriers additionally need to seek Company Approval using Form S-093002-02FRM

61

S-P-09.30.05 Lock-Out Tag-Out Procedure

Covered under Daily Job Order

PIC : Deck ➔ C/O E/Rm ➔ C/E

- On Master / C/E permission
- Identify hazards prior Lock-out Tag-out.

S-093005-01 FRM lock Out Tag out Log
S-093005-02 FIG Lock Out Tag Out Placards

62

S-P-09.40.00 Safety Instructions for Visitors

- Duty watchman shall meet all visitors at the gangway and the following shall be explained:-
  - S-094000-01FIG Visitor Safety Guidelines - Dry Vessels or
  - S-094000-02FIG Visitor Safety Guidelines - Tankers and Gas Carriers

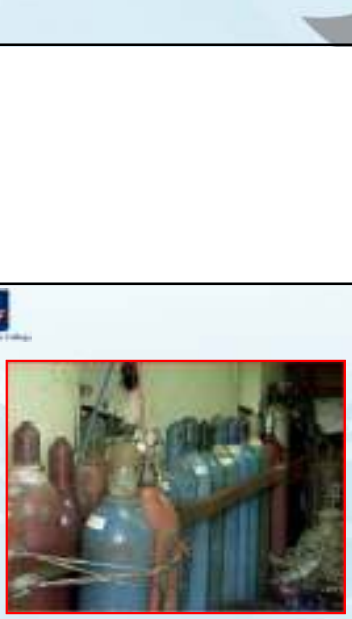
S-094000-03FIG - Visitor- Crew Interaction Safety Guidelines

63

Identify the DEVIL in the following slides!!!

Happy Hunting!!

64



- Oxygen and acetylene stored in same locker
- Increased risk of fire and explosion

65

- Safety guards both missing
- Area is dirty, untidy
- No obvious emergency stop button

66


✪ End coupling incorrectly secured to fire hose
✪ risk of injury due to rusty jubilee clips

67


✪ Machinery guard missing – drive belt exposed
✪ Hazard to personnel working in the vicinity

68


✪ Dirty, unhygienic
✪ Risk of infection and illness
✪ Dirty cloth will spread germs and cause cross contamination

69


✪ Trip hazard unmarked
✪ Blends into the same colour deck

70


✪ Greasy and dirty, causing a major fire hazard

71


✪ Paint stored haphazardly
✪ No lashing for heavy weather
✪ Potential fire hazard

72


✪ Hose box blocked by steel sheet and ✪duckboards
✪ Fire hose not ready for immediate use

73


✪Lever open, cap off
✪Tape left in sounding pipe
✪ Increased risk of high-level spill

74


✪Not using a harness
✪ Increases risk of injury from falling
✪ Endangers others working in vicinity

75


✪Engine casing very oily
Loose oily plates
– trip/slip hazards
✪Hose/rags lying around
– trip hazards
✪Bad housekeeping leads to increased risk of fire/

76


✪ In need of cleaning
✪ Evidence of poor maintenance
✪ Locating source of leaks is difficult

77


✪ Self-closing mechanism
✪disconnected, despite
✪well-marked instructions
FIREDOOR

78


✪ No safety net
✪ No Markings
✪ Raised platform without safety rails in- sufficient

79


✪ Surrounding equipment badly stowed
✪ Oily rags and equipment left around – potential fire risk
✪ Chemical segregation not considered

80


Health, Safety and Environmental Committee Meeting
Monthly OR
❖On occurrence of any serious incident / accident
❖During visit by Shore Management
❖Not to be held on Bridge at sea.
Z-094002-01FRM Minutes of Health Safety & Environmental Committee Meeting

81

What is Fatigue?

- A state of physical and/or mental impairment
- Resulting from factors such as inadequate sleep, extended wakefulness, work/rest requirements out of sync with circadian rhythms and physical, mental or emotional exertion
- That can impair alertness and the ability to safely operate a ship or perform safety-related duties.
- S-094003-05FIG Fatigue Management

82

Effects of Fatigue!

- Fatigue is a hazard - affecting safety, health and well-being.
- So, it presents a considerable risk to
  - safety of life
  - property
  - health
  - security and
  - protection of the marine environment.

83

Fatigue from a Seafarer's Context

- Work long, irregular hours
- An extended period working and living away from home
- The ship is both a seafarer's workplace and their home while on board
- Possibility of a Lack of clear separation between work and recreation, which can influence mental and emotional well-being.

84

Recognizing signs of fatigue - Cognitive

- Focus on trivial problems, ignore important ones
- Slow response to normal, abnormal or emergency situations
- Attention lapses
- Poor judgement of distance, speed, time, etc.
- Forgetting to complete a task
- Difficulty in concentrating and thinking clearly

85

Recognizing signs of fatigue - Physical

- Inability to stay awake (nodding of head, falling asleep involuntarily)
- Difficulty in hand-eye coordination skills (selecting the right switch)
- Speech Difficulties (slurred, slowed or garbled)
- Increased frequency of dropping objects like tools, spare parts
- Digestion problems

86

87

Understanding Fatigue – Workload

- Type and intensity of tasks performed
- High workload – Physical and Mental workload. eg. frequent port calls, tank cleaning and cargo operations, etc
- Fatigue can be compounded with long periods of wakefulness and long duty hours.

88

My responsibilities in Fatigue Risk Management on board

- Commence duty schedule in a fit state to work, expected shift duration
- Monitoring and Effectively managing hours of sleep
- Reporting fatigue related hazards that affect safety
- Maintaining appropriate communication about safety
- Using available rest periods appropriately, in addition to using personal fatigue mitigation techniques

89

Workshop – Write in notebook

What makes you stressed? How can it be seen! How do YOU know you are stressed? How do you deal with it!

Share with your partner!

Exercise: 15 minutes

90

Case Study

Serious Incident on Board

91

No Safety…
Know Accidents!!

Know Safety…
No Accidents !!

92

Behaviour Based Safety Training

NMC 03N

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1

Why do people do the silly things that they do?

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2

The Costa Concordia Incident

- Was built in 2004 in Italy for the Carnival Corporation
- When delivered, it was the largest ship in service.
- She was 290 mtrs overall with a breadth of 35.50 mtrs drawing a draft of 8.20 mtrs and service speed of 19.6 kts
- She had 13 public decks for passenger comfort and recreation.
- She had approximately 1,500 cabins.
- At 20:45 UTC the vessel Collided with rocks off Giglio,
- Grounded at 21:10, Listed 50 degrees to stbd,
- Subsequently Flooded,
- Ordered to Abandon ship resulting in a loss of 32 lives.

Photo Courtesy: Jean-Philippe Boulet [CC BY 3.0 (https://creativecommons.org/licenses/by/3.0)]

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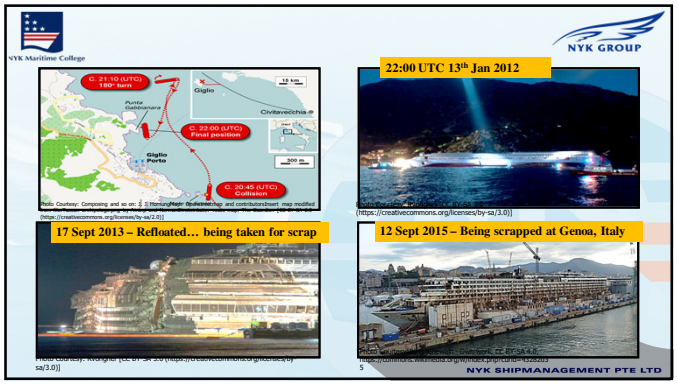
3


C. 21:10 (UTC)
180° turn
Giglio
Punta Gabbianara
Civitavecchia
C. 22:00 (UTC)
Final position
Giglio Porto
C. 20:45 (UTC)
Collision
22:00 UTC 13th Jan 2012
17 Sept 2013 – Refloated… being taken for scrap
12 Sept 2015 – Being scrapped at Genoa, Italy
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4


What went wrong? Why?
from Commandant
to Criminal
Photo Courtesy: Southcott[CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0)]
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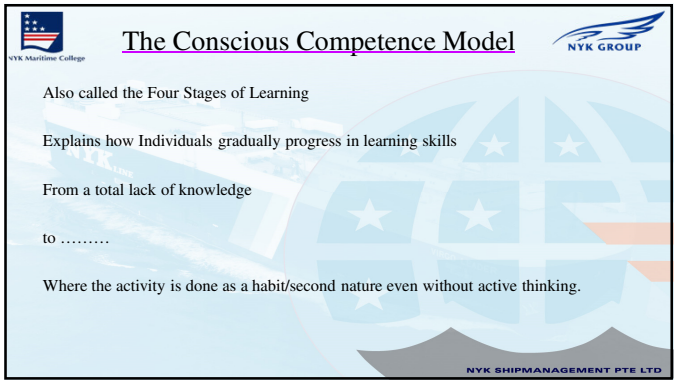
5


The Conscious Competence Model
Also called the Four Stages of Learning
Explains how Individuals gradually progress in learning skills
From a total lack of knowledge
to ……
Where the activity is done as a habit/second nature even without active thinking.
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6

Ex: Learning to drive a car.

- Recall your first time Sitting behind the wheel
- Probably you **never knew** what driving a car involved, **neither did you realize what knowledge or skill you lacked.**
- This is the First Stage of the learning process.

Photo Courtesy: https://www.needpix.com/photo/1047...

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7

- Stage Two:
- As the tutor started the Ignition and the car started to move, you probably realized what skills you were lacking.
- This is the Second Stage.
- Making mistakes is integral to the learning process at this stage

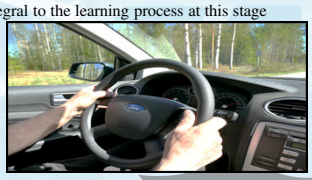

Photo Courtesy: Santeri Viinamäki [CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0)]

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8

- Stage Three:
- Now Try and recall the day of your Driving test.
- All your senses would have been at their highest alert.
- You would have been fully conscious of everything around you.
- This stage can be stressful since a person uses his utmost concentration in the execution of the task.
- A person remains for a short time in this stage and either gives up or proceeds to the next stage.

https://pxabay.com/photos/driving-...-car-alps-2681097/

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- Stage Four:
- Now picture yourself driving Today.
- How effortless it has become.
- It has become second nature. You can answer phone calls and drive at the same time.
- Driving has become a habit.

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10

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11

Individuals at the Stage 4 can sometimes *DRIFT* into the dangerous Stage 1 by Complacency.

When this happens, skills are forgotten, all safety aspects are overridden, and shortcuts employed.

This Drifting Stage is the most common cause of serious Accidents on board vessels

In the case of Capt. Francesco Schettino……

He had dangerously drifted from **Stage 4** to …… **Stage 1**

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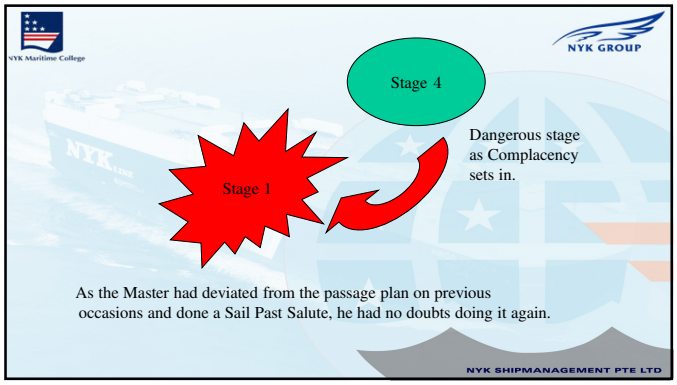
12


Stage 4
Stage 1
Dangerous stage as Complacency sets in.
As the Master had deviated from the passage plan on previous occasions and done a Sail Past Salute, he had no doubts doing it again.
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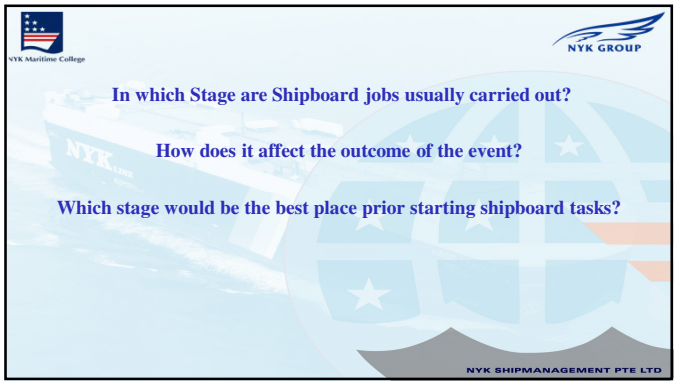
13


In which Stage are Shipboard jobs usually carried out?
How does it affect the outcome of the event?
Which stage would be the best place prior starting shipboard tasks?
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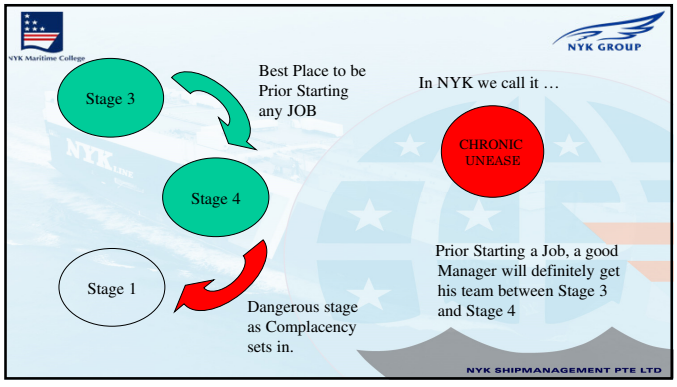
14


Stage 3
Best Place to be Prior Starting any JOB
In NYK we call it …
CHRONIC UNEASE
Stage 4
Stage 1
Prior Starting a Job, a good Manager will definitely get his team between Stage 3 and Stage 4
Dangerous stage as Complacency sets in.
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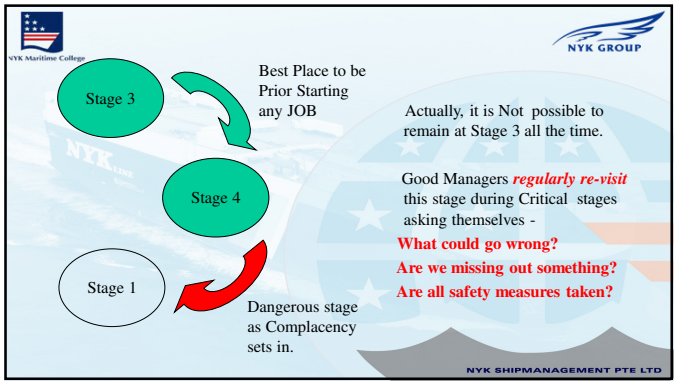
15


Stage 3
Best Place to be Prior Starting any JOB
Actually, it is Not possible to remain at Stage 3 all the time.
Stage 4
Good Managers regularly re-visit this stage during Critical stages asking themselves -
What could go wrong?
Are we missing out something?
Are all safety measures taken?
Stage 1
Dangerous stage as Complacency sets in.
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16


Some examples of "silly things" done in NYK Fleet !!!!!
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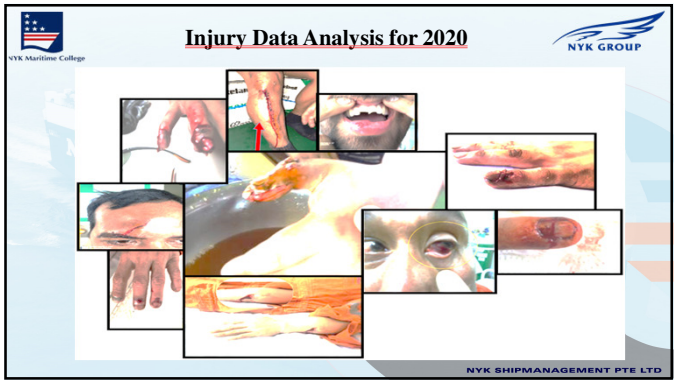
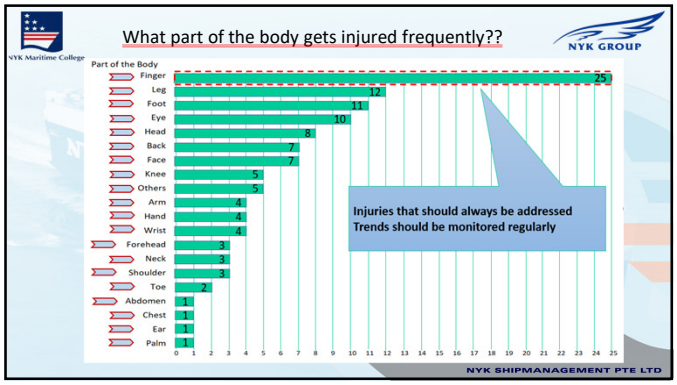
17


Injury Data Analysis for 2020
NYK SHIPMANAGEMENT PTE LTD

18


What part of the body gets injured frequently??
NYK GROUP
Part of the Body
Finger 25
Leg 12
Foot 11
Eye 10
Head 8
Back 7
Face 7
Knee 5
Others 5
Arm 4
Hand 4
Wrist 4
Forehead 3
Neck 3
Shoulder 3
Toe 2
Abdomen 1
Chest 1
Ear 1
Palm 1
Injuries that should always be addressed
Trends should be monitored regularly
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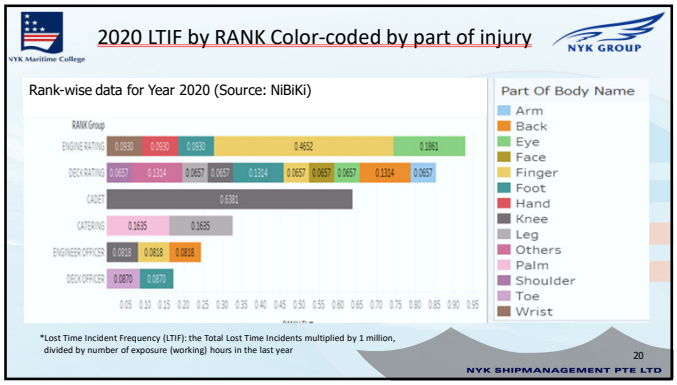
19


2020 LTIF by RANK Color-coded by part of injury
NYK GROUP
Rank-wise data for Year 2020 (Source: NiBiKi)
Part Of Body Name
Arm
Back
Eye
Face
Finger
Foot
Hand
Knee
Leg
Others
Palm
Shoulder
Toe
Wrist
*Lost Time Incident Frequency (LTIF): the Total Lost Time Incidents multiplied by 1 million, divided by number of exposure (working) hours in the last year
20
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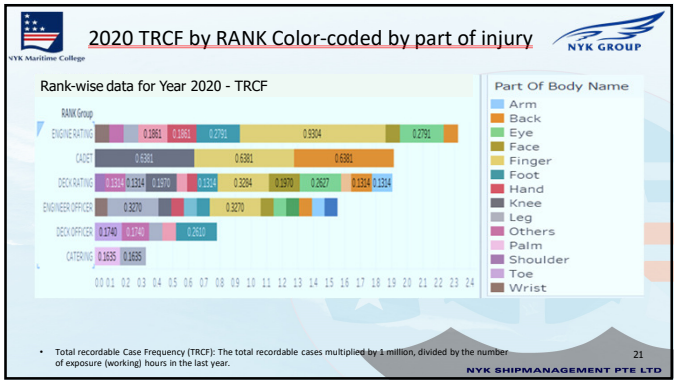
20


2020 TRCF by RANK Color-coded by part of injury
NYK GROUP
Rank-wise data for Year 2020 - TRCF
Part Of Body Name
Arm
Back
Eye
Face
Finger
Foot
Hand
Knee
Leg
Others
Palm
Shoulder
Toe
Wrist
Total recordable Case Frequency (TRCF): The total recordable cases multiplied by 1 million, divided by the number of exposure (working) hours in the last year.
21
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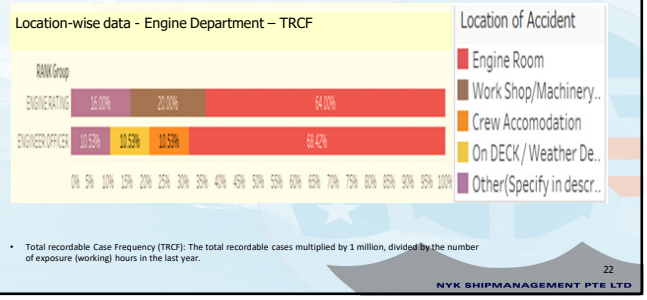
21

Injury Location of Engine Department (TRCF)



- Total recordable Case Frequency (TRCF): The total recordable cases multiplied by 1 million, divided by the number of exposure (working) hours in the last year.

22

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22

Key points from injury statistics FY2020

- The number of injuries to the Engine crew is the highest and there are many injury cases involving Fitter
- However, there are serious injury cases involving other Engine, Deck and Catering crew as well
- Maintain good safety practices such as safe working environment, proper condition, use of tools and PPE etc.
- Senior staff should assess the possibilities of injuries and give safety instructions to the crew before commencement of the job and ensure proper supervision

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How to prevent these injuries??

- Conduct effective Tool-box talk
- Proper use and maintenance of PPE
- Proper use and maintenance of Work Equipment and Tools
- Provide training (OJT) on the use of PPE, Work Equipment and Tools
- Ensure compliance with Procedures




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How to prevent these slips !
How Effective are our Toolbox Meetings?

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Usually, Senior Officers will assign the jobs and TELL/EXPLAIN all the Safety precautions to be taken.

How would the crew member be feeling at this stage?

How can we make them "Owners" of their job?

Suggestions!!!!!!!!

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Non-Directive Coaching

Most of the time crew members KNOW what to do.

It is complacency, distractions that make them forget.

How to make sure they REMEMBER?

ASK THEM!!!

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Non-Directive Coaching

- Under the Behavior Based Safety Concept – Non-Directive Coaching is a new method of getting crew to take ownership of their jobs.
- Statistics from Investigation of Incidents prove that one of the root causes of accidents is Human Error.
- Crew nowadays are amply trained both On Board and Ashore.

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Workshop

Write about a Serious accident/incident/near miss that happened on your previous vessel?

Explain how it has influenced you and your working style on board?

What were the lessons you learnt?

Writing Time : 5 minutes

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When crew are involved right from the planning stage, made to take ownership of their job, we help them move from ……..

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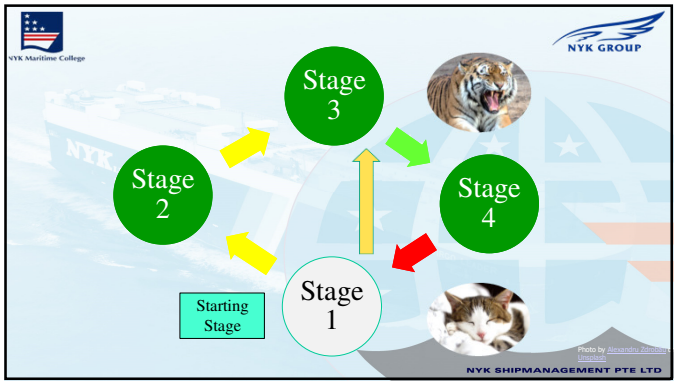
Stage 3
Stage 2
Stage 4
Stage 1
Starting Stage
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11th May 1985
Valley Parade Stadium, Home of Bradford City Football Club
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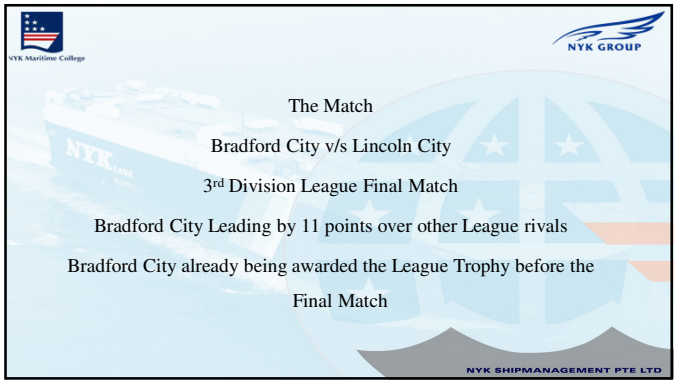
The Match
Bradford City v/s Lincoln City
3rd Division League Final Match
Bradford City Leading by 11 points over other League rivals
Bradford City already being awarded the League Trophy before the Final Match
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Bradford City to be promoted to 2nd Division after the season

11,076 supporters in the ground

A huge crowd considering an average of 6600 at other matches

About 3000 fans in the main stand

Click on below link for video clip

https://www.youtube.com/watch?v=6nqPZpJ9_2w

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What were the reactions displayed in front of the camera as the fire engulfed the stands?

WHY ?

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Owing to our hormones, any provocation, either physical, mental or verbal results in a Surge of Adrenalin which causes an individual to lose control over his/her actions/speech.

This energy could be **RELEASED** either as Panic, Screaming, Rejoicing, Fear, Incoherent Speech, etc

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NYK GROUP
Photo courtesy: David Morris, https://www.pexels.com/photo/
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37


NYK GROUP
Photo courtesy: https://www.pexels.com/photo/water-park-amusement-park-fun-34524/
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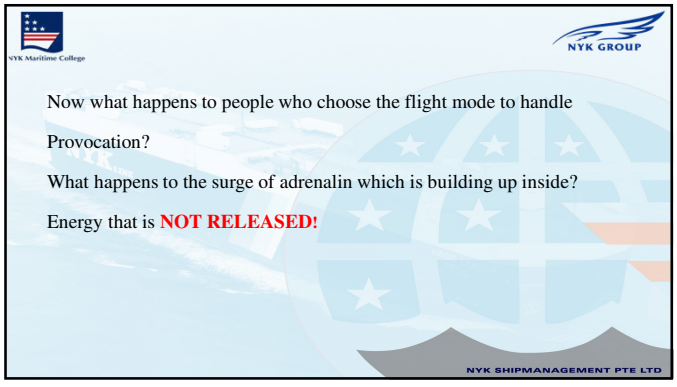
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Now what happens to people who choose the flight mode to handle
Provocation?
What happens to the surge of adrenalin which is building up inside?
Energy that is NOT RELEASED!
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If the adrenalin is not allowed to vent out through natural bodily reactions it will be released in a variety of psychosomatic symptoms like Headache, Stomachache, Vomiting, Skin irritations, Etc.

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On a vessel, a person in Flight Mode can be quite risky.

Skills and Safety precautions would have been easily forgotten.

Lack of Motivation can be a huge setback to efficient running of the shipboard team.

High Risk of Accidents !!!!!!!!!!!!

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STOP and HAZID Card

- Any ship staff who identifies any unsafe act shall advise the worker or workers to halt their work by showing STOP and HAZID Card.
- Factors which discourage Ship Staff from not issuing STOP and HAZID Card
  - They see others not acting.
  - More experienced people around them.
  - They think they have misread the situation.
  - They worry about upsetting a co-worker.
  - Unaware that they can issue STOP and HAZID Card
  - They feel it could get them into trouble.

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How to draw silent crew members out?

Take time to reflect on a person on your last vessel whom you can identify as being the SILENT Type.

Write in your notebook about this person?

How could you have drawn him out!

Have you been a Silent person sometime! Did someone pull you out! Who!

Discuss!

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How to draw silent crew members out?

- -- At a Personal Level
- -- Between 2 persons – The Buddy Concept
- -- In a group

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We all feel good about ourselves! There is an inherent goodness in everyone.

Having a Crew member talk about himself and his family will allow him to come out of his shell and become a part of the group.

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Understanding Behavior

Click on the link below for video Clip

https://www.youtube.com/watch?v=h4Aw0euqesk

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The ABC Analysis of Behavior

A – Antecedents

B – Behavior

C – Consequence

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ABC Analysis

Antecedents – The Events or Activity that precedes a behavior.

On a Ship, Antecedents would be :

Learning – From Tool Box meeting
Training – Ashore and On board
Policies and Procedures – Checklists
Experience – Seniority

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ABC Analysis

Behavior – The way the Job is actually carried out.

This means how a crew member actually does the job!

An Observer watching will be able to easily identify how the job is being carried out.

Whether procedures have been followed or whether shortcuts have been taken.

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ABC Analysis

Consequence – Will I meet my objective

I get what I want
I don't get what I want
I get what I don't want
I don't get what I don't want

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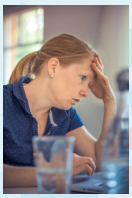
Example:
I am feeling stressed out.
I need to calm down before I can continue with the job.

2 options:
I can head to the waterfront for a walk or I can take a smoke.



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Antecedents:
From past experience, I know a walk to the waterfront will be great. It will bring physical and mental benefits.

I also know a smoke can be dangerous in the long run. Can result in cancer and a host of other complications.

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Consequence: Need to calm down
Walking to waterfront: Will definitely help, but requires some effort. I am feeling tired right now.

Smoking: I will definitely feel relaxed.
I may or may not contact cancer.
One stick wont make a difference.
(The negative consequences seem so far away, whereas the relief is very close)

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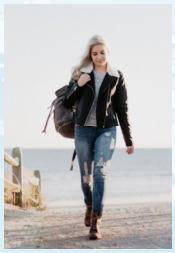
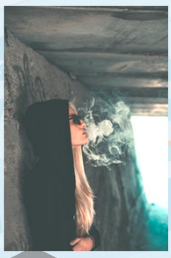
Behavior: What will you choose?



OR



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ABC Analysis

So to summarize…..

Any **B**ehavior is governed by

Antecedents & **C**onsequence

Which one governs human behavior MORE….?

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ABC Analysis

Sadly, it is Consequences and not the Antecedents that govern Behavior.

Crew actions on board are governed less by Antecedents and more by Consequences.

So how effective are all the Trainings, Toolbox meetings, Checklists, experience?

How much emphasis is placed on Consequence?

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Antecedents In NYK
NYK GROUP
CADET - STARS
CADET
Shipboard
Training and
Assessment
Records
System
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Antecedents In NYK
NYK GROUP
NYK-STARS
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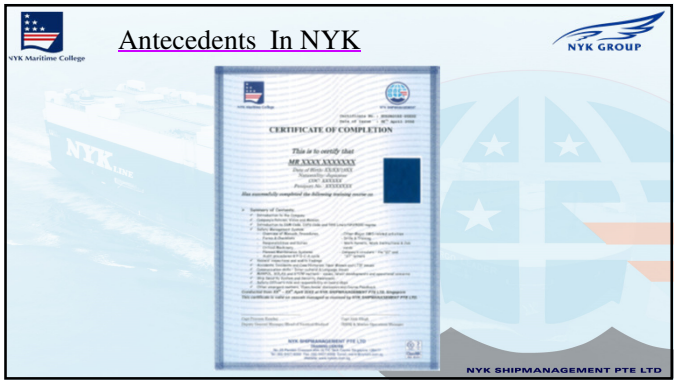
Antecedents In NYK
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CERTIFICATE OF COMPLETION
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Previously a big focus was placed on the **Antecedents** …… activities leading to behavior.

NOW!!!!!

The focus shift to **Consequence!!!**

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Time for Appreciation

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Time for Celebration

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Recognition!

In 1962, President John F Kennedy paid a visit to the NASA as the centre was nearing completion of Project Mercury, which involved *sending the first manned mission to space*.

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At this point of time NASA was already preparing for the next mission of landing a man on the moon.

As he was taking a guided tour he noticed a Janitor carrying a broom.

President Kennedy interrupted his tour, walked over to the man and said " Hi I'm John Kennedy. What are you doing?

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Well Mr. President, the Janitor replied, " I am helping put a man on the moon".

To most people this Janitor was just cleaning the building, but in the more Mythic, Larger story folding around him, he was helping to make History.

No Matter how large or small your role, you are contributing to the larger story unfolding within your life, your business and your organization.

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The Chicago Light Bulb Company

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Excerpt from an NYK Master's Order Book

Greetings. Thank you for welcoming my boarding. I am glad to work with you, such well capable officers.

I prepared my Standing Orders. However vessel is still engaged in busy traffic area tonight. So mind to concentrate proper

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Excerpt from an NYK Master's Order Book

* Thank you for your wonderful support during the China coastal voyage. Let's celebrate what we overcame such very hard time and successfully ended without any incidents. However our voyage is still inside of "High Density Fishing Traffic Area". Take keen mind-set continuously to maintain safe navigation.

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Final Workshop

Write a Letter to a person who has made a big impact in your life / has contributed to what you are today.

In this letter you will write what you learnt from him, and how you have imitated him/her in your own life.

It could be a family member/friend/crew!

Time : 15 minutes

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