PAMBANSANG PUNONGHIMPILAN TANOD BAYBAYIN NG PILIPINAS
(National Headquarters Philippine Coast Guard)
139 25th Street Port Area
1018 Manila

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NHQ-PCG/HMSSC/CG-8

STANDING OPERATING PROCEDURE
NUMBER.....12-22

GUIDELINES ON THE CONDUCT OF SHIPS ROUTE RISK ASSESSMENT

I. REFERENCES:

A. IALA Guidelines G1138 The Use of the Simplified IALA Risk Assessment Method (SIRA) Edition 1.0 dated December 2017

B. IALA Guidelines G1018 IALA Risk Management Edition 4.0 dated June 2022

C. PCG Memorandum Circular 06-22 "Guidelines on the Establishment of Routeing System, to Include Designation of Traffic Separation Scheme within the Maritime Jurisdiction of the Philippines" dated 07 June 2022

II. SCOPE:

This Standing Operating Procedure (SOP) applies to personnel tasked and given orders to conduct a risk assessment prior establishment and review of routeing systems within the area of responsibility of respective Maritime Safety Services Units (MSSU).

III. PURPOSE:

These guidelines provide a structured process to identify and mitigate hazards and reduce the risk of maritime incidents when establishing and reviewing routeing systems to "As Low as Reasonably Practicable (ALARP)". It also aims to provide qualitative estimates of risk and the production of potential risk control options to reduce such risk to acceptable levels.

IV. PROCEDURES:

A. The MSSU Commander shall select waterways and or existing routeing systems to be analyzed and reviewed;

B. The Commander, Maritime Safety Services Units (MSSU) shall lead and compose the Risk Assessment Team consisting of three (3) MSSU personnel, three (3) Coast Guard District/Station personnel and five (5) stakeholders.

These personnel shall be covered by orders emanating from the Commander, MSSC. They are to conduct a risk assessment prior to establishing and review of routeing systems within the MSSU area of responsibility.

C. The Risk Assessment Team shall then define assessment zones as offshore zones, coastal zones, straits and choke points, restricted waters, major ports, and riverine waterways; and describe each area of the selected waterway or existing routeing system. Once zones have been defined, each zone must be described in terms of:

1. Volume and mix of traffic;
2. Bathymetry (charts);
3. Geometry of routes in the area, traffic choke points and sharp bends;
4. Oceanographic, meteorological and environmental conditions;
5. Existing fixed and floating Aids to Navigation and routeing measures;
6. Availability of Vessel Traffic Service and pilotage;
7. History of maritime incidents such as collisions and groundings; and
8. Stakeholders of the zone.

D. The Risk Assessment Team shall identify hazards and develop associated scenarios.

1. Hazards are grouped into the following categories:
   - 1.1 Natural
   - 1.2 Economic
   - 1.3 Technical
   - 1.4 Human
   - 1.5 Operational and
   - 1.6 Waterway complexity.

   Examples of which are provided in ANNEX A (Hazard Examples)

2. Identify hazards based on all available relevant information, Including:

   2.1 Volume and mix of traffic along all routes and areas within the zone;

   2.2 Geometry of routes in the area, traffic choke points and sharp bends;

   2.3 Isolated dangers including wrecks and obstructions;

2.4 Quality of hydrographic data and charted information available;

2.5 Anchorages, fishing grounds, aquaculture and offshore energy sites and routes to and from;

2.6 Safe Minimum depth (chart Datum) required for vessel operating within the waterway;

2.7 Meteorological visibility in the zone;

2.8 Passages through a narrow channel, restricted waters or port entry;

2.9 Possible effects low sun, background lighting or glare;

2.10 Spoil grounds, undersea cables, military exercise areas and Particularly Sensitive Sea Areas;

2.11 Historical evidence of natural and/or malicious interference to Global Navigational Satellite System signal;

2.12 Information in IMO Ships' Routeing publication and Sailing Directions;

2.13 Problems with marine communications have been identified in the past; and

2.14 History of maritime incidents such as collisions and groundings.

3. Develop associated scenarios from the identified hazards which can be categorized as follows:

3.1 Grounding
3.2 Collision
3.3 Allision
3.4 Foundering
3.5 Structural Failure and
3.6 Others.

Examples of which are provided in ANNEX B (Scenario Examples)

E. The team shall then assess the probability and impact of each scenario using five (5) levels of probability and five (5) levels of the impact that each type of undesired incident or scenario would create. Each is allocated a score from which a risk value is calculated from the product of probability and impact.

1. The probability and impact scores are assessed against the criteria specified in ANNEX C Table 1 (Descriptions of Probability) and Table 2 (Descriptions of Impact).

2. Having determined the probability and impact scores, the risk value can be calculated in accordance with the risk value matrix in ANNEX C Table 3 (Risk Value Matrix).

3. The Team will then determine whether those risks are acceptable or not using the IALA-approved four color-banded levels of risk shown in ANNEX C Table 4 (Action Required for Risk Categories).

F. The Team will then identify risk mitigation options for each undesirable incident that would reduce the risk to an acceptable level, if implemented. To include:

1. Improved coordination and planning;
2. Additional training and education;
3. Publication of new rules and procedures;
4. Enforcement of existing rules and procedures;
5. Improved charted hydrographical, meteorological and general navigation information;
6. Enhanced aids to navigation service provision;
7. Improved radio communications;
8. Active traffic management such as Vessel Traffic Services;
9. Changes to the waterway;
10. Improved decisions support systems; and
11. Pilotage requirements.

The Team shall provide a Completed Risk Matrix (ANNEX D) listing containing all scenarios, providing quantification of the risk and considerations associated with each scenario.

G. The Team shall prepare a Risk Assessment Comprehensive Report and submit the same to the Commander, Navigational Safety Services Unit (NSSU) for determination of acceptability and subsequent approval of the Technical Working Group (TWG) for Ships Routeing. The report shall include the following:

1. Description of the Routeing System and individual zones;
2. Hazards and scenarios identified within each zone;
3. Mitigating measures identified and recommended;
4. Completed Risk Matrix; and
5. Any other amplifying information regarding the assessment.

V. RESPONSIBILITIES:

A. Chairman, Technical Working Group (TWG) for Ships Routeing shall:

1. Preside on the deliberation of the Risk Assessment Comprehensive Report endorsed by the Commander, Navigational Safety Services Unit (NSSU);

2. Endorse the draft Memorandum Circular based on the Risk Assessment Comprehensive Report to the Commander, MSSC; and

3. Perform other tasks as directed by the Commander, MSSC.

B. Commander, Navigational Safety Services Unit shall:

1. Ensure that the rudimentary requirements of the Risk Assessment Comprehensive Report submitted by the Commander, MSSU are met;

2. Endorse the reviewed Risk Assessment Comprehensive Report to the Chairman, TWG for Ships Routeing for deliberation and evaluation;

3. Draft the corresponding Memorandum Circular or amendments to the existing Memorandum Circular based on the submitted Risk Assessment Comprehensive Report;

4. Keep and maintain records of Risk Assessment Comprehensive Reports;

5. Review existing policies relative to these guidelines; and

6. Perform other tasks as directed by the Commander, MSSC.

C. MSS-1 shall:

1. Issue corresponding orders to Risk Assessment Teams as endorsed by the Commander, MSSU; and

2. Perform other tasks as directed by the Commander, MSSC.

D. Commander, Maritime Safety Services Units shall:

1. Select waterways and or existing routeing systems to be analyzed and reviewed by the Risk Assessment Team;

2. Act as the team leader of the Risk Assessment Team;

3. Designate personnel to compose the members of the Risk Assessment Team and forward it to concerned MSSC staff;

4. Submit the accomplished Risk Assessment Comprehensive Report to the Commander, Navigational Safety Services Unit;

5. Keep and maintain records of Risk Assessment Comprehensive Reports; and

6. Perform other tasks as directed by the Commander, MSSC.

E. Risk Assessment Team shall:

1. Conduct risk assessment on the selected waterway;
2. Ensure that all required data are readily available;
3. Define assessment zones;
4. Identify hazards and develop associated scenarios;
5. Assess the probability and impact of each scenario;
6. Identify and recommend risk mitigation options for each undesirable incident that would reduce the risk to an acceptable level;
7. Prepare a Risk Assessment Comprehensive Report; and
8. Perform other tasks as directed by the Commander, MSSC.

VI. EFFECTIVITY:

This SOP shall take effect upon approval.

BY COMMAND OF COAST GUARD ADMIRAL ABU:

OFFICIAL:

TITO ALVIN G ANDAL
CG COMMO
Chief of Coast Guard Staff

JAYSIEBELL B FERRER
CG CDR
Coast Guard Adjutant

Annexes:

Annex A – Hazard Examples
Annex B – Scenario Examples
Annex C – Table 1 Description of Probability
Table 2 Description of Impact
Table 3 Risk Value Matrix
Table 4 Action Required for Risk Categories
Annex D – Completed Risk Matrix

ANNEX A HAZARD EXAMPLES

	Description
Volume of traffic	(Specific Numbers)
Bathymetry (Charts)	(Availability, Last Updated, Scale, Difference between Actual & Recorded Depth)
Geometry of Routes	(Number of Chokepoints & sharp bends/Curves if any)
Oceanographic, Meteorological & Environmental Conditions	(Current, Tidal info, Visibility, water quality, Volume of garbage and water lily)
Existing fixed & floating AtoN routeing measures	(Location, Number of Aton, Status of Aton)
Availability of VTS	(Number & Status)
History of Maritime Incident	(Number, Details, Cause, Nature of Incident)
Stakeholders of the zone	(List of Stakeholders)

ZONE NUMBER_____ Hazard Examples

HAZARDS		REMARKS
1. Natural	Safe minimum depth (m)	
	Geographical obstruction	
	Tide, wind, wave and current effect	
	Minimum visibility	
	Background lighting	
2. Economic	Legal action problems	
3. Technical	Quality and validity of charted information	
	Substandard ship	
	Loss of vessel control	
	Loss of Communication	
4. Human	Crew Distractions	
	Piracy/terrorism	

HAZARDS		REMARKS
5. Operational	Seasonal Activities	
	Inadequate Routeing Guidance	
6. Maritime Space	Crowded waterway issues	
	Existence of restricted areas	
7. Waterway Complexity	Traffic considerations	
	Narrow fairway/channel	
	New or existing obstruction	
	Sharp bends	

ZONE NUMBER_____ DEFINITION_____

	Description
Volume and Mix of Traffic	(Specific Numbers Biggest Draft) Name of Vessel Type of Vessel Draught 1. 2. 3.
Bathymetry (Charts)	(Availability, Last Updated, Scale, Difference between Actual & Recorded Depth)
Geometry of Routes	(Number of Chokepoints & sharp bends/Curves if any)
Oceanographic, Meteorological & Environmental Conditions	(Current, Tidal info, Visibility, water quality, Volume of garbage and water lily)
Existing Fixed & Floating AtoN Routeing Measures	(Location, Number of Aton, Status of Aton)
Availability of VTS	(Number & Status)
History of Maritime Incident	(Number, Details, Cause, Nature of Incident)
Stakeholders of the Zone	(List of Stakeholders)

ANNEX B SCENARIO EXAMPLES

SCENARIOS		REMARKS
Collisions	Head on situation, overtaking bend, crossing and merging	Light and shapes, communication failure and tidal information
	Changing course, restricted visibility and type of water	Maneuvering constrain by draught
	Vessel speed, relative bearing, vessel sizes and maneuverable	Engine casualty, steering casualty and human organizational factors
Grounding	Grounding on rock	Low mean water and highest low tide
	Grounding on soft bottom	Current, tide wind, depth of waterway, waves and geometry of waterway
	Grounding on wrecks	Size of vessel, type of vessel and speed
Allisions	Windfarms, oil rigs, wave and tidal energy structure, breakwater, aquaculture site and aids to navigation	Breaking the rules of Navigation and not observing speed limit
Foundering	Capsizing	Sailing through rough weather and stormy seas
	Sinking	Hull Failure

SCENARIOS		REMARKS
Structural Failure	Structural Failure of the Vessel	
	Structural Failure of Features external to vessel (bridge, lighthouse etc.)	Fatigue cracks occur due to cycling loading specially action of waves on ship structure
Other	Engine Fire	Lack of checking for leaking or random hot spot
	Cargo Fire	Faulty electrical wiring, overheating engines

ANNEX C PROBABILITY AND IMPACT

Table 1 Description of Probability

Classification	Score	Probability
Very Rare	1	Very rare or unlike, will occur only in exceptional circumstances and not more than once every 20 years.
Rare	2	Rare, may occur every 2-20 years.
Occasional	3	Occasional, may occur every 2 months to 2 years.
Frequent	4	Frequent, may occur once weekly to every 2 months.
Very frequent	5	Very frequent, may occur at least once every week.

Table 2 Description of Impact

Description Scenario	Score	Service Disruption Criteria	Human Impact Criteria	Financial Criteria	Environment
Insignificant	1	No service disruption apart from some delays or nuisance	No injury to humans, perhaps significant nuisance	Loss, including third party losses, less than Php 60,000.00	No damage
Minor	2	Some non-permanent loss of services such as closure of port of waterways for up to 4 hours	Minor injury to one or more individuals, may require hospitalization	Loss, including third party losses, Php 60,000.00 – Php 300,000.00	Limited short term damage to the environment
Severe	3	Sustained disruption to services such as closure of a port or waterways for 4-24 hours	Injuries to several individuals requiring hospitalization	Loss, including third party losses of Php 300,000.00 – 30,000,000.00	Short term damage to the environment in a small area
Major	4	Sustained disruption to service such as closure of major port or waterways for 1-30 days or permanent or irreversible loss of services	Service injuries to many individuals or loss of life	Loss, including third party losses of Php 30,000,000.00 – 600,000,000.00	Long term to irreversible damage to the environment in a limited area
Catastrophic	5	Sustained disruption to services such as closure of a major port or waterways for months or years	Severe injuries to numerous individuals and/ or loss of several lives	Loss, including third party losses over Php 600,000,000.00 and above	Irreversible damage to the environment in a large area

Table 3

Risk Value Matrix

		PROBABILITY				
		Very Rare (1)	Rare (2)	Occasional (3)	Frequent (4)	Very Frequent (5)
CONSEQUENCE (IMPACT)	Catastrophic (5)	5	10	15	20	25
	Major (4)	4	8	12	16	20
	Severe (3)	3	6	9	12	15
	Minor (2)	2	4	6	8	10
	Insignificant (1)	1	2	3	4	5

Table 4 Action Required for Risk Categories

Risk Value	Risk Category	Action Required
1-4	Green	Low risk not requiring additional risk control options unless they can be implemented at low cost in terms of time, money and effort.
5-8	Yellow	Moderate risk which must be reduced to the "as low as reasonably practicable" (ALARP) level by the implementation of additional control options which are likely to require additional funding.
9-12	Amber	High risk for which substantial and urgent efforts must be reduce it to "ALARP" levels within a defined time period. Significant funding is likely to be required and services may need to be suspended or restricted until risk control options have been actioned.
15-25	Red	Very high and unacceptable risk for which substantial and immediate improvements are necessary. Major funding may be required and ports and waterways are likely to be forced to close until the risk has been reduced to an acceptable level.

ANNEX D

Completed Risk Matrix

Scenario	Description of Incident	Root Cause(s) Hazard(s)	Description of Consequences (Short term and long term	Exiting Risk Control Measures	Probability Score	Consequence Score	Risk Score	Further Risk Control Options
1. Collisions								
1.1 Tanker	Collision of tankers with other Type of Vessel	Human Factors	Detrimental chemical spill 100,000 tons and damage the corral area	Traffic Separation in place	3	5	15	VTS and oil spill response unit in place
1.2 Fishing Vessels	2 Fishing vessel 10 passengers on board collided at a cross section at nighttime	Lack of navigational aids and AtoN	10 people died and 2 ships lost	None	2	5	10	Lit Aton are installed at the spot and ships are equipped with AIS
2. Grounding								
2.1 Grounding on Rock-Tankers	10,000GT container vessel run aground on a submerged rock while avoiding drifting ice at nighttime	Drifting Ice	Damage to hull and 10,000 tons Radar oil spill	Radar	1	3	3	Install a buoy on the shallow area
2.2 Grounding on Sand	3 ton small fishing boat run aground on a sand bank	Lack of AtoN service	24 hours delay of fishing activity	None	5	1	5	Install a beacon at the edge of the bank
3. Allision								
3.1 Grounding on breakwater	Ro-ro passenger ship hit a breakwater	Miscommunication between the Captain Officer and Helmsman	10,000 oil spill and 5 people injured	Pilot	4	4	16	Strengthen training and luminating light on the breakwater
4. Foundering								
4.1 Pilot boat foundering	20 tonnage boat sank at a pilot point by water jet nozzle damage	Insufficient number of crew member on board to deal with unexpected event	Vessel sank	None	4	1	4	Crew training
5. Other								
5.1 Sinking by misoperation	256 TEU container ship sank from misoperation of the ballast tanks	Lack of competency of the crew	About 20 containers from the sunken vessel were spilled and floating inside the port	None	1	3	3	Towing vessel ready at the port and Emergency Wreck Marking Buoys (EWMB) ready to be installed