

NAVIGATIONAL RISK ASSESSMENTS IN THE PORT OF LONDON

GUIDANCE TO OPERATORS AND OWNERS

1. Introduction

The Port Marine Safety Code (the Code) requires that all ports must base their management of marine operations (i.e. their powers, policies, plans and procedures) on a formal assessment of the hazards and risks to navigation within the port. Furthermore, port authorities must maintain a formal navigational Safety Management System (SMS) developed from that risk assessment.

The Port of London Authority (PLA) maintains such a navigational SMS.

It is important therefore, that where there are particular marine operations, such as specialist one-off towage, vessel movements or new trades, which fall outside the scope of the PLA SMS, those operations are assessed to determine the likely risk to navigational safety. Also to establish what, if any, additional or new risk control measures are required to reduce that risk to an acceptable level. The district Harbour Master will advise operators if any such operation or trade falls in that category. It is logical, and not unreasonable, that the approach to and method of risk assessment undertaken by owners/operators in such circumstances is the same or similar to that employed by the PLA. The result of this specific risk assessment can then interface seamlessly with the wider port SMS.

This document provides operators and owners with an overview of the risk assessment approach applied by the PLA and guidance on its application.

2. Risk Assessment

The attitude to safety in the UK has evolved over recent decades from the reactive to the proactive. The Health and Safety Executive has promoted a common approach to safety across all the industries it regulates. In the past, safety regulation was introduced as the result of an accident or a series of accidents and tended to address the most obvious causes. However, over the years a number of defining incidents have altered the way in which safety is viewed.

The UK has now progressed to a risk based approach to commercial safety that aims to identify risks and control them, and to do this in a way that constantly updates the risks in any given process or operation. These principles can be applied readily to navigation in restricted tidal waters and rivers.

3. The Risk Assessment Process

For those embarking on this process, it is important to recognise that an effective and comprehensive risk assessment, and indeed the resultant safety management system, can only be achieved with the total commitment of both senior management and those staff involved. There has to be a 'buy-in' by all concerned. Communications (including bottom/up, top/down and where necessary external communication), and openness are vital.

The process must be seen for what it is – of benefit to the whole organisation, and in this case the wider port. It is important therefore for management to involve vessel masters and crews, as well as potentially the PLA, at an early stage and keep the relevant Harbour Master apprised of progress and the outcome of the risk assessment and seek and take his advice when and where necessary. Safety is the business of all concerned, around which the entire operation must function.

Involving crews and staff, and where necessary external advice, in the risk assessment; and utilising specialist knowledge and skills is essential, especially in the identification of hazards and the development or refinement of procedures and defences to mitigate those risks.

Definitions:

Hazard is something that has the potential to cause harm.

Risk is a combination of frequency of occurrence and consequence (outcome).

The risk assessment will typically involve five stages:

1. Data Gathering and Familiarisation
2. Hazard Identification
3. Risk Analysis
4. Risk Assessment
5. Risk Control

1. Data Gathering and Familiarisation

This initial stage has two main objectives: to allow the team undertaking the risk assessment to become wholly familiar with the particular operation in question and also, where necessary; the organisation, its culture, policies, procedures, issues and priorities, and to assess the existing (vessel/organisational) safety management structure and identify any relevant hazards and risks.

The work should include, but not be limited to:

- A review of current (and relevant) organisational and vessel management and operational procedures;
- A thorough assessment of the operation(s) in question from a safety of navigation perspective;
- Interviews with the vessel skipper, crew, management and where necessary contractors or principals;

- Auditing of selected marine/navigational safety procedures;
- A review of the requirements, limitations, and technical and contractual requirements of the operation/trade in question; and
- A review of any relevant established incident database or similar records.

2. Hazard Identification

This phase seeks to build on the work of Stage 1 and identify known hazards expected to be encountered because of the nature and/or area of the operation, and the existing risk control measures relating to those hazards. Equally importantly, it also seeks to identify any new hazards created as a result of the proposed service or operation. Structured Hazard Identification meetings (HAZIDs) should be held involving relevant marine staff, management, relevant customers or principals and potentially the PLA. The PLA can provide advice on the facilitation of such workshops.

Examples of hazards identified in the PLA SMS are included at Annex A.

3. Risk Analysis

Stage 3 introduces the concept of risk in a qualitative way in order to prioritise the hazards identified during Stage 2 and assess their impact on navigational safety. As shown above, risk is the combination of frequency and consequence. Prioritisation is an essential part of the process, as clearly, the greater the potential posed by a hazard, the greater the need to ensure that there are control measures, or defences, in place to mitigate that risk.

Sorting and ranking the HAZID output and adding the frequency component (i.e. how often such a hazard could happen – once a year, once every 10 years; 100 years 1000 years...) generates the risk profile. The frequency or likelihood of incidents can be established using professional advice, judgement or experience and, where appropriate, historical data identified in the first stage of the work. However, such historical information may not be available for new specialist trades or for one-off specialist operations.

Normally, risks are assessed in four ways against a common frequency scale:

- consequence to life;
- consequence to the environment;
- consequence to port authority operations; and
- consequence to port users.

Such an approach not only assesses the impact of hazards on port safety, but also their impact on other important areas of the port infrastructure.

4. Risk Assessment

This process compares existing operations and procedures supported by relevant control measures with the new risk profile created by the introduction of the new trade or operation. It identifies gaps, which will require the introduction of new or enhanced risk control measures to reduce the level of risk to an acceptable level.

5. Risk Control

This stage identifies the specific control measures to be adopted. Cost benefit analysis techniques are used at this stage to support the identification and choice of recommendations.

Again, Stages 3-5 are likely to be best achieved through dedicated workshop(s) attended by representatives of all those involved.

4. Linking to the PLA navigational Safety Management System

The scope of work addressed in Stages 1-5 will depend upon the nature of the operation being considered and how far removed it is from established port marine operations (already covered by the PLA's navigational SMS).

In any event, the outcome of the risk assessment process will identify:

1. whether the Harbour Master is able to approve the operation; and if so
2. what additional risk control measures, if any, are required to reduce the new risk to acceptable levels.

If the process has identified any new hazards to navigation, the hazard will be scored, and those details, together with information on associated risk control measures, will be incorporated into the PLA's hazard management database. Alternatively, the process may simply confirm that the proposed operation/trade relates directly to one or more existing hazards to navigation. In such cases, any new risk control measures or changes to existing risk controls, will be incorporated into the hazard, which will be rescored accordingly.

5. The Overall Concept

The Relationship between Risk Assessment and Safety Management Systems

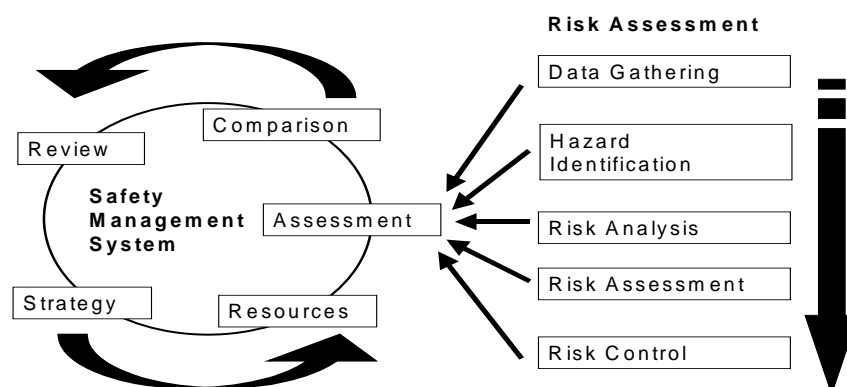


Fig 1 – Relationship between SMS and Risk Assessment

Figure 1 shows the relationship between risk assessment and safety management systems.

This relationship can be summed up by the following two statements:

- Risk Assessment defines the risks
- Safety Management Systems manage the risks

These are two fundamentally different stand-alone processes, which have a symbiotic relationship; the two processes are only fully effective when used together.

6. Further Information

The PLA is happy to supply owners/operators with further information and advice on its approach to the risk assessment of navigational safety.

Navigational Risk Assessment Pro-forma

A simple table to assist in the process of assessing the hazards to navigation associated with marine operations within the Port. A worked example is included with this guidance at Annex B. It should be noted, however, that this example is for illustrative purposes only. In reality, there are likely to be additional hazards and associated risk control measures, which could be identified, following discussion with the District Harbour Master.

Port-wide Risk Assessment Report

The report of the port-wide risk assessment undertaken between October 1999 and May 2001 contains further information on the basic risk assessment methodology. It can be viewed or downloaded from this PLA website. ([Link](#))

Alternatively, either of the district Harbour Masters or the Marine Administrative Support Manager at Gravesend will be happy to answer any questions you may have.

Port of London Authority
October 2005

Examples of Hazard Titles identified in the PLA's navigational Safety Management System

Contact - Class V Passenger Vessel with Bridges
 Collision - Oaze Deep
 Collision - West Oaze - SR1
 Loss of Hull Integrity - Sinking of Small Vessel
 Collision - Lower/Upper Pool
 Collision - Dredger
 Collision - Gravesend Reach
 Grounding - Yantlet Flat, Grain Spit, Nore Sand
 Grounding - Vessel with incorrectly reported draft
 Collision - London Bridge to Bell Lane Creek
 Collision - St. Clement's Reach
 Collision - Sea Reach, W of Canvey Island
 Collision - Merging Traffic from N. Sand Swatchway
 Collision - Warp Pilot Station
 Mooring Breakout - (Non-Tanker)
 Collision - Lower Hope
 Grounding - West Oaze Bank/E Nore Sand
 Collision - Thames Ferry (River)
 Collision - Princes Channel (Western End)
 Collision - Class V Passenger Vessel
 Collision - Princes Channel (East End)
 Collision - Vessel entering/leaving Tilbury Lock
 Grounding - Black Shelf
 Collision - Leisure Vessel (Marinas/Locks)
 Collision - Northfleet Hope (ex Tilbury Lock)
 Swamping - Vessel Overwhelmed by Seas
 Collision - Putney to Richmond
 Collision - Black Deep Precautionary Area
 Collision - Tug & Barges (River)
 Collision - Greenwich/Limehouse Reach
 Grounding - Broadness and Stoneness Points
 Collision - Berthing / Un-berthing
 Collision - VLCC (Warp)
 Contact - Moored Vessel/Structure
 Contact - No.4 Jetty (& Dolphins) on Ebb Tide
 Swamping - Tug 'girting'
 Grounding - Outward bound Deep Draft Vessels
 Collision - Private Leisure Craft (River)
 Collision - Tanker Berthing (Sea Reach)
 Collision - Large Tanker (River)
 Contact - Vessel in Southend Anchorage
 Contact - Tanker at Coryton/Canvey
 Collision - VLCC (Black Deep and Knock John)

Contact - Thames Barrier (Barrier Open)
 Contact - Tanker alongside Vopak
 Fire/Explosion - Any Jetty
 Wash - Passing Traffic
 Contact - Vessel anchored in Gravesend Reach
 Contact - Tanker alongside ST Services
 Fire/Explosion - Fire on Class V Passenger Vessel
 Collision - Vessel leaving Sea Reach Anchorages
 Chemical Tanker (River)
 Contact - Passenger jetty, pier or pontoon.
 Contact - Bridge (Tower to Richmond)
 Contact - Vessel in Leigh/Yantlet Anchorage
 Collision - Knob Buoy
 Grounding - Pilot/PEC/Master's Error
 Contact - Small Bulk Carrier & Bridge
 Collision - Bugsby's/Blackwall Reach
 Grounding - Princes Channel (Western End)
 Contact - Vessel on Erith Tier/Swing Buoy
 Contact - Jetties, Berths, during river passage
 Collision - Bunker Barge
 Collision - Chemical Tanker (Estuary)
 Collision - Small Bulker and Tug/Tow
 Collision - Small Bulker Class V Passenger Vessel
 Collision - Erith Rands/Erith Reach
 Grounding - Warp/Oaze Area
 Grounding - Across Dredged Box
 Contact - Greenhithe Swing Buoy/Vessel moored nearby
 Collision - Long Reach
 Collision - Yantlet Channel
 Contact - Inside Berths
 Collision - E. Swin Channel (Nr Whitaker Buoy)
 Contact - Moorings or vessel on Moorings
 Mooring Breakout - (Tanker)
 Grounding - Knock John Channel
 Grounding - London Bridge to Teddington
 Contact - Groynes off Diver Shoal
 Contact - Tanker alongside Esso Purfleet
 Contact - QEII Bridge
 Contact - Propulsion system immobilized
 Collision - Passenger Ship (River)
 Collision - Product Tanker (River)
 Contact - Oikos (Heavy Landing)
 Contact - Coryton No 4 Upper Dolphin (Berthing)

- Note:**
1. Contact means any vessel hitting a facility, bridge or other moored, anchored or fixed object.
 2. Collision means two vessels colliding whilst underway.

Navigational Safety Risk Assessment

Location/Vessel:	MARY ROSE		
Dates Applicable:	October 2005 – January 2006		
Project Description:	Coastal bulk carrier trading cargoes of stone to Battersea. A new trade – nothing similar to this berth in last 15 years.		
Prepared By:	ABC Coasters Ltd / PLA Harbour Master		

Ratings

PROBABILITY (P)	x	SEVERITY (S)	=	RISK	BAND	ACTION
5 = Extremely High		5 = Fatality or major injury. Major oil spill/impact.		0 - 4	Low	PROCEED
4 = Very Likely		4 = Serious injury or significant loss. Serious oil spill.		5 - 7	Medium	PROCEED
3 = Likely		3 = Minor/moderate injuries. Moderate oil spill.		8 - 11	High	DO NOT PROCEED
2 = Unlikely		2 = Minor injury. Minor oil spill/damage to environment		12 - 15	Very High	DO NOT PROCEED
1 = Highly Unlikely		1 = Minimal impact. No injuries/environment impact.		16 – 25	Extremely High	DO NOT PROCEED

Risk Assessment

	HAZARD	Relevance to Operations	UNMITIGATED				Actions to Reduce Risk	MITIGATED			
			P	S	Risk	Band		P	S	Risk	Band
1	Collision with Class V Passenger Vessel	Vessel trading above bridges to Battersea. Harbour Master has assessed that risks posed by this vessel when navigating below bridges are adequately covered already. Applies to all hazards below. Actions to reduce risk are applicable to several hazards.	3	5	15	VH	Harbour Service Launch escort. Lookout forward when above Tower Bridge. Valid ISM Certificate. Machinery redundancy verified. Specific local training prior to starting trade. Owner alcohol/drugs policy.	1	3	3	L
2	Collision with tug and tow		2	4	12	VH	See Hazard 1	1	2	2	L
3	Collision with small craft		2	4	8	H	See Hazard 1	2	3	6	M
4	Grounding		4	3	12	VH	Vessel arrival/departure times limited to specific times around high water. Tug escort.	2	3	6	M
5	Contact with bridge/pier		3	4	12	VH	Limitations imposed on vessel trim when in ballast. Anchor ready to let go.	2	2	4	L

RESULT	Operation can proceed on condition that all identified risk control measures (actions to reduce risk) are implemented.
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