CF1
Vessel collision accident

RF1
Avoidance Essential

PROVIDENCE

CF1a
Near collision

CB1
Emergency manoeuvring for collision avoidance

CF2
Imminent vessel collision

CB2
Collision avoidance through vessel detection & situation assessment, vessel to vessel communication and COLREGs implementation (applicable COLREGs and/or sound and light warning signal)

CF3
Close quarters situation

AND

Vessel Induced

CF3a
Vessel induced close quarters situation

CB4a
Conflict and close quarter situation prevention by OOW

RF5a
Other vessel

CF5a
Vessel induced incursion/ erroneous transit

OR

CF5_1a
Own vessel incursion (incorrect approach to the TSS/ congested waters)

CB5_1a
OOW incursion monitoring (including the appropriate passage plan)

CF6_1a
Inappropriate approaching/ leaving congested waters (heading)

CF5_2a
Own vessel incursion (premature/late crossing)

CB5_2a
OWW incursion monitoring (related to surrounding traffic)

CF6_2a
Inappropriate crossing of congested waters (non-timely)

CF5_3a
Own vessel erroneous transit within TSS/congested waters

CB5_3a
OOW transit monitoring (related to surrounding traffic)

CF6_3a
Inappropriate transit within TSS/ congested waters

CF5_4a
Other vessel incursion/ erroneous transit

CB5_4a
OOW incursion/erroneous transit monitoring (regarding other vessels)

CF6_4a
Unidentified vessel approaching or erroneous passage/behaviour in TSS/ congested waters

VTS Induced

CF3b
VTS induced close quarters situation

CB3
VTS collision avoidance through monitoring, situation assessment, communication with vessel and associated actions

CF4b
Conflict not prevented by VTS, involving non compliant vessel

CB4b
Conflict prevention by VTS

RF5b
Other vessel

CF5b
VTS induced incursion/ erroneous transit

CB5_Xb
VTS management

"X" = 1, 2, 3
1 = crossing
2 = entry/exit
3 = transit

YES

NO

RF6
Area covered by VTS

CF6_1b
Vessel is crossing the congested waters inappropriately

CF6_2b
Vessel enters/exits congested waters inappropriately

CF6_3b
Vessel is transiting erroneously within congested waters

Terminology

Situations

Imminent collision
Refers to the last stage of the situation where the courses of two vessels cross and if not necessary actions are implemented, the situation concludes with a collision or near collision.

Close quarter situation
Refers to the intermediate stage of a situation where the courses of two vessels cross and if not necessary actions are implemented, the situation evolves into an imminent collision.

Conflict
Refers to the first stage of a situation where the courses of two vessels cross and if not necessary actions are implemented, the situation evolves into a close quarter situation. For instance, when the two vessels are on a course which brings them too close but the bridge teams are not aware of the situation due to lack of situational awareness.

Incursion
Refers to the inappropriate navigation in TSS/congested waters, regarding inappropriate approaching or leaving, either due to incorrect point of entry/exit or due to icorrect timing (related to the surrounding traffic). For instance, the entry into a lane or fairway after predefined buoy(s), or the exiting without monitoring other nearby vessels, which may later lead to a conflict.

Erroneous transit
Refers to the inappropriate behaviour within TSS/congested waters, when transiting. For instance, it may refer to overtaking situations.

Passage

Transit
Refers to the normal course within a TSS lane or within congested waters in general. Appropriate passage monitoring and situational awareness are necessary during a transit.

Crossing
Refers to the vertical course with respect to the TSS lanes/congested waters fairway. A crossing can be performed at certain points of the TSS and with the appropriate passage planning and crossing monitoring.

TSS entry/exit
Refers to the entering or exiting of a vessel in/from a TSS lane (approaching and leaving). It could be performed at the beginning or ending of the TSS lane/congested waters fairway, or at an intermediate point along its entire length. Appropriate passage plan and respective monitoring is in order.

VTS

VTS services
VTS includes of 3 services:

1. INS - Information Assistance Service : Provides information regarding weather, surrounding environment and traffic constraints.

2. TOS - Traffic Organisation Service : Manages and monitors the traffic in a TSS.

3. NAS - Navigation Assistance Service : Provides suggestions and maybe instructions for routing in emergency situations.

Instructions may be given from all three services in some specific VTS areas. NAS usually intervenes in a close quarter situation (imminent collision). INS and TOS are in constant communication with vessels in order to inform of any condition or manage the traffic in the TSS.

Passage planning

Passage planning, according to IMO Resolution A.893(21), includes appraisal, detailed planning of the voyage from berth to berth, execution of the plan and the monitoring of the progress of the vessel in the implementation plan.

Appraisal: it is the gathering of all information relevant to the comptemplated voyage that should be considered (e.g., characteristics of cargo, nautical publications, weather forecast, etc.)

Planning: On the basis of the fullest possible appraisal, a detailed voyage or passage plan should be prepared which should cover the entire voyage or passage from berth to berth, including those areas where the services of a pilot will be used.

Execution: Having finalized the voyage or passage plan, as soon as time of departure and estimated time of arrival can be determined with reasonable accuracy, the voyage or passage should be executed in accordance with the plan.

Monitoring: The progress of the vessel in accordance with the voyage and passage plan should be closely and continuously monitored. Any changes made to the plan should be made consistent with these Guidelines and clearly marked and recorded

The 'Appraisal' and 'Planning' are considered within CB3a barrier, while 'Execution' and 'Monitoring' phases are captured within both CB3a and CB2a barriers in the form of continuous monitoring and situational awareness.

ACTORS

The actors in this Risk Model are the following:
Onboard the vessel:
- Master
- Officer of the Watch (OOW)
- Officer in charge of the passage plan

From VTS:
- VTS operator

On board the vessel during navigation in congested waters, the overall responsibility lies with the OOW, who is in charge of the navigational watch. If Master (who is not the OOW at the time) is present, the responsibility lies with him. If not present, in case of a troubling situation, the OOW should call him to the bridge.

Officer in charge of the passage plan is one of the vessel's deck officers and is appointed by the Master and has this role only in the passage planning process, and not during navigation.

VC-SC1
A situation where a vessel comes into physical contact with another vessel.

VC-SC1a
A situation where an imminent collision was not mitigated by any corrective action, but psysical contact with another vessel did not occur.

VC-SC2
A situation where collision (physical contanct with another vessel) is imminent, as there is a certain collision course, but evasive manoeuvring may prevent it.

VC-SC3
A situation where there is a collision course (close quarters situation), but situation awareness and assessment, along with the use of vessel to vessel communication & implemenation of COLREGs may prevent an imminent collision.

CF1
Vessel collision accident

RF1
Avoidance Essential

PROVIDENCE

CF1a
Near collision

CB1
Emergency manoeuvring for collision avoidance

OOW/Master
Performs evasive manoeuvring to prevent collision - involves application of COLREGs (Rule 8)

CF2
Imminent vessel collision

CB2
Collision avoidance through vessel detection & situation assessment, vessel to vessel communication and COLREGs implementation (applicable COLREGs and/or sound and light warning signal)

OOW/Master
Performs vessel detection, situation assessment, vessel to vessel communication and implements applicable COLREGs or sound and light warning signals

CF3
Close quarters situation

AND

Vessel Induced

CF3a
Vessel induced close quarters situation

CB4a
Conflict and close quarter situation prevention by OOW

OOW
Prevents conflict and close quarter situation with other vessel, with the assistance of navigational aids and lookout, and by implementing corrective actions

RF5a
Other vessel

CF5a
Vessel induced incursion/ erroneous transit

OR

CF5_1a
Own vessel incursion (incorrect approach to the TSS congested waters)

CB5_1a
OOW incursion monitoring (including the appropriate passage plan)

OOW
Avoids incursion thrpugh an effective passage plan and lookout with the assistance of navigational aids and lookout, followed by the implementation of the required corrective actions

CF6_1a
Inappropriate approaching/ leaving congested waters (heading)

CF5_2a
Own vessel incursion (premature/late crossing)

CB5_2a
OWW incursion monitoring (related to surrounding traffic)

OOW
Avoids incursion with the assistance of navigational aids and lookout, followed by the implementation of the required corrective actions

CF6_2a
Inappropriate crossing of congested waters (non-timely)

CF5_3a
Own vessel erroneous transit within TSS/congested waters

CB5_3a
OOW transit monitoring (related to surrounding traffic)

OOW
Avoids erroneous transit with the assistance of navigational aids and lookout, followed by the implementation of the required corrective actions

CF6_3a
Inappropriate transit within TSS/ congested waters

CF5_4a
Other vessel incursion/ erroneous transit

CB5_4a
OOW incursion/erroneous transit monitoring (regarding other vessels)

OOW
Detects other vessel incursion or erroneous transit with the assistance of navigational aids and lookout and implements corrective actions for own vessel

CF6_4a
Unidentified vessel approaching or erroneous passage/behaviour in TSS/ congested waters

The barrier refers mostly to passage plan and the respective monitoring process of the vessel's passage during approaching or leaving TSS/congested waters.

Example: approaching or crossing congested waters in the wrong point, because of an inappropriate passage plan or monitoring of passage.

The barrier refers mostly to the monitoring process of surrounding traffic conditions and respective compliance actions during passage, and more specifically, when approaching TSS/congested waters.

Example: approaching congested waters without monitoring transiting vessels, which may lead into a conflict

The barrier refers mostly to the monitoring process of surrounding traffic conditions and respective compliance actions during passage within TSS/congested waters.

Example: faulty overtaking actions by a transiting vessel

The barrier refers mostly to the monitoring process of surrounding traffic conditions regarding erroneous behaviour of other vessels and respective compliance actions during passage within TSS/congested waters

VTS Induced

CF3b
VTS induced close quarters situation

CB3
VTS collision avoidance through monitoring, situation assessment, communication with vessel and associated actions

VTS operator
Monitors and assesses an imminent close quarters situation, communicates with implicated vessel and provides warnings and advice, as required, and instructions, where applicable.

CF4b
Conflict not prevented by VTS, involving non compliant vessel

CB4b
Conflict prevention by VTS

RF5b
Other vessel

VTS operator
Monitors and assesses an imminent conflict situation, communicates with implicated vessel and provides warnings and advice, as required, and instructions, where applicable.

CF5b
VTS induced incursion/ erroneous transit

CB5_Xb
VTS management

VTS operator
Monitors and assesses an imminent vessel incursion or erroneous transit, communicates with vessel and provides warnings and advice, as required, and instructions, where applicable.

"X" = 1, 2, 3
1 = crossing
2 = entry/exit
3 = transit

YES

NO

RF6
Area covered by VTS

CF6_1b
Vessel is crossing the congested waters inappropriately

CF6_2b
Vessel enters/exits congested waters inappropriately

CF6_3b
Vessel is transiting erroneously within congested waters

VC-SC3a
A situation where there is a vessel induced conflict and a close quarter situation between two vessels in TSS/congested waters

VC-SC5a
A situation where there is a vessel induced incursion or erroneous transit in TSS/congested waters.

VC-SC5_4a
A situation where another vessel's incursion or erroneous transit occurs in TSS/congested waters.

VC-SC5_3a
A situation where a vessel is transiting the TSS/congested waters inappropriately, resulting in an erroneous transit.

VC-SC5_2a
A situation where a vessel is prematurely or late crossing in TSS/congested waters, which results in an incursion.

VC-SC5_1a
A situation where there is a vessel incursion, due to incorrect approaching or leaving the TSS/congested waters.

VC-SC6_1a
A situation where there is an inappropriate approaching or leaving the TSS/congested waters by a vessel, which may result in an incursion.

VC-SC6_2a
A situation where there is an inappropriate (non-timely) crossing of the TSS/congested waters by a vessel, which may result in an incursion.

VC-SC6_3a
A situation where there is an inappropriate transit of TSS/congested waters by a vessel, which may result in an erroneous transit.

VC-SC6_4a
A situation where there is an imminent incursion or erroneous transit in TSS by an unidentified vessel, or by a vessel with erroneous behaviour.

VC-SC3b
A situation where there is a VTS induced close quarter situation between two vessels in TSS/congested waters

VC-SC4b
A situation where there is a conflict between two vessels' courses in a TSS/congested waters, which was not anticipated by the VTS operator.

VC-SC5b
A situation where there is an incursion (due to erroneous crossing or entry/exit) or erroneous transit of a vessel in congested waters, which was not anticipated by the VTS operator.

VC-SC6_3b
A situation where there is an imminent erroneous transit in TSS/congested waters, but may be anticipated by VTS management (transit management), if the area is covered by VTS.

VC-SC6_2b
A situation where there is a vessel inappropriate entering in or exiting from TSS/congested waters, which may be anticipated by VTS management (entry/exit management), if the area is covered by VTS.

VC-SC6_1b
A situation where there is an inappropriate vessel crossing in TSS/congested waters, but may be anticipated by VTS management (crossing management), if the area is covered by VTS.