Italian Ministry of Infrastructure and Transport

ITALIAN MARITIME INVESTIGATIVE BODY ON MARINE ACCIDENTS

MARINE ACCIDENT INVESTIGATION C/S COSTA CONCORDIA

13th January 2012

MSC90

London - May 18th, 2012

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1. ITALIAN MARITIME INVESTIGATIVE BODY

THE INVESTIGATIVE BODY :

- acts under the Ministry of Infrastructure and Transport *(the Administration)*
- carries out investigations and reports to the Administration on the circumstances and causes related to the accidents or incidents.
- is responsible for collecting and analyzing data concerning maritime safety and uses the investigations' outcomes for the enhancement of safety of navigation and maritime transport.
- is responsible for the maintenance and updating of the European Marine Casualty Platform (EMCIP) and Global Integrated Shipping Information (GISIS).

2. INVESTIGATIVE ACTIVITIES

- PREAMBLE -

INVESTIGATION	COMPETENT ADMINISTRATION	LEGAL BASIS	TASK
ADMINISTRATIVE	Italian Coastguard	Italian Navigation Code	determination of the causes and possible responsibilities arising from the accident
TECHNICAL MARINE SAFETY	Ministry of Infrastructure and Transport **Maritime Investigative Body**	National Act n.165 dated 6-Sep-2011 implementing Directive 2009/18/EC and SOLAS - IMO Code	Identification of the causes and circumstances determining the accident, from a strictly technical perspective. Reporting the outcomes for possible follow-up action to improve maritime safety
CRIMINAL	Prosecutor	Criminal Law	Ascertainment of responsibilities and guilties

2. INVESTIGATIVE ACTIVITIES
- PREAMBLE -

- Legal Preeminence of Criminal Investigation above the other ones

- Cooperation between the Criminal and Technical Inquiries, however some due dates provided by law are to be respected.

Next 21st July, Experts of the Prosecutor will provide the outcome of the VDR analysis and the investigative body will have complete access to the data.

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3. FACTUAL INFORMATION

3.1 The Accident

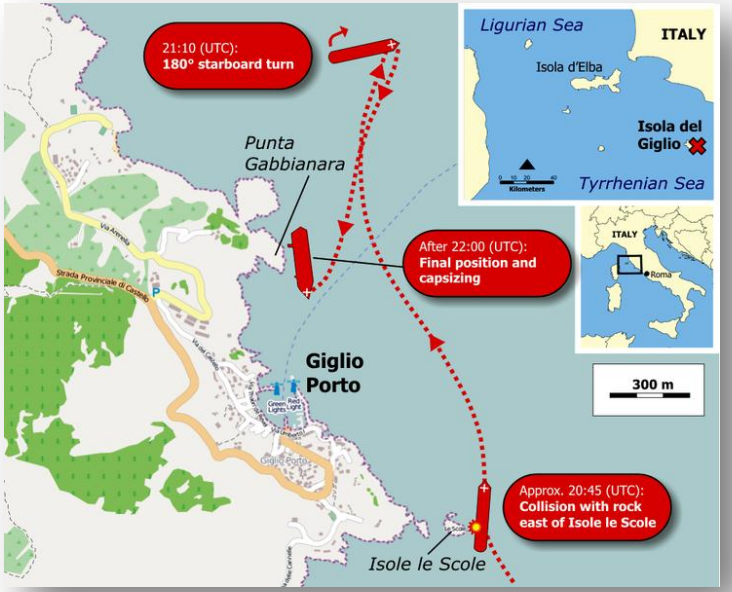
January 13th, 2012

- C/S Costa CONCORDIA (the "Ship") docks at the port of Civitavecchia
- 7.00 pm: scheduled departure for Savona

Civitavecchia-Savona: last leg of her seven - days cruise.

Before departure

Planning of a **touristic sailing course** envisaging an approach to the Island of Giglio – up to a bathymetric contour line at 10 meters depth



The **voyage plan** schedules:

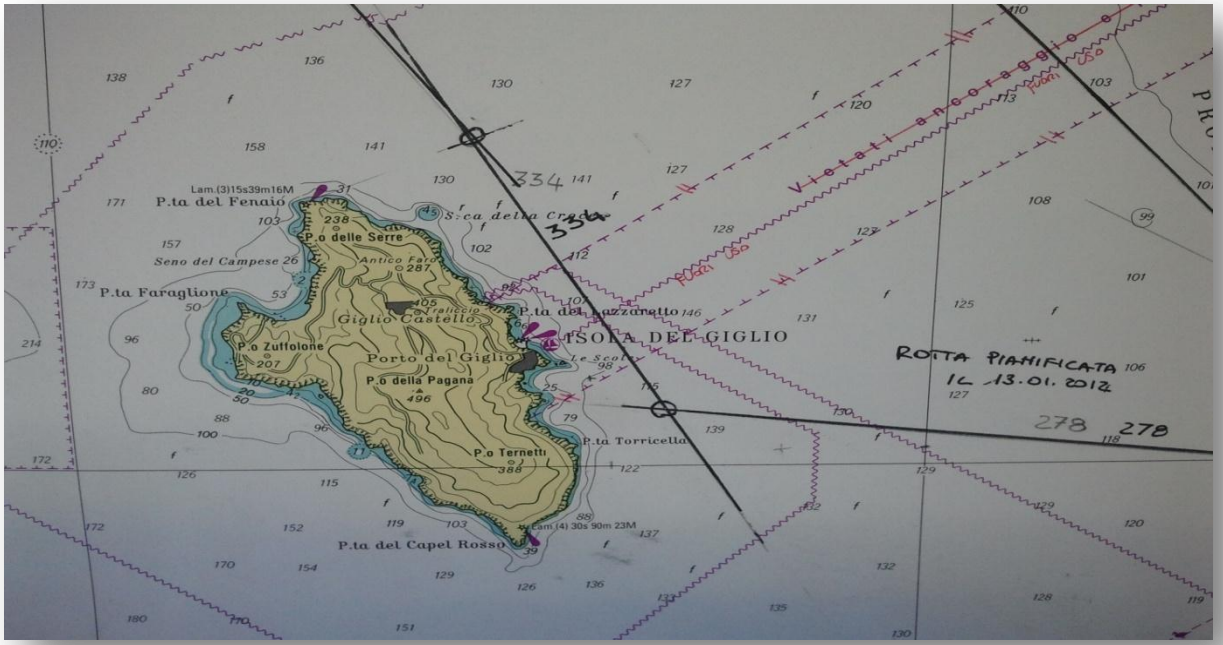
- leaving the funnel-shaped exit of the Port of Civitavecchia
- proceeding 302°
- turning to 278° - abeam *Punta Secca* (Island of Giannutri), at a distance of 4,5 miles from it
- altering the course to 334°, where *Punta della Torricella* (Island of Giglio) is bearing 239° from the ship, at a distance of 0,9 miles.

3. FACTUAL INFORMATION

3.1 The Accident

Passage 0,5 miles from the bathymetric limit of 10 meters depth, abeam "Le Scole Reef" (Island of Giglio).

The Ship's ***Integrated Navigation System*** (**Nautical Chart nr. 6 - scale 1:100.000 of Italian Hydrographic Service and the Electronic Cartography – ECDIS**)
reports the planned course.



January 13th, 2012 07.18 pm:

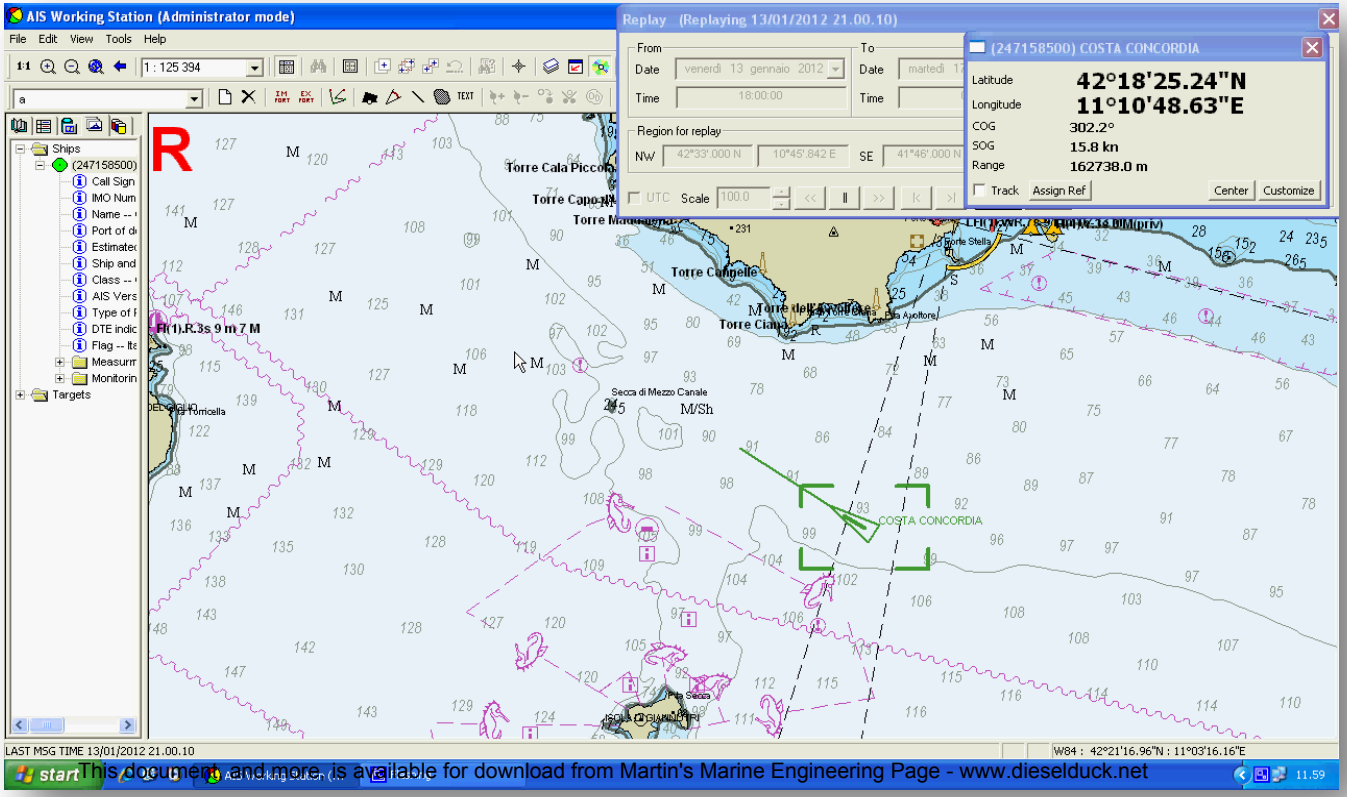
Actual departure from the port of Civitavecchia bound for Savona

3. FACTUAL INFORMATION

3.1 The Accident

Ship's position at 09.00 pm according to the *Automatic Identification System (AIS)*

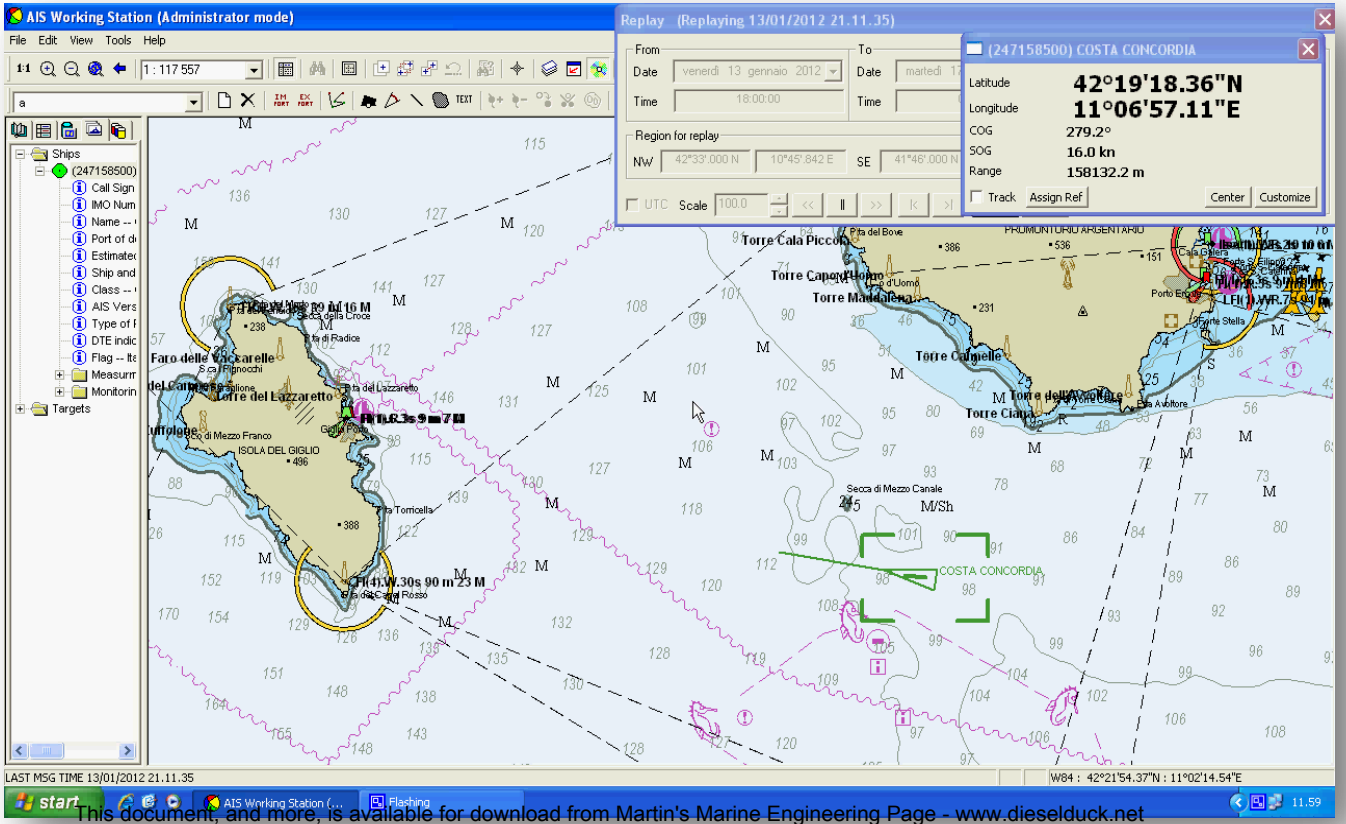
- *Coordinates*: Lat 42°18'25"N - Lon 011°10'48"E
- Bearing of 230° Punta Secca - Island of Giannutri
- *Distance*: 4,2 miles
- *True course*: 302°
- *Speed*: 15.8 knots



09.03 pm

the Ship starts attending to port until 09.11 pm, when she gets to a position of

- *Coordinates:* 42°19'18"N - 011°06'57"E ;
- Heading of 279°,
- *Speed:* 16 knots;
- Heading towards the Island of Giglio.



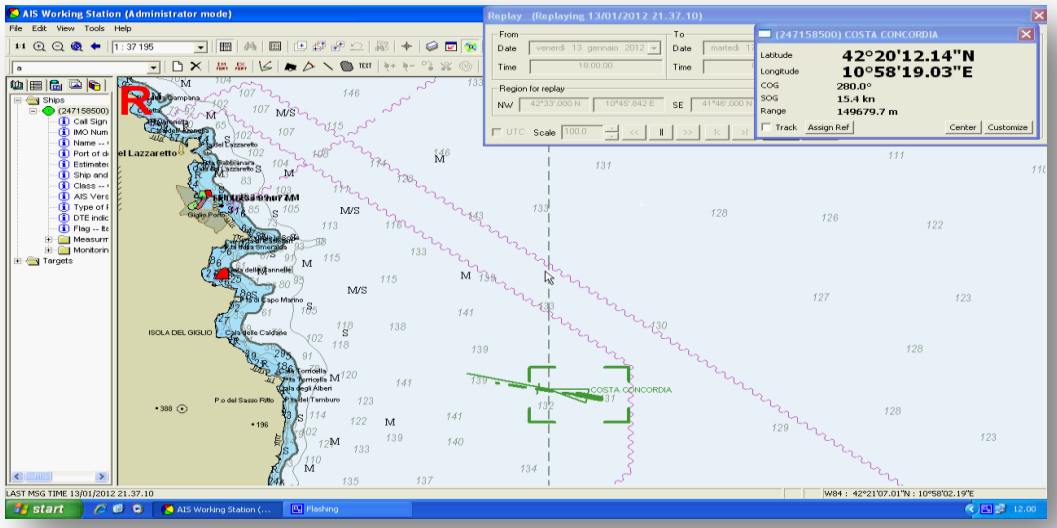
3. FACTUAL INFORMATION

3.1 The Accident

- Five minutes after completing the turning to port manouevre, the Chief Officer on duty contacts the Ship Master who arrives to the bridge and takes over the con.
- He takes the manual steering and orders the helmsman to keep unchanged the course.
- Radars under observation.

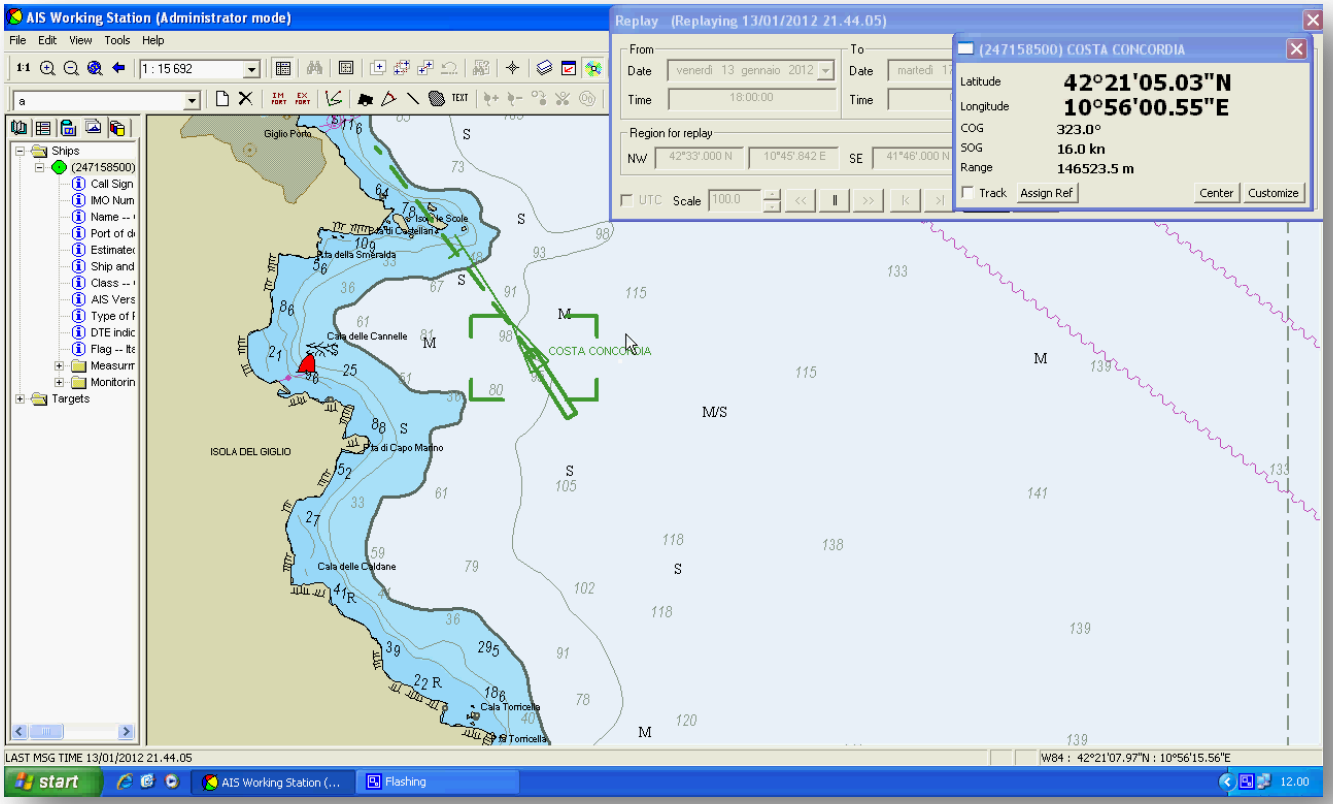
At 09.37 pm : Ship's position is 42°20'12"N ; 010°58'19"E (about 1,8 mile East Punta della Torricella - Island of Giglio), at a speed of 15.4 knots.

She turns to starboard in order to make the safety passage close to the Island.



09.44 pm

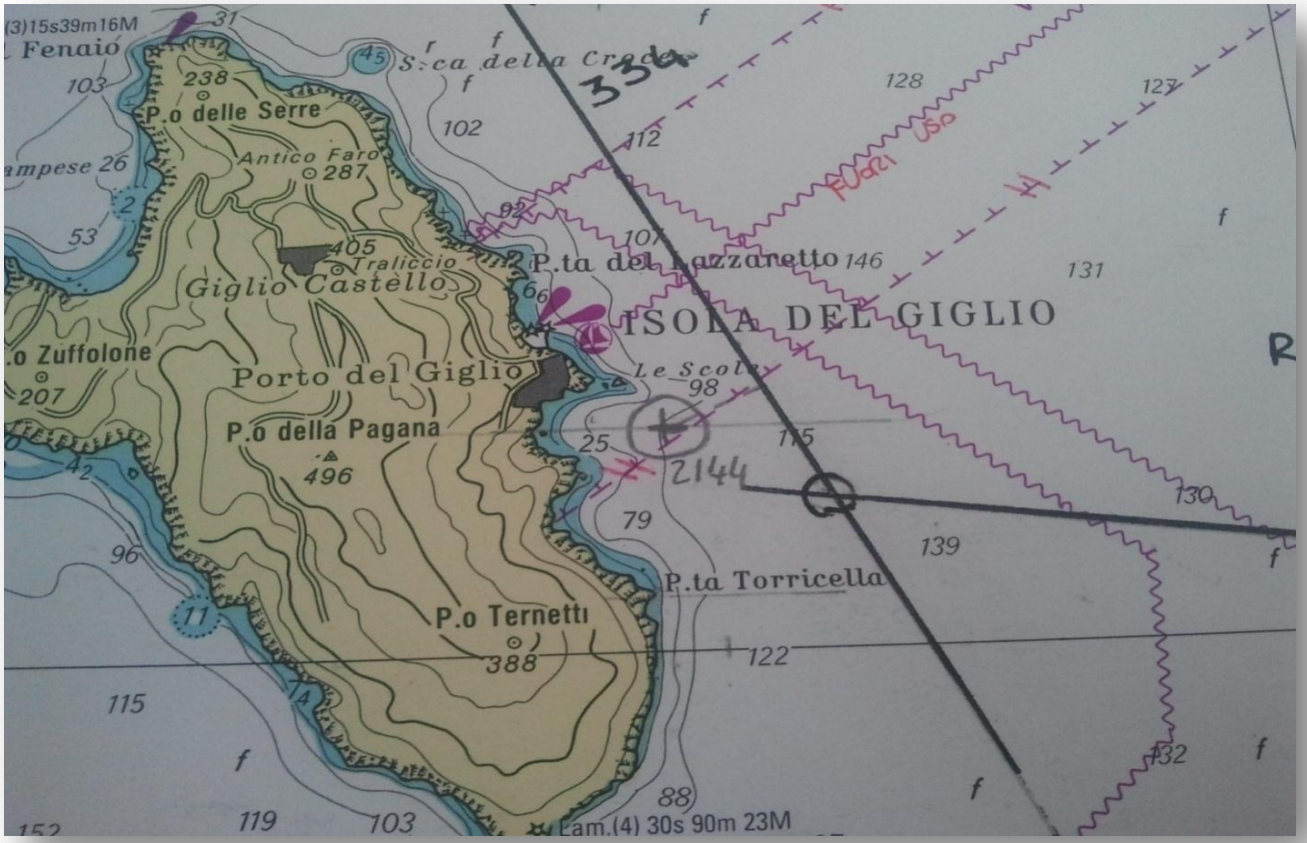
- Manoeuvre still ongoing
- *Ship's position*: 42°21'05"N; 010°56' E
  her bow heading to "Le Scole Reef" - 0,3 miles off the rocks
- *Speed*: 16 knots



3. FACTUAL INFORMATION

3.1 The Accident

The Yaw Radius is such that the Ship is situated 0.5 miles south-west off the planned course - *much more close to the coast compared to the planned route*



3. FACTUAL INFORMATION

3.1 The Accident

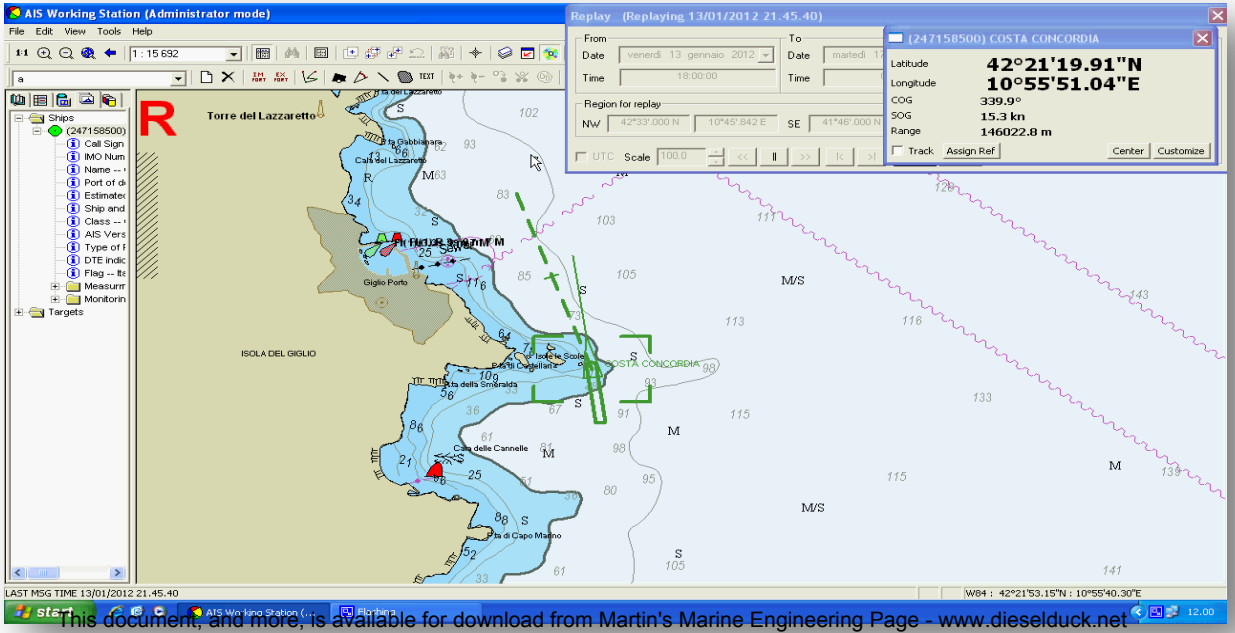
When the Ship is deemed to be sailing too close to the coast the **SEQUENCE OF SHIP MASTER'S ORDERS** *is the following:*

1) "hard to starboard" and the Ship's bow avoids the shallows;
2) "hard to port", but the Ship's stern cannot avoid them

09.45 pm : COLLISSION *between the port side of the hull and the eastern rock of "Le Scole"*

3) "hard to starboard" and the ship speed reduces instantly up to 8,3 knots, drifting off in headway, on a heading of 350°

IMMEDIATELY the two Ship's main electrical engines lose power



WHEATHER CONTITIONS ON SCENE ACCIDENT

«…Northern Tyrrhenian Sea: changeable 3 rotating from north-east and increasing - partly cloudy - good visibility ….»

At 09.00 pm the Monte Argentario weather station records «wind blowing from East-North-East at a speed of 17 knots that intensifies up to 19 knots at 11.00 pm»

Source : Mediterranean weather bulletin, issued at 18:00/utc of Friday, 13th January 2012 and valid till 06:00/utc of Saturday 14th January 2012 - *Centro Nazionale di Meteorologia e Climatologia Aeronautica*

At 09.50 pm : black-out onboard

- the emergency generator turns on, but is unable to connect with the emergency electrical panel
- the two rudders are starboard;
- the supplementary batteries guarantee only the functioning of the emergency lighting and shipboard internal communication appliances
- the Bridge instruments work thanks to the dedicated batteries (UPS)
- the computer containing the software to calculate the stability (NAPA) is out of order

At 09.55 pm : the engine crew department gets aware about the flooding

- *Chief Engineer informs the personnel on bridge about the flooding in the two contiguous generators rooms (bow and stern -* **compartment 6 and 7)**
- the 2nd Engineer assesses the flooding into the Propulsion Engine Motor (PEM) room too (**compartment 5**) - *Message is passed on to the bridge.*
- the Chief Mate informs, via UHF, the Staff Captain about the flooding of 3 contiguous compartments (generators rooms at the bow, generators room at the stern and PEM room (compartments 5, 6 e 7);

During 10-15 minutes following the impact

- Ship Master is informed directly about the flooding. No orders from him.

- Inspection activity in the watertight compartments carried out by the Chief Mate and the Staff Engineer

  Assessment: Deck A - water flow leaking out through the watertight door n.24. Compartment n. 4 is flooding

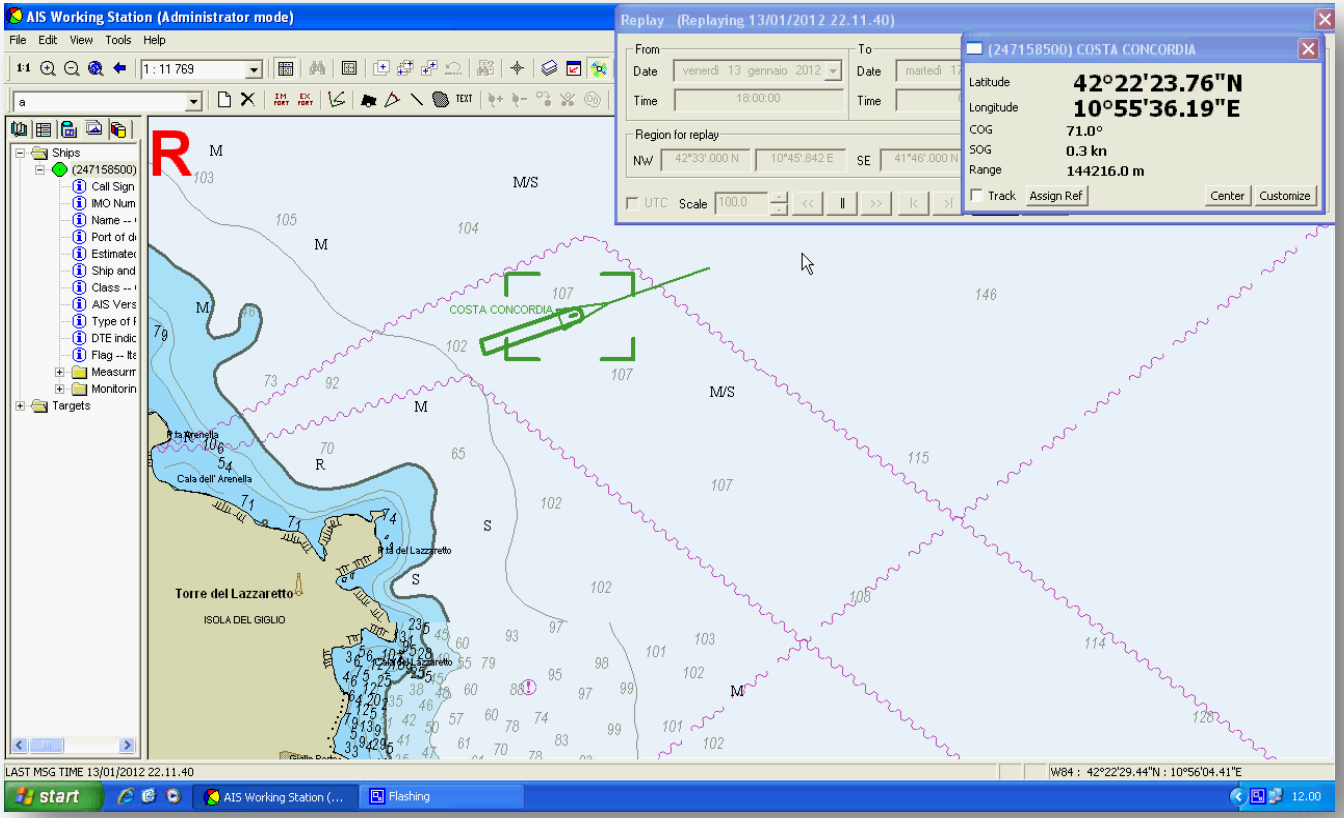
Ship's position at 10.11 pm

- steady (0.3 knots)
- 42°22'24"N 010°55'36"E
- starting to drift and to list her bow to starboard, south-westward due to the combined influence of the **north-east wind** and the **helm hard to starboard.**

At 10.12 pm

Leghorn *Maritime Rescue Sub-center Control* (MRSC)

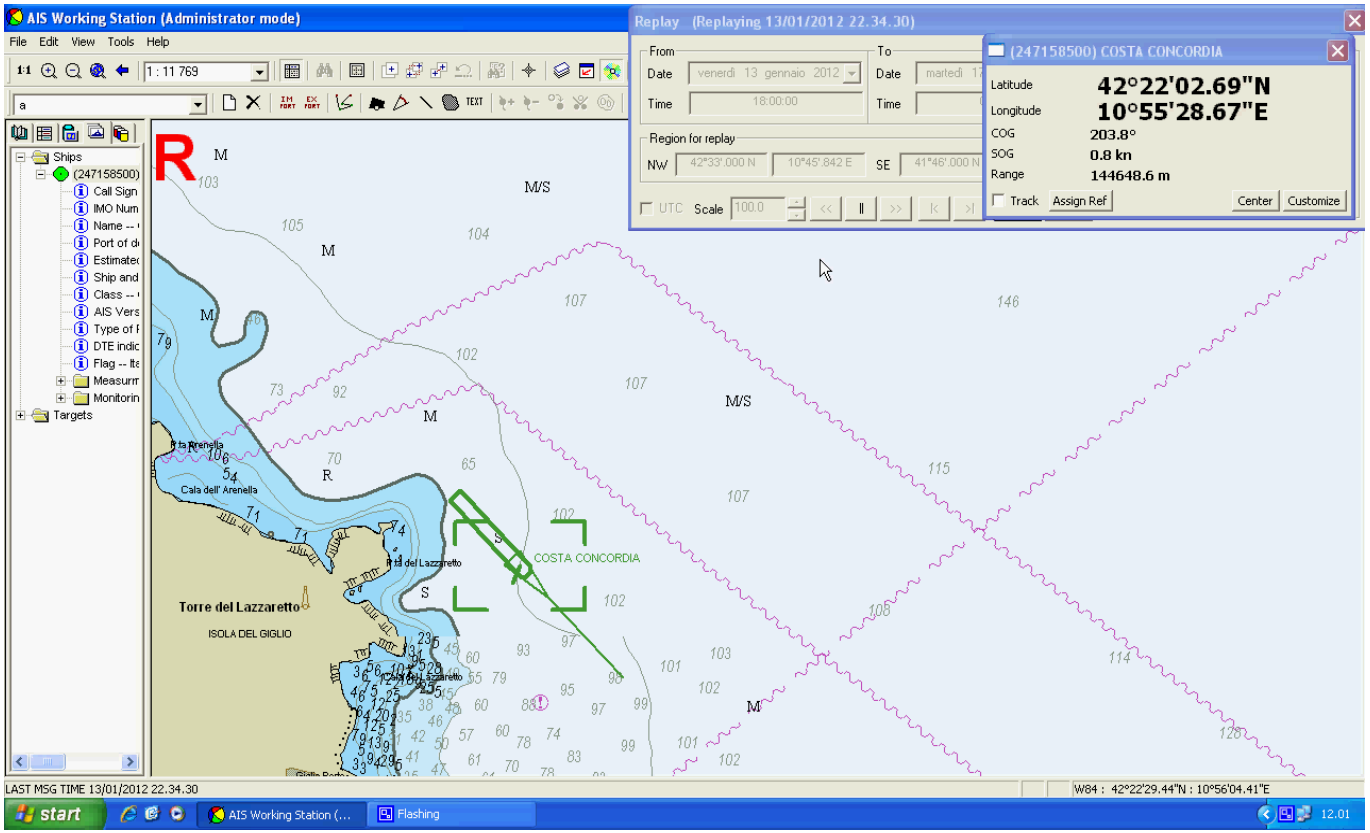
- detects the Ship in proximity of the Island of Giglio (Punta Lazzaretto).
- tries to contacts the Ship. Someone onboard (unknown identity) informs about the black out onboard.



At 10.34 pm

The ship reports that the heeling is increasing and declares the "DISTRESS"

The MRSC requests information on the number of persons on board.



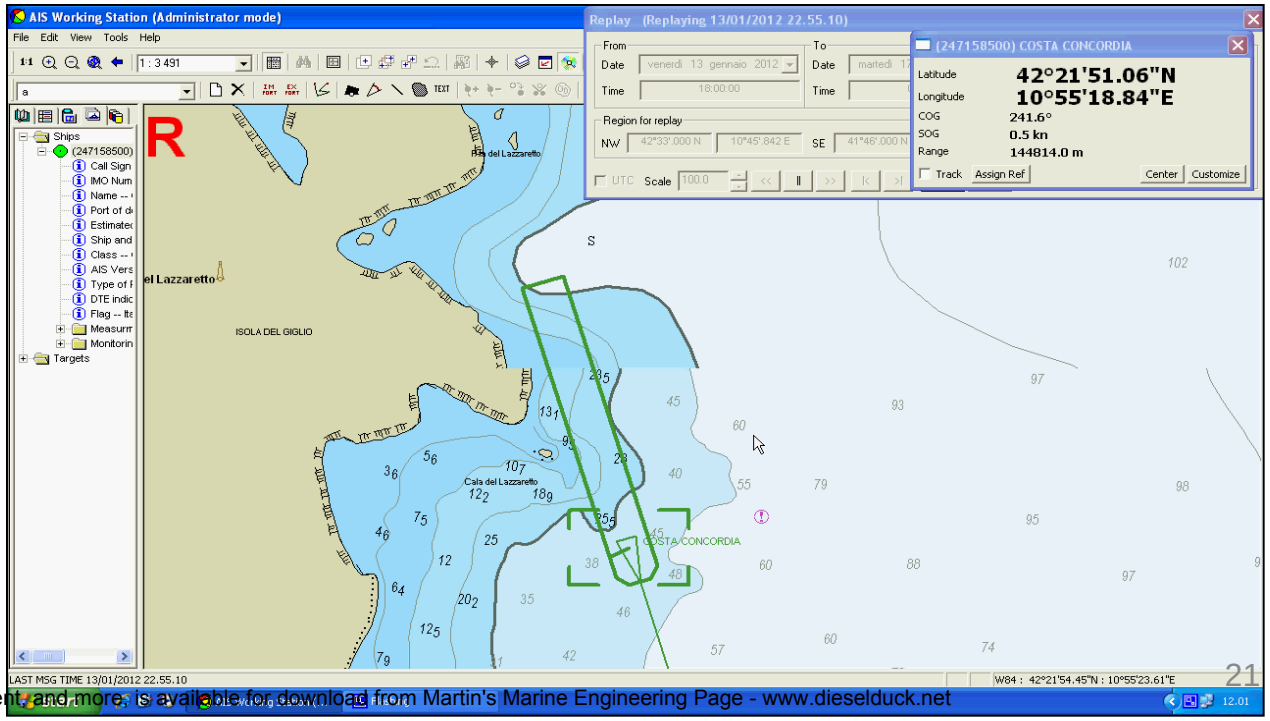
At 10.39 pm

"Patrol boat G 104" (designated O.S.C. – On Scene Commander), being alongside the ship, informs Leghorn M.R.S.C. about the Ship's stern heaviness, and at 10.44 pm she is laying on her starboard;

Weather conditions are good

At 10.40 pm (09.40 pm UTC)

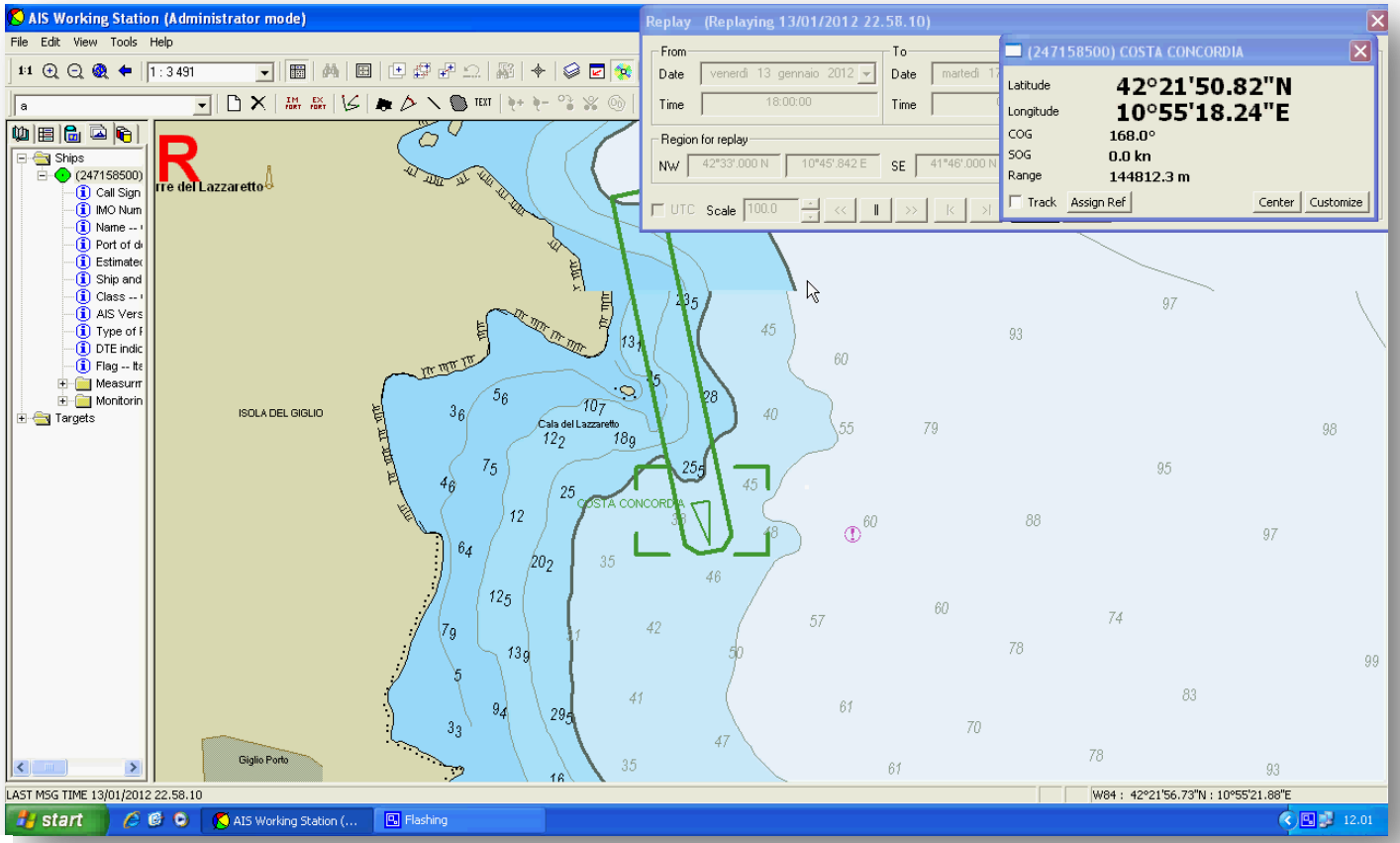
the Ship launches the distress through INMARSAT "C" (1530 – 75 tracks).



At 10.58 pm

Almost in **final grounded position,** struck, Lat 42°21'50"N – Lon 010°55'18"E

Island of Giglio – Cala del Lazzereto



3. FACTUAL INFORMATION

3.1 The Accident

- **10.58 pm** : the Ship Master informs the Coast Guard that he orderded **Abandon Ship**
- **11.37 pm:** Livorno M.R.S.C. calls the Ship Master. He reports the presence of about 300 persons (passengers and crew) on board.
- **00.32 am:** The Ship Master communicates that some persons are overboard, into the starboard side seawater, to be rescued.
- **00.34 am:** The Ship Master tells Livorno M.R.S.C. to be onboard a survival craft and is seeing other persons overboard, into water, on the starboard side.
- **00.36 am:** The "Patrol boat G 104" reports to Livorno M.R.S.C. the presence of 70-80 persons, at least, onboard.
- **00.41 am:** The ship has a 80° list, about 50 persons cannot leave the ship.
- **00.53 am:** Start of helicopters rescue operations. Other assets, already dispatched on the scene, keep on rescuing castaways.
- **01.11 am:** Leghorn M.R.S.C. contacts the Ship Master who tells to be ashore, on the Island.

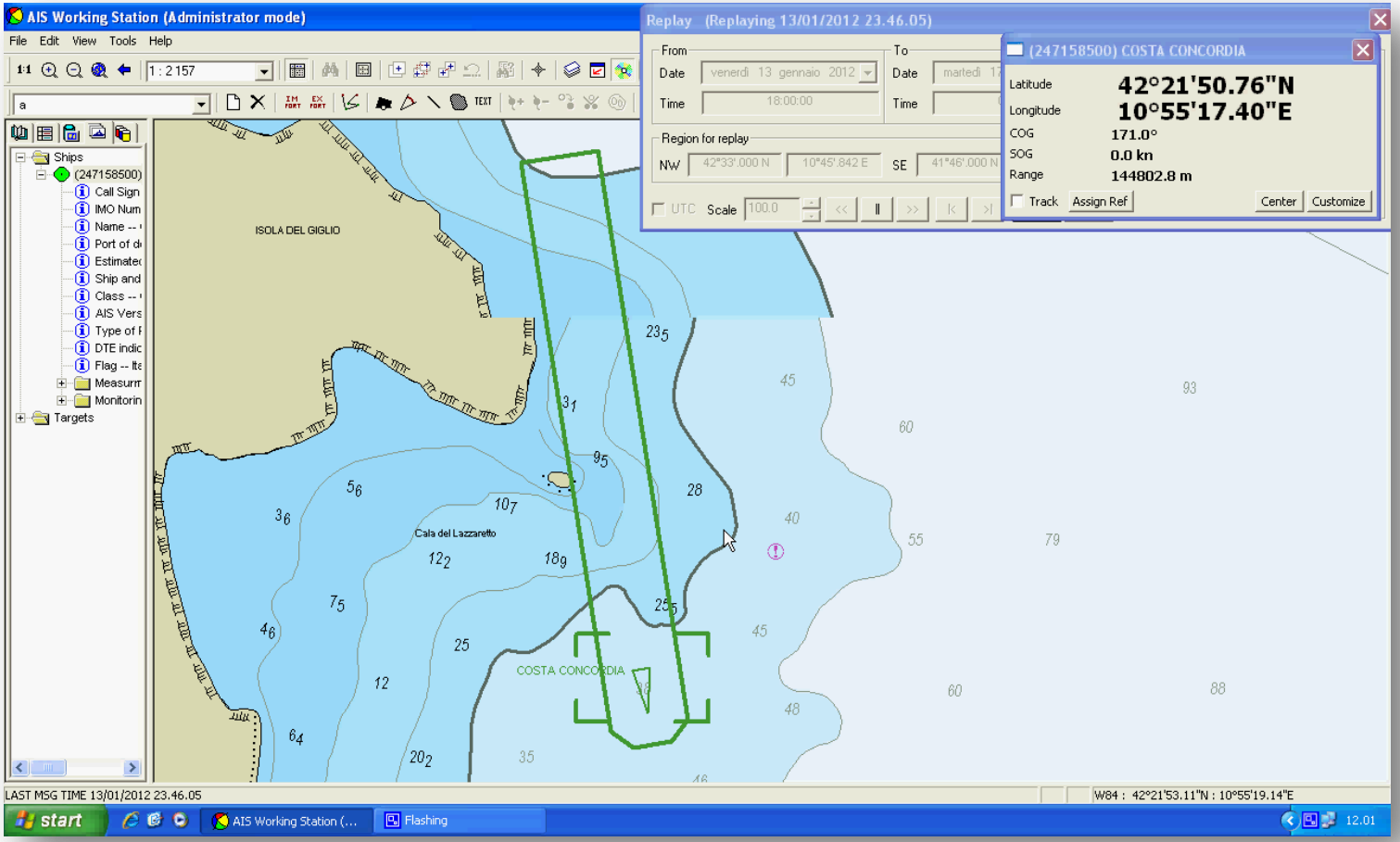
The pictures were taken from the Island of Giglio
the image does not correspond to the present history of events, but it is noteworthy for showing the exact moment when the lifeboats are launched on the starboard side

3. FACTUAL INFORMATION

3.1 The Accident

- **01.46 am**: Leghorn M.R.S.C intimates the Ship Master to go onboard the Ship and to give an account of the actual situation
- **03.44 am :** 40-50 persons at least are onboard
- **04.22 am :** 30 persons are still onboard
- **04.39 am:** On Leghorn M.R.S.C. request, the "Patrol boat G.104" reports the ship's position - 42°21'.36N 010°55'.12E, laying on a 27 meters bottom

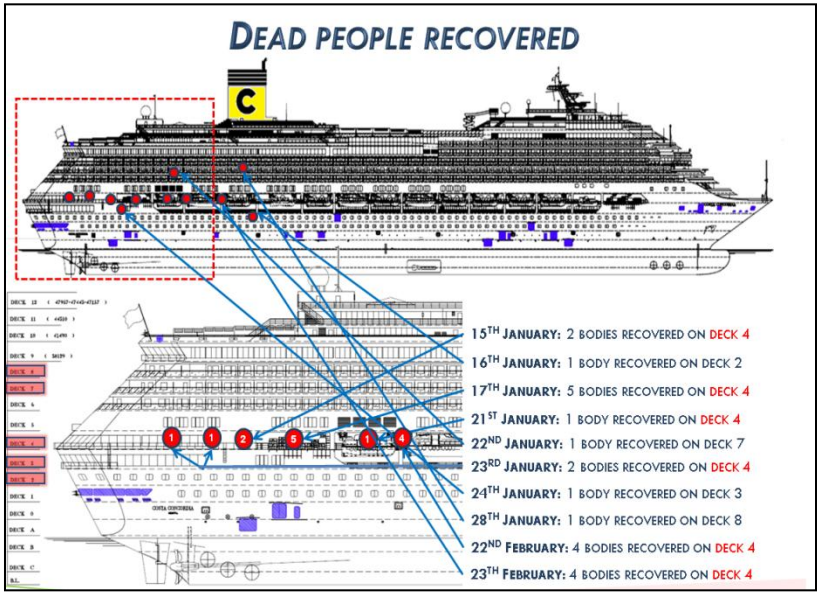
SHIP'S LAST POSITION



- **Intense activity of assistance** to the castaways from rescuers and the local population.
- **Retrieving** of persons from water

14th January, at 04.00 am:

- **Search operations** at sea and on board the ship
- **Transfer operations** of survivors by local ferry.
- **Counting and identification of passengers and crew operations**



- **Underwater search operations** report, so far, 30 bodies - found mainly at deck no. 4 and close to the keel. Two persons still missing.

OVERVIEW - HISTORY of EVENTS

TIME	EVENT	HEELING	EVIDENCE *from*
09.45 pm	Collision with the Scole reefs		A.I.S.
09.50 pm	Black-out onboard		Crew
10.36 pm	Ship drifting	05°	Crew
10.44 pm	Ship touches the sea bottom	12°	Patrol boat "G 104"
10.48 pm	General Emergency		Witness ashore
10.55 pm	First lifeboat launched at sea		Patrol boat "G 104"
10.58 pm	Ship grounding	15°	Ship Master
11.37 pm	440 persons still to evacuate	20°	Livorno Coast Guard
00.34 am	Ship master leaves the Ship by lifeboat	70° - 75°	Ship Master
00.41 am	Helicopter ITCG intervention to recover 50 persons	80°	Livorno Coast Guard
03.44 am	50 persons still to evacuate		Livorno Coast Guard
04.22 am	30 persons still to evacuate		Livorno Coast Guard
06.14 am	Evacuation completed		Livorno Coast Guard

CREW MEMBERS

- The TOTAL CREW onboard were composed of 1023 members *whose*
  838 with direct/active roles set in the Muster List

- *MUSTER LIST*
  Crew members with roles in the Muster List were trained according to the "Basic training" certification (Ref. STCW 78-95 – Regulation VI/2)

Nationality of the crew members (no.1023 persons)

NATIONALITY	NO. OF CREW MEMBERS
AUSTRIA	3
BELGIO	1
BRASILE	6
BULGARIA	7
CHILE	2
CHINA	20
COLOMBIA	10
CROAZIA	1
DOMINICAN REPUBBLIC	7
FRANCE	1
GERMANY	5
GREAT BRITAIN	12
GUATEMALA	6
HONDURAS	17
HUNGARY	6
INDIA	**202**
INDONESIA	**170**
ITALY	**150**
UKRAINE	2

NATIONALITY	NO. OF CREW MEMBERS
JAMAICA	2
JAPAN	1
MOLDOVIA	1
MYANMAR	1
NEPAL	1
PARAGUAY	2
PERU'	45
PHILIPPINES	**294**
POLAND	3
ROMANIA	26
RUSSIAN FEDERATION	3
SERBIA	1
SLOVAKIA	1
SLOVENIA	1
SOUTH KOREA	2
SPAIN	7
SRI LANKA	1
SYRIA	1
VIETNAM	3

Italian Decree 13 October 1999

implementing Directive 98/41/EC on the registration of persons sailing on board passenger ships operating to or from ports of the Member States of the Community and the provisions set in Reg III/27of SOLAS Convetion

- At the moment of the accident 4229 persons were onboard, as follows:

Passenger information fully recorded on a system approved by the Administration

TOTALE QUANTITA' VERIFICATE ALLE: : _20:04__ (ORA) *TOTAL QUANTITIES VERIFIED AT :_____ (TIME)*	
Adulti (> 12 anni) *Adults (over 12 years)*	2954
Bambini (da > 3 a ≤ 12 anni) *Children (fm > 3 to ≤ 12 years)*	200
Neonati (da 0 a ≤ 3 anni) *Infants (fm 0 to ≤ 3 years)*	52
Bisognosi di Assistenza *Needing Assistance*	19
TOTALE OSPITI *TOTAL GUESTS*	3206
TOTALE EQUIPAGGIO *TOTAL CREW*	1023
TOTALE PERSONE A BORDO *TOTAL SOULS ON BOARD*	4229

Nationality of passengers (no. 3206 persons)

ITALY (989)
GERMANY (568),
FRANCE (462),
SPAIN (177),
U.S. (129),
CROATIA (127),
RUSSIA (108),
AUSTRIA (74),
SWISS (69),
BRASIL (46),
JAPAN (46),
HOLLAND (42),
UKRAINE (33),
KOREA (30),
ROMANIA (29),
HONG KONG (26),
GREAT BRITAIN (25),
AUTRALIA (21),
ARGENTINE (17),
TAIWAN (13),
CANADA (12),
CHINA (12),
PORTUGAL (11),
COLOMBIA (10),
CHILE (10),
TURKEY (9),
BELGIUM (8),
ISRAEL (8),
KAZAKHSTAN(8),
PERU' (8),
POLOAND (8),
MOLDOVA (6),
NEPAL (6),
SWEDEN (5),
VENEZUELA (5),
DENMARK (4),
DOMINICAN REPUBLIC(4),
SERBIA (4),
SOUTH AFRICA (4),
NETHERLANDS ANTILLES (3),
BELARUS (3),
GREECE (3),
HUNGARY (3),
IRAN (3),
EIRE (3),
MACEDONIA (3),
ALBANIA (2),
CUBA (2),
ALGERIA (2),
EQUADOR (2),
MEXICO (2),
FINLAND (2),
ANDORRA (1),
BULGARIA (1),
BOSNIA (1),
CZECH REPUBLIC (1),
INDIA (1),
MOROCCO (1),
NORWAY (1),
NEW ZELAND(1),
PHILIPPINES (1),
URUGUAY (1).

- VICTIMS: No. 32
- NATIONALITY:
  -  Germany (12)
  -  Italy (7)
  -  France (6)
  -  Peru (2)
  -  United States (2)
  -  Hungary (1)
  -  Spain (1)
  -  India (1)

3. FACTUAL INFORMATION

3.3 Survival Crafts

LIFE SAVING APPLIANCES
- LIFEBOATS/LIFERAFTS-

- 26 lifeboats
- 23 the launched ones

3 lifeboats on portside could not be launched due to the significant list of the vessel

- 6 Liferafts were launched

3. FACTUAL INFORMATION

3.3 Survival Crafts

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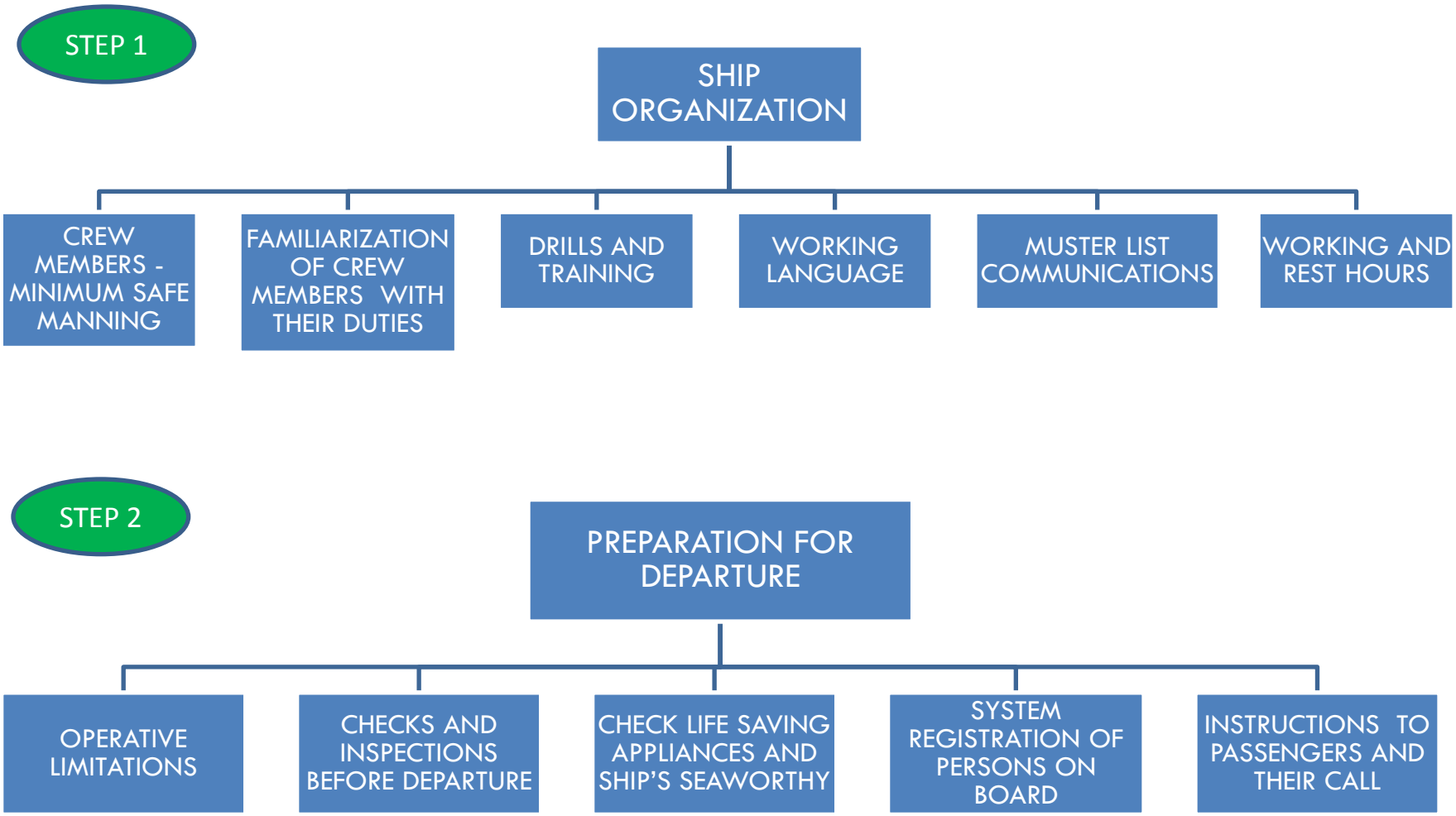
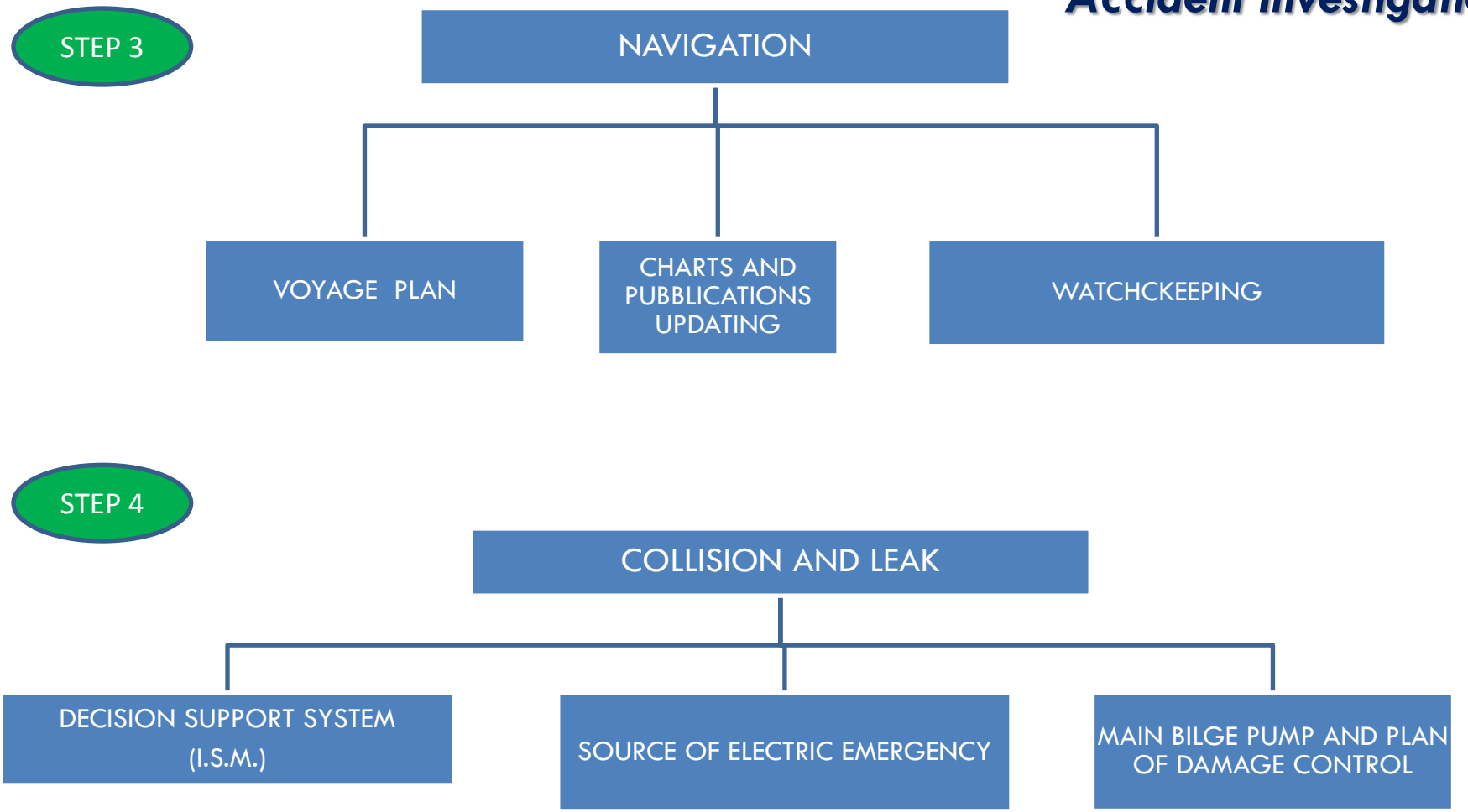
4. ANALYSIS

4.1 Methodology of C/s Costa CONCORDIA Marine Accident Investigation

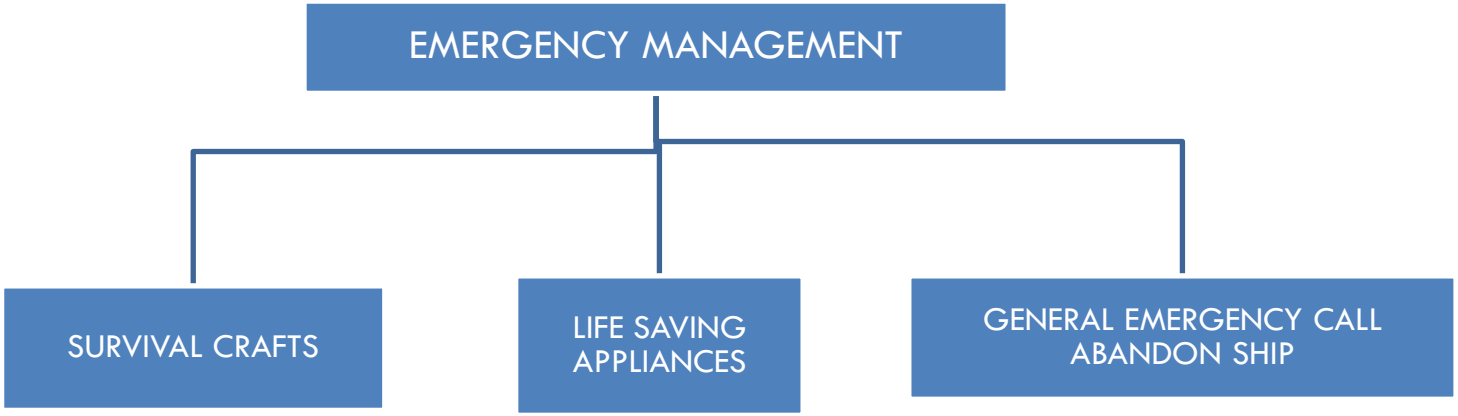


4. ANALYSIS

4.1 Methodology of C/s Costa CONCORDIA Marine Accident Investigation

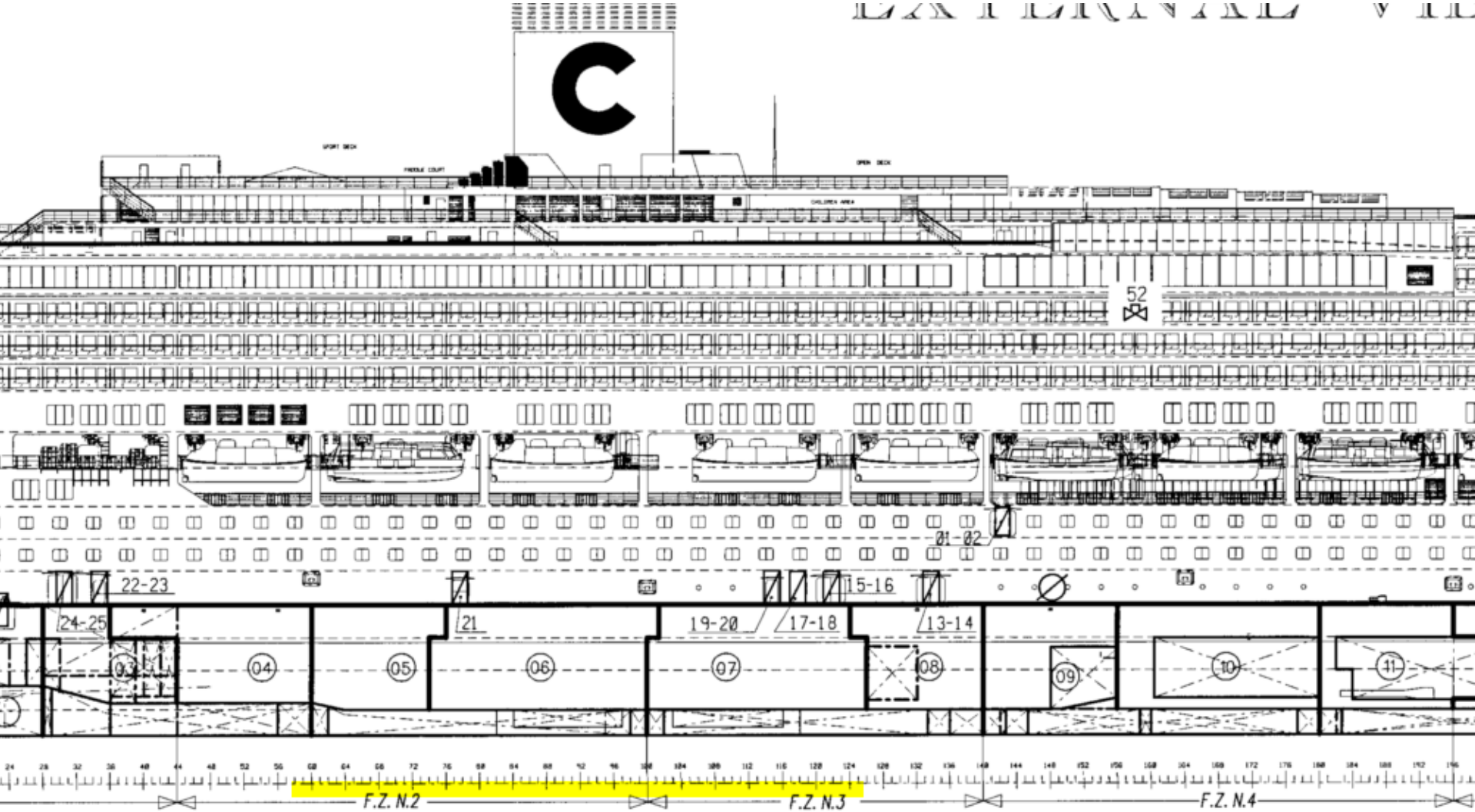


STEP 5



Damage between frame no. 58 and frame no. 125/128,
creating a 60 meters hole into the hull – portside

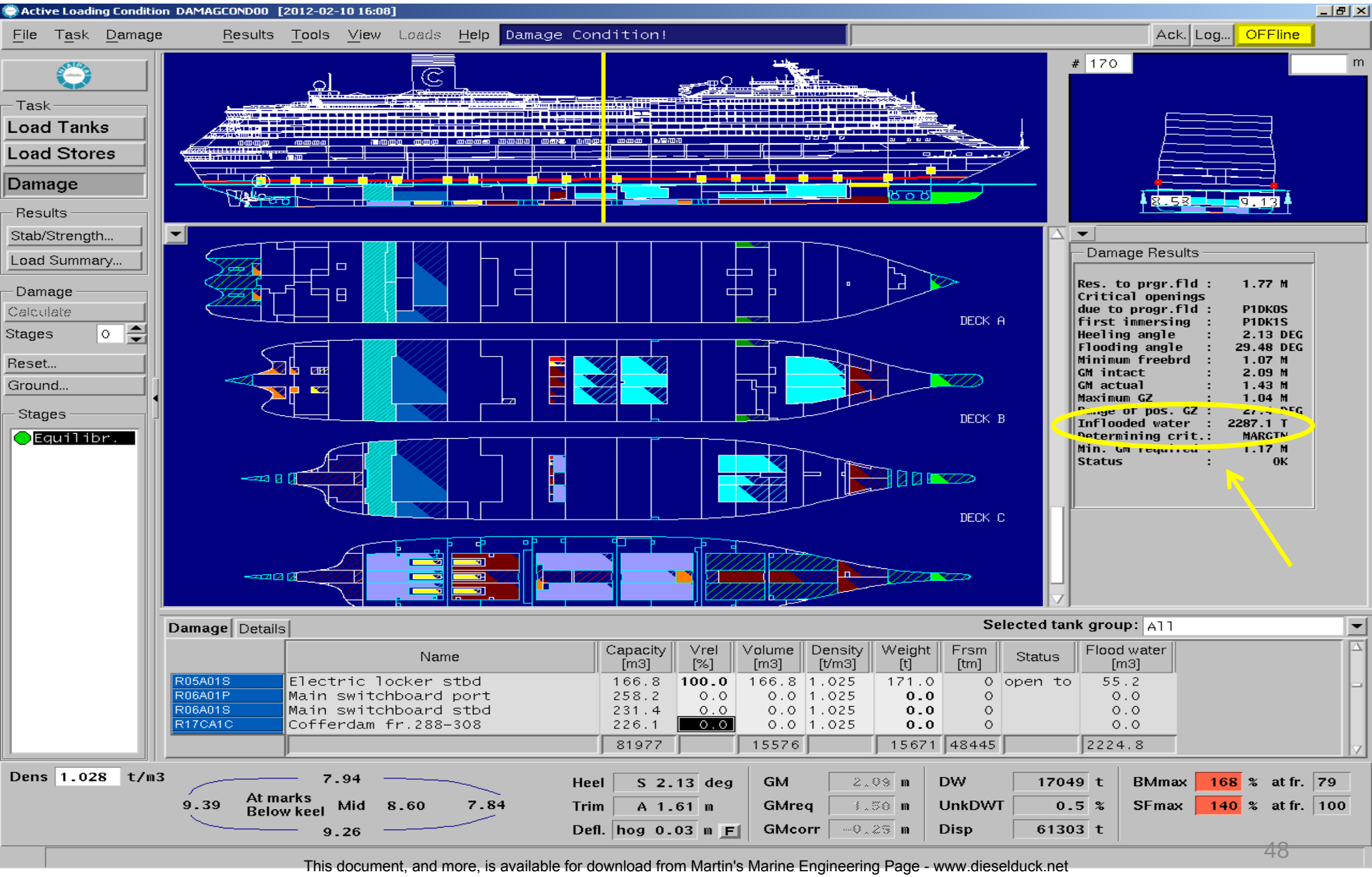
- **The two most affected watertight compartments (contiguous), immediately flooded:**
  - no. 5 (Propulsion Electric Motor)
  - no. 6 (aft generators)
- **Partially flooded at the time of crew inspection (10 minutes after the impact)**
  - no. 7 (forward generators)
  - no. 4 (Galley compressors)



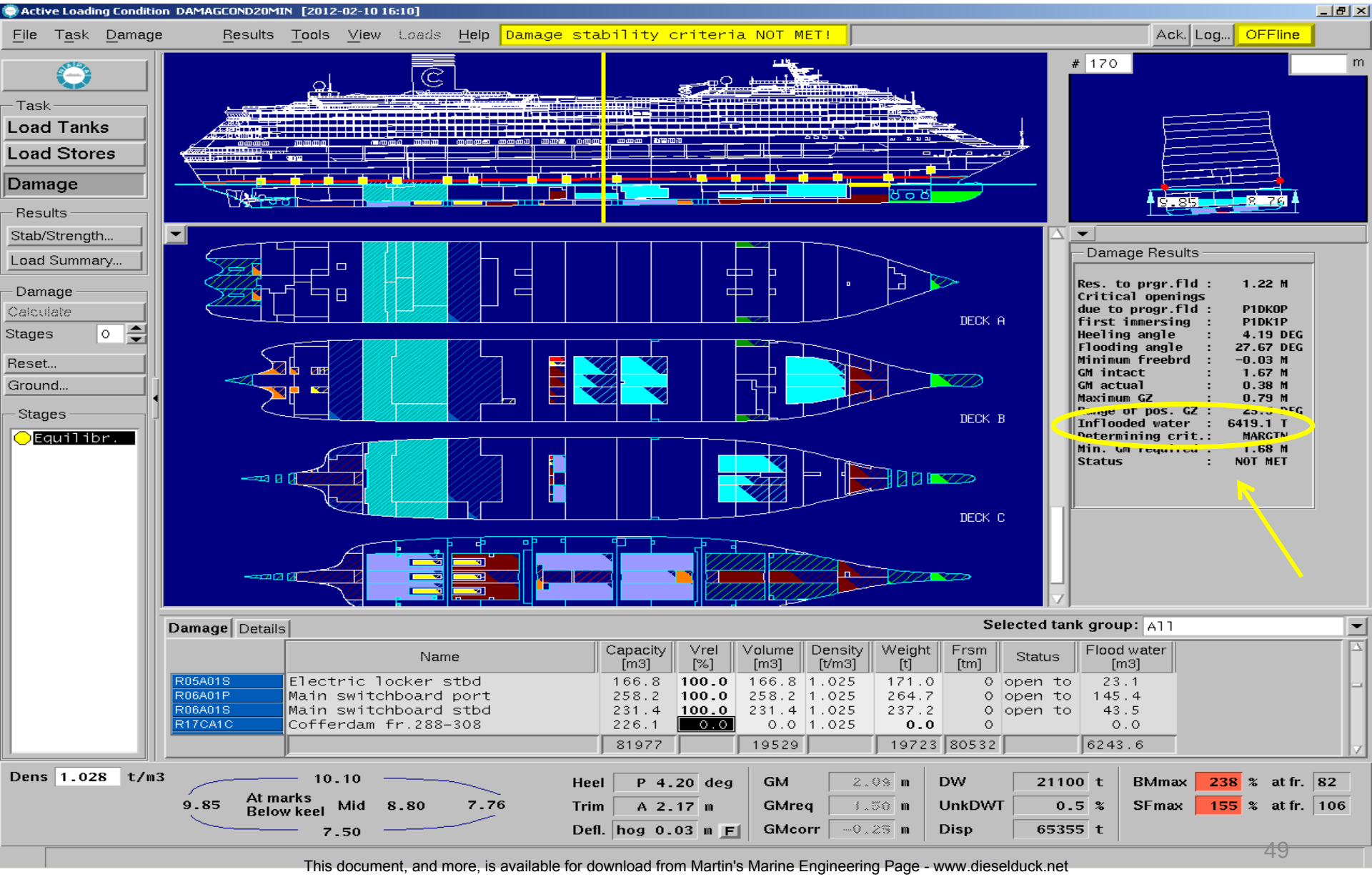
DESCRIZIONE POMPE			
DECK	FRAMES	NAME OF PUMP	CAPACITY/HEAD
PONTE	ORD.	NOME DELLA POMPA	PORTATA/PREVALENZA

REMOTE CONTROLLED SHELL		
ITEM	PIECE NUMBER	SERVICE DESCRIPTION
Nr.	MARCAPEZZO	DESCRIZIONE DEL SERVIZIO

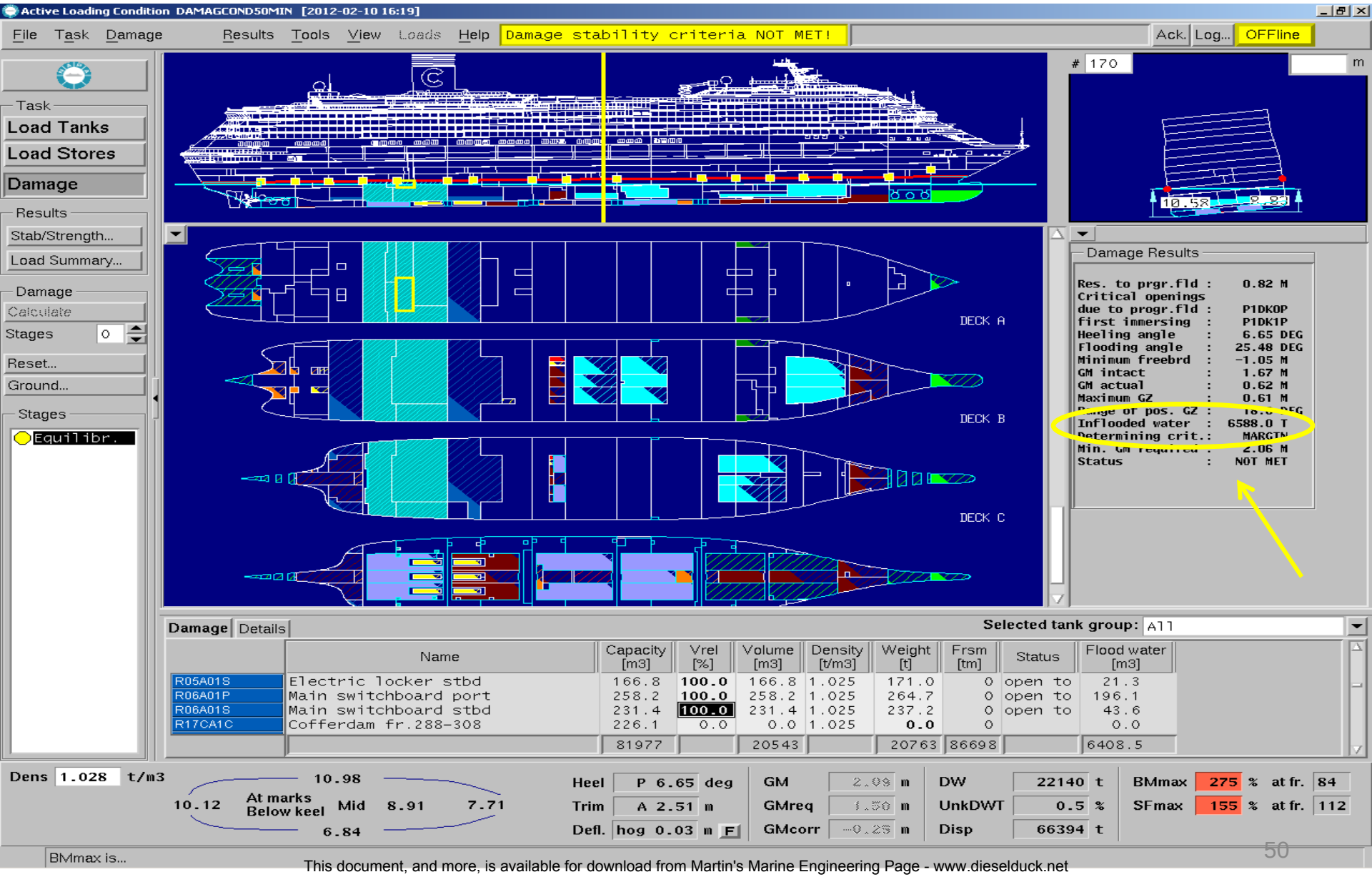
Costa Serena simulation after the impact – Damage condition 0
Compartment no. 5 flooded immediately 2287.1 t of water



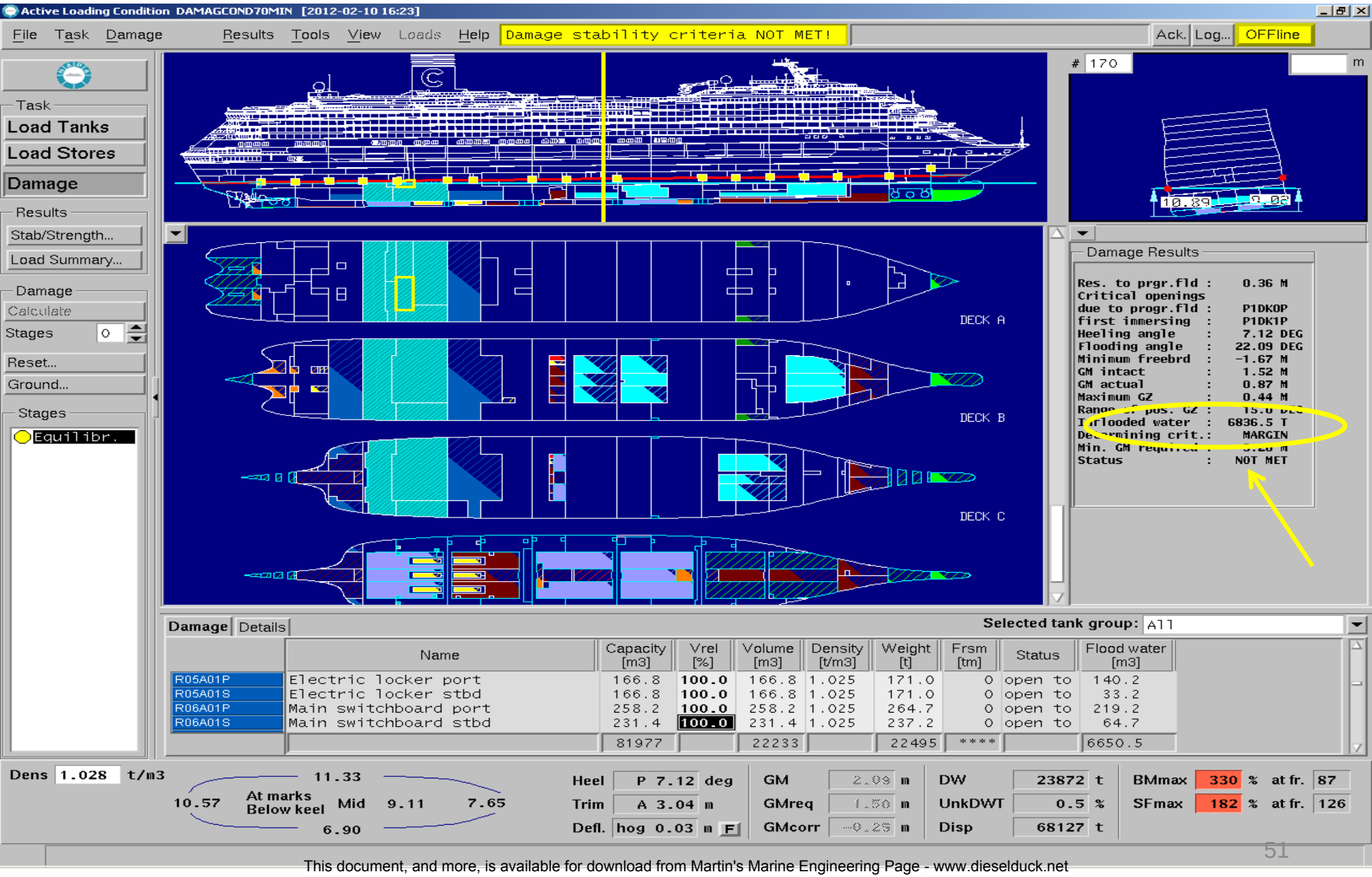
Damage condition after 20 minutes inflooded water 6419.1 t



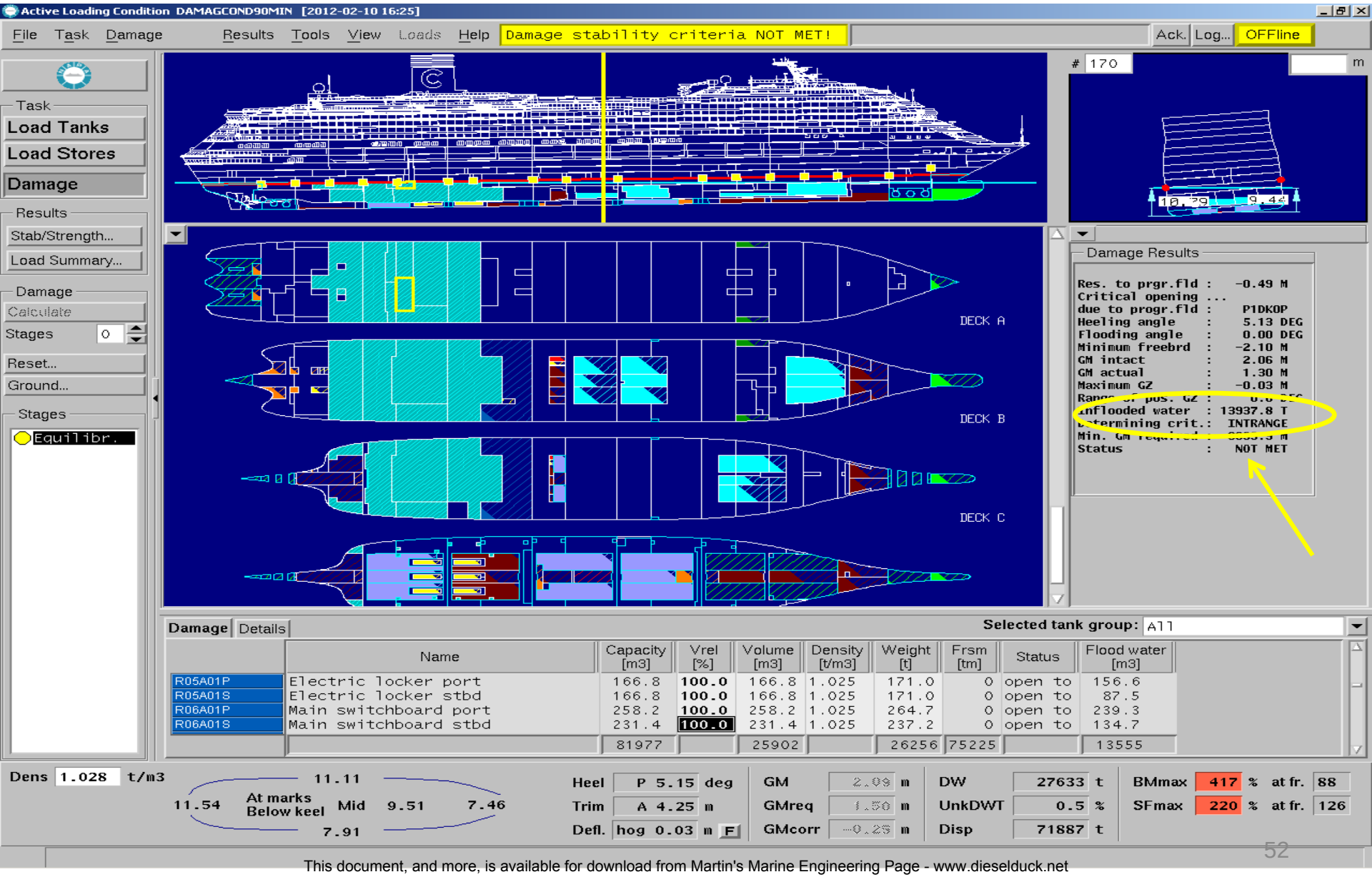
Damage condition after 50 minutes
inflooded water 6588.0 t



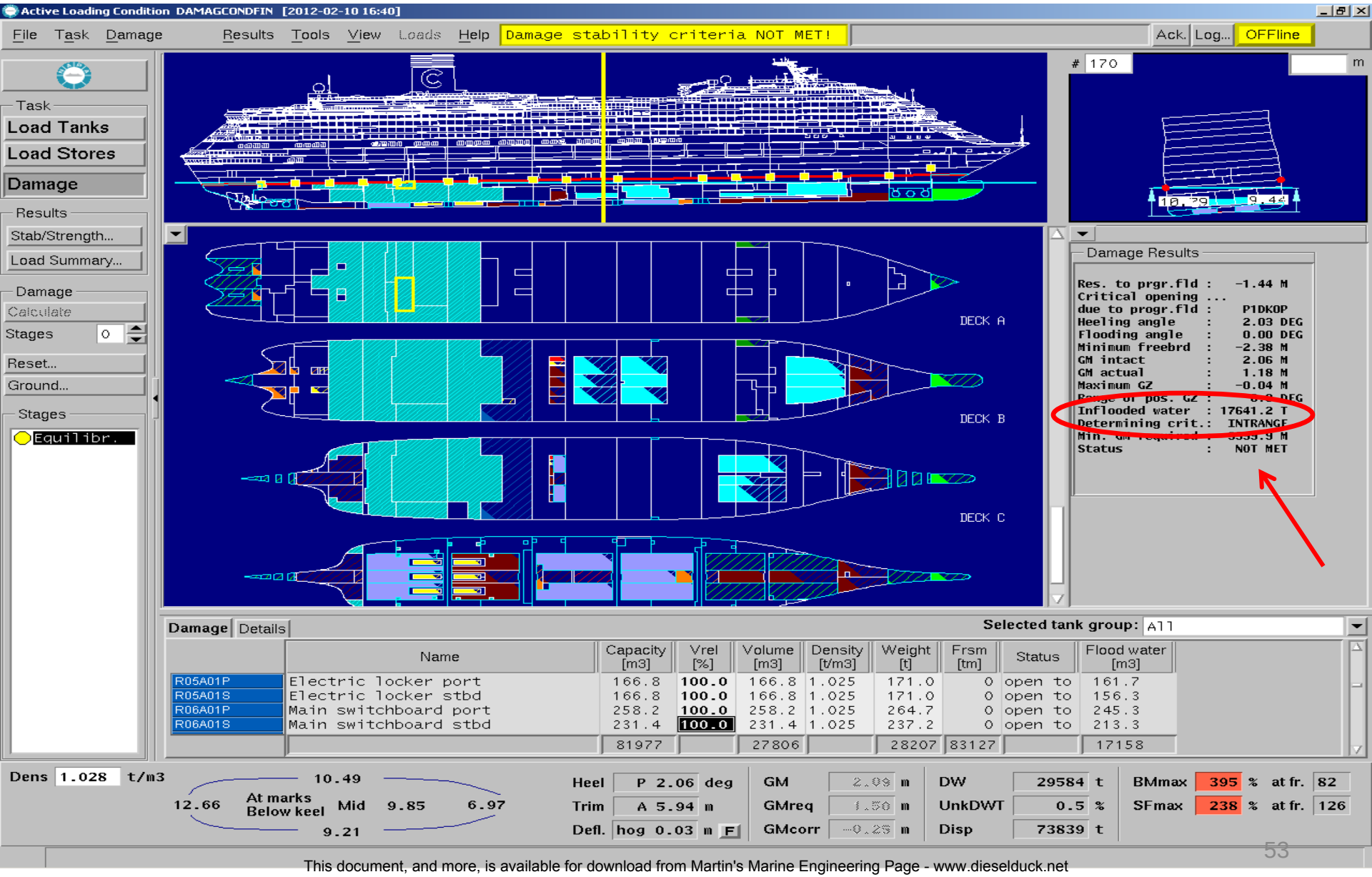
Damage condition after 70 minutes
inflooded water 6836.5 t



Damage condition after 90 minutes
inflooded water 13937.8 t



Damage final condition
inflooded water **17641.2 t**



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- ***Critical point*** **- <u>delay in sounding the "General Emergency</u>"** alarm and taking timely steps to abandon the ship

- Organization of the abandonment of the ship was **<u>on the whole appropriate</u>** to manage an emergency such as the one that occurred a Giglio Island

5. INVESTIGATION UNDERWAY

5.1 Issues still under investigation

CREW MANNING

- Recruitment of crew members
- Muster List arrangement
- Management of "Complementary" personnel
- Familiarization with emergency tasks/roles

VOYAGE

- Navigation planning
- Bridge asset
- "*Master Com*" procedure

5. INVESTIGATION UNDERWAY

5.1 Issues still under investigation

STABILITY

- Leak assessment
- Flooding dynamics
- Ship response capacity to flooding
- Watertight compartment system

BLACK OUT

- Loss of electric power
- Loss of electric power distribution
- Emergency electric source

5. INVESTIGATION UNDERWAY

5.1 Issues still under investigation

GENERAL EMRGENCY MANAGEMENT

- Internal communication
- Emergency timing
- Bridge team crisis response

SAFETY EQUIPMENTS

- Survival crafts and rescue boats
- Effects of the progressive ship asset on the evacuation procedure
- Ship evacuation timing

5. INVESTIGATION UNDERWAY

5.1 Issues still under investigation

SHIP DEVICES/ CAPABILITY TO PUT IN PLACE AN ADEQUATE RESPONSE TO THE EMERGENCY

- Devices Arrangement
- Devices Vulnerability
- Devices Interoperability
- Redundancies

THANKS FOR YOUR ATTENTION

ITALIAN MARITIME INVESTIGATIVE
BODY ON MARINE ACCIDENTS

ANY QUESTION OR REQUEST FOR CLARIFICATION MAY BE ADDRESSED BY MAIL TO

investigative.body@mit.gov.it