Report of safety investigation

KLEIN FAMILIE
SICHEM PANDORA

Bureau d'enquêtes sur les évènements de mer

Report of the inquiry into

THE COLLISION

BETWEEN THE LONGLINER

KLEIN FAMILIE

AND THE CHEMICAL PRODUCTS CARRIER

SICHEM PANDORA

ON 05th JANUARY 2006
IN THE NORTHEASTBOUND LANE
OF THE OFF CASQUETS TSS

Warning

This report has been drawn up according to the provisions of Clause III of Act No.2002-3 passed by the French government on 3rd January 2002 relating notably to technical and administrative investigations after accidents at sea and the decree of enforcement No. 2004-85 of 26th January 2004 relating to technical investigations after marine casualties and terrestrial accidents or incidents, and in compliance with the "Code for the Investigation of Marine Casualties and Accidents" laid out in Resolutions A.849(20) and A.884(21) adopted by the International Maritime Organization (IMO) on 27/11/97 and 25/11/99.

It sets out the conclusions reached by the investigators of the *BEA*mer on the circumstances and causes of the accident under investigation.

In compliance with the above mentioned provisions, the analysis of this incident has not been carried out in order to determine or apportion criminal responsibility nor to assess individual or collective liability. **Its sole purpose is to identify relevant safety issues and thereby prevent similar accidents in the future.** As a consequence**,** the use of this report for other purposes could therefore lead to erroneous interpretations.

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ANNEXES

List of abbreviations

A1	:	In the GMDSS, a sea area within range of a shore-based VHF DSC coast station
A2	:	In the GMDSS, a sea area within range of a shore-based MF DSC Coast station
A3	:	In the GMDSS, a sea area covered by at least one geostationary INMARSAT satellite
A4	:	In the GMDSS, a sea area outside areas A1, A2 or A3
AIS	:	Automatic Identification System
ANFR	:	Agence Nationale des Fréquences (French National Frequencies Agency)
***BEA*mer**	:	Bureau d'enquêtes sur les évènements de mer (French maritime accident investigation Bureau)
BPNM	:	Brevet de patron de petite navigation (Certificate of competency for inshore navigation)
CAPM	:	Certificat d'Aptitude Professionnelle Maritime
CIN	:	Certificat d'Initiation Nautique
COSPAS-SARSAT	:	International organization using satellites for distress situations (SARSAT : Search And Rescue Satellite-Aided Tracking system)
CROSS	:	Centre Régional Opérationnel de Surveillance et de Sauvetage (Regional Centre for Monitoring and Search and Rescue Operations)
DSC	:	Digital Selective Calling
EPIRB	:	Emergency Position Indicating Radio Beacon (COSPAS-SARSAT)
GMDSS	:	Global Maritime Distress and Safety System
GPS	:	Global Positioning System
IMO	:	International Maritime Organization
INMARSAT	:	International organization using telecommunications satellites in geostationary orbit
ISM	:	International Safety Management (Code)
kW	:	Kilowatt
MAIB	:	Marine Accident Investigation Branch

MF	:	Medium Frequency
MMSI	:	Maritime Mobile Service Identity : GMDSS identification number for ships
MRCC	:	Maritime Search and Rescue Coordination Centre
MDV	:	Mine Disposal Vehicle
PCM	:	Permis de Conduire les Moteurs (Licence to operate small engines)
PFD	:	Personal Flotation Device
ROC	**:**	Restricted Operator's Certificate
ROV	:	Remotely Operated Vehicle
TSS	**:**	Traffic Separation Scheme
UTC	:	Universal Time Coordinated
VHF	:	Very High Frequency

PRELIMINARY *REMARK*

The *KLEIN FAMILIE* was involved in a collision: this was clearly shown by inspection of the wreck by divers after the accident and by the statement made by the only survivor who saw the dark mass of a large vessel with pipes on its deck but which he was unable to identify.

By analysing the radar archives and reports made by ships to the JOBOURG TRAFFIC, a list of eleven ships likely to have been in the vicinity at the time of the accident was drawn up. Among them, the chemical carrier *SICHEM PANDORA* seemed most likely to have been involved in the accident and this was borne out by information obtained subsequently.

The aim of the *BEA*mer is to analyse the causes and circumstances of the accident in order to see what lessons can be learned from it to improve maritime safety.

Throughout this report the *SICHEM PANDORA* will be considered to be the vessel involved in the collision with the *KLEIN FAMILIE*. Proof of her possible involvement will not be developed as this is a matter for the judicial inquiry conducted by the vessel's flag state, viz. Malta. Under no circumstances may the analyses or conclusions drawn by the report be used as proof, nor may they be used to apportion civil or criminal liability or interfere with any ongoing or future judicial proceedings.

1 CIRCUMSTANCES

(All times are UTC +1)

On the 05th January 2006 the *KLEIN FAMILIE*, a wooden longliner a little under 15 metres in length sailed from Cherbourg around 0415 in the morning, with six crew on board. She set course to northnorthwest.

The weather was good with an easterly wind.

At 0848 the merchant vessel *ALBLAS* reported sighting a red rocket flare ; at 0945 she picked up a survivor from a liferaft who stated that he was a crew member of the *KLEIN FAMILIE*.

No trace was found of any of the other crew members.

A large number of airborne and nautical resources were deployed during 05th January in an effort to locate other survivors and to establish which ships were likely to have been in the area when the accident occurred.

The wreck of the *KLEIN FAMILIE* was pinpointed and identified on the 06th January by a French Navy minesweeper and a team of divers was sent down to ascertain whether any bodies remained on board and to make a description of the wreck for the technical investigators of the *BEA*mer and the legal authorities.

On the basis of the radar recordings made by JOBOURG TRAFFIC and observations made in situ, the chemical carrier *SICHEM PANDORA* was diverted to Dunkirk in the evening of 05th January 2006 following a Court decision. She was allowed to leave on 27th January 2006.

This accident raises the question as to whether watchkeeping obligations are really being fulfilled on merchant vessels and fishing boats; it also highlights the problem of locating and identifying fishing vessels as well as that of navigating in traffic separation schemes.

2 BACKGROUND

2.1 *KLEIN FAMILIE*

The *KLEIN FAMILIE* was a bottom longliner engaged in near water fishing and authorized to sail up to 20 miles from shelter. She was first operated in North Brittany under the name *GRAIN DE SEL* as a trawler/scallop dredger and, in March 1998, was bought by the mother of the present skipper who became her owner on 13th July 2004.

Her usual fishing grounds lay north and west of the Cotentin peninsula and in the area near and around the Channel Islands.

She would usually fish for rock salmon, ling, conger eels or cod.

Her fishing trips would usually last about 12 hours, with her departure time depending on the tide and chosen fishing ground; the aim would be to pay out the lines an hour before low water slack and to start hauling them in about a quarter of an hour after the tide began to rise again. The lines would be paid out with the vessel under way, that is, making 9 or 10 knots, following the current and the whole operation would take between 20 minutes and half an hour, the lines being paid out over the starboard quarter. The hauling operation would take two to three

hours at a speed of 3 to 4 knots. It was carried out using a line hauler positioned just abaft the wheelhouse.

Baiting the hooks would be carried out by the hands ashore before sailing and would take about four hours. Bait would consist of mackerel, cuttlefish or squid.

2.2 *SICHEM PANDORA*

The *SICHEM PANDORA* is a chemical tanker. She operates deep sea mainly in Europe, the Mediterranean and the Americas. She has belonged to the Norwegian group ARAGON CHEMICAL KS since she came into service and is operated by a Danish owner, EITZEN CHEMICAL A/S. Technical management is provided by a subsidiary company based in Singapore called TESMA which constitutes the "company" in the ISM meaning of the term.

3 THE VESSELS

3.1 *KLEIN FAMILIE*

The main characteristics of the *KLEIN FAMILIE* are as follows :

- Type of vessel : Bottom longliner;
- Length overall : 14.44 m;
- Length between perpendiculars : 13.69 m;
- Maximum breadth : 5.10 m;
- Depth : 1.80 m;
- Freeboard : 500 mm;
- London tonnage : 26.56;
- Diesel engine : BAUDOUIN 6R 120 SR22;
- Power : 158 kW at 1.800 rpm;
- Service speed : 9/10 knots;
- Construction : wood;
- Shipyard : DANIEL (Paimpol);
- Year of build : 1968;

- Registration : CH 221187;
- Call sign : FP 7613;
- MMSI N° : 227 322 790;
- Category of navigation : 3rd (up to 20 miles from shelter);
- GMDSS Ocean area : A1.

Although she was old, the vessel had been well maintained and was in good condition, as was evidenced by perusal of the reports of her safety inspections.

The underdeck spaces comprised four compartments, from fore to aft, the fish hold, the engine compartment, the crew's quarters and the steering gear compartment.

The main deck comprised, from fore to aft : a fore deck with a hatchway giving access to the fish hold, a wheelhouse with the wheelhouse itself occupying the forward half and a small galley/mess room in the after half, and a deck space covering more than half the length of the vessel extending aft to the transom. Access to the engine compartment was via a hatchway in the galley and to the crew's quarters via a hatchway on the after deck.

There were four berths in the crew's quarters, two longitudinal and two placed transversely aft.

The after deck was reserved for fishing operations. It was protected by a structure made of aluminium tubing over which an awning was placed forming a roof and sides. Over the transom and facing the stern, the awning remained permanently open; the lines were paid out through this opening. Vertically opening "doors" were placed in the forward part of each side, thus abaft the wheelhouse; they were rolled open and closed by means of zip fasteners. The port "door" remained closed while the starboard "door" remained permanently open : it was used when hauling in the lines or alongside for crew access and for loading or unloading fishing gear, stores or the catch. There was a line hauler on the starboard side just forward of the wheelhouse.

There was a steel gantry at the stern, outside the awning.

History and modifications

In February 2003 the vessel sprung a serious leak which resulted in the engine lub oil being contaminated by sea water.

The Navigation Licence and Load Line certificate were withdrawn on 06th August 2003 following a special survey in a shipyard during which a number of wooden parts around the stem were observed to have rotted and the stem itself was seen to be cracked; this damage was thought to be the result of inadequate repairs carried out by a shipyard. It was decided to replace the engine and bunker tanks at the same time as carrying out repairs to the hull.

Upon completion of these repairs the vessel underwent an annual survey on 3rd.October.2003. On this occasion, among other things, the owners were ordered to have the liferaft inspected (it had last been inspected in April 2003) and to have an inspector from the ANFR (National Frequencies Agency) finalize the DSC VHF installation. The Navigation Licence and Load Line certificate were renewed until 02nd October 2004.

Surveys and certification

The last annual survey was carried out on 18th November 2004. It gave rise to little in the way of prescriptions except for the repetition of a prescription dating back to October 2003 concerning the life raft which had last been inspected in April 2003, and which had not been acted on. The vessel's Navigation licence and Load Line certificate were renewed until 15th November 2005.

These certificates were out of date when the accident occurred. Examination of the dates at which they had previously been renewed showed that the owner had, on several occasions, not renewed them before expiry of their dates of validity.

Life raft

The vessel was equipped with a Class III 6 person liferaft fitted with a hydrostatic release unit.

As a result of the surveys conducted in October 2003 and November 2004 the owners were ordered to have the liferaft inspected, as the last inspection dated back to April 2003.

According to the sole survivor the liferaft was inspected just before Christmas 2005. It functioned correctly on the day of the accident as did the distress rocket flares it contained.

Radioelectric installation and aids to navigation

The vessel was equipped with two DSC VHF sets and a GMDSS compliant portable VHF. The installation was inspected by an inspector from the ANFR (National Frequencies

Agency) on 11th March 2005, who also strongly recommended that the vessel's MMSI number be programmed into the 2nd VHF set and that she be equipped with an emergency position indicating radio beacon before 1st January 2006, date at which they became mandatory for 3rd category fishing vessels (up to 20 miles from shelter).

On the day of the accident, the EPIRB had not been placed on board.

The *KLEIN FAMILIE* was fitted with two radar sets with guard alarm zones.

She was fitted with a radar reflector mounted on the stern gantry which was the highest part of the vessel.

Watchkeeping

The skipper stood watch by himself in the wheelhouse.

VHF channels used were 6, 9 and 72 ("private" channel) with permanent watch on channel 16, and CB.

The *BEA*mer investigators were unable to determine how the radars were set. The usual practice of the skipper of a similar vessel, the *CALYPSO*, is to have one radar set on 3 miles, the other on 6 miles and the guard zone alarm set on 1.5 miles.

Fishing gear

The fishing gear consists of a number of lines, each one 1000 metres long, to which are connected 290 branch lines (or snoods) each equipped with a hook. The lines are stowed in metal bins and, when the lines are set, are interconnected to form a main line at the ends of which two buoy lines are connected to marker buoys.

Anchors fixed to ends of the main line keep it on the seabed and prevent it from drifting in the current. Grapnels or weights can be fixed between the lines to keep them on the sea bottom according to the nature of the seabed.

Balls are fitted to the buoy lines at the ends of the main line between the anchor and the marker buoy so that the line comes in evenly when it is hauled.

There were twelve lines on board. A main line could therefore be 12 000 metres in length and have 3 500 hooks.

The marker buoys consist of a buoy and pole about 3 metres high. The pole is fitted with a flag at its top end enabling it to be identified in daylight and two flashing white lights for nighttime use. As the lights used on the *KLEIN FAMILIE* did not have an on/off switch, usual practice was for the skipper to insert three new batteries into the marker buoys when he came on board just before sailing. This meant that the lights operated permanently from the time the vessel set sail until she returned to quay.

There were four marker buoys on board and two of them had marker lights. Three of them were stowed vertically, forward of the wheelhouse, while the fourth one was stowed horizontally at the after end of the work deck, with the pole projecting about one or two metres over the transom bulwark. One of the three buoys stowed forward and the horizontally stowed one aft were equipped with marker lights.

As there were four marker buoys, one main line 12 000 metres long or two main lines the lengths of which could be modified according to the conditions, could be set.

3.2 SICHEM PANDORA

The main characteristics of the *SICHEM PANDORA* are as follows :

- Type of vessel : chemical tanker;
- IMO class : II / III;
- Length overall : 116.59 m;
- Length between perpendiculars : 110.00 m;
- Overall breadth : 19.00 m;
- Depth : 10.1 m;
- Freeboard at summer draught : 2 313 mm;
- Summer draught : 7.79 m;
- Gross tonnage : 6 544;
- Net tonnage : 3 081;
- Deadweight : 9 214 tonnes;

- Diesel engine : Mak 6M 552 C;
- Power : 4 050 kW;
- Service speed : around 12 knots;
- Speed in light condition : around 13.5 knots;
- Year of build : 1994;
- Shipyard : HYUNDAI (South Korea;
- IMO N° : 9050412;
- Call sign : 9HKI8;
- MMSI N° : 256 075 000;
- Flag : MALTA;
- Classification society : DET NORSKE VERITAS;
- Class notation : 1A1 ICE-1A Tanker for Oil Products and Chemicals ESP E0 ICS;
- GMDSS ocean area : A1+A2+A3.

The vessel was delivered under the name *MALENE SIF*, was subsequently renamed *SICHEM MALENE* before taking her present name in November 2002. She successively flew the flags of Denmark (International Registry), Singapore, Isle of Man, Singapore again and finally Malta from 22nd December 2005. She has always had the same owners.

She has ten cargo tanks: two centre tanks and eight wing tanks as well as two slop tanks. Each tank is fitted with its own submerged pump.

It is worthy of note that the vessel is classed for navigation in ice. Her oval-shaped bulbous bow has been strengthened to this end and reaches a height of 6.5 metres above the vessel's base line.

Surveys and certification

All the safety and pollution prevention certificates were issued by Det Norsk Veritas on 22nd December 2005 acting on the authority of the State of Malta and were valid until 21st.May.2006.

The ISM Safety Management Certificate was issued by Det Norsk Veritas on 22nd.December 2005 and was valid until 22nd May 2006.

The ISM Code Document of Compliance was issued on 02nd November 2005 to TESMA Singapore Pte. Ltd by Det Norsk Veritas, and is valid until 31st October 2010.

Port State Control

Between 1999 and 2006 the vessel was inspected thirteen times by port State control within the framework of the Paris Memorandum of Understanding and by the US Coast Guard. She has never been detained and only three deficiencies were reported during the inspections.

The same level of general maintenance has been observed for the whole EITZEN fleet : in the 19 inspections carried out between 1999 and 2006 9 deficiencies were reported and no vessel was detained.

Bridge equipment

The vessel has an enclosed bridge and is equipped with a sound reception system in compliance with Rule 19.1.2.8 of Chapter V of the SOLAS Convention. The *BEA*mer investigators tested this equipment while the vessel was alongside. They were able to hear the forward whistle, faintly, with the main engine and part of the engine room ventilation system stopped. They also tested the windscreen wipers and clearview screens which were found to be working correctly.

The vessel is fitted with two radar sets : a 3 cm relative motion radar set on the port side of the bridge and a 10 cm set which can be set to relative or true motion on the starboard side. Both radar sets have an automatic radar plotting aid (ARPA) system. They have blind sectors forward between 359° and 001° and aft betwe en 176° and 190°. In light condition the blind area ahead masked by the stem is 30 metres, in loaded condition it is 25 metres.

The radiocommunications equipment complies with the requirements for ocean area A1, A2 and A3 with one INMARSAT C station and one type B station.

The vessel has three VHF sets.

The ANSCHUTZ helm and automatic pilot console comprises a switch to pass from manual to automatic steering and vice versa. It takes 20 seconds to pass the helm from hard over on one side to hard over on the other side (35° on each side).

The turning circle diagrams of the vessel show that when the helm is put hard over to starboard with the vessel in light condition making 15.5 knots, her heading changes by 90° in 48 seconds, the advance being 0.17 miles, with the speed decreasing to 10.5 knots.

The vessel is fitted with a paper course recorder which is operational.

As the vessel is fitted with a controllable pitch propeller, both the propeller pitch and the engine can be controlled on the bridge from two KAMEWA consoles on each side of the bridge.

Bridge watchkeeping

Bridge watchkeeping is divided into three watches with a watchofficer and a rating. Watchkeeping hours are 0 to 4, 4 to 8 and 8 to 12. The master does not stand watch and can ask the watchofficer to stand watch alone during the day.

The passage plan includes, amongst other things, details of how the watches are organized :

A : watchofficer and rating;
B : master, watchofficer and rating;
C : master, two watchofficers and rating;
D : master, pilot, watchofficer, rating and helmsman.

It also mentions what navigational aids should be used for position fixing and how often this should be done.

During each watch the rating makes two safety rounds each lasting about ten minutes which are recorded in the log book.

Both radars are working with the guard zone alarm set to two miles.

At sea, the changeover from autopilot to manual steering is tested every four hours. The *BEA*mer investigators noted that such a test was recorded in the log book for 05th January 2006 but were unable to consult the rest of the log book to check whether the same was true for the preceding days. The course recorder showed no course changes at the time of these tests.

VHF channels guarded are 16 and 13, the latter being required for transiting TSSs, as well as channel 71 for internal communications.

4 THE CREWS

4.1 *KLEIN FAMILIE*

Minimum manning requirements were set at three persons with a maximum of six persons being allowed on board.

Crew composition of the *KLEIN FAMILIE* remained stable with four crew members including the skipper who had sailed in her since 2000; the younger crew members had joined her in March and August 2005 after leaving their maritime training schools.

The members of the crew possessed the requisite qualifications.

The skipper held a motorman's certificate of competency enabling him to act as Chief engineer for engines up to 160 kW, as well as a certificate of competency for inshore navigation enabling him to command fishing vessels up to a gross tonnage of 200 navigating less than 20 miles from the coast, or act as Chief engineer for engine powers of less than 250 kW. He also held a Restricted Operator's Certificate (ROC).

The five deckhands had all followed approved courses in maritime training centres.

There were usually six persons on the crew list. On the day of the accident, there were five persons on the crew list but six persons on board. This can be explained by the fact that one of the crewmembers had fallen ill on 16th November 2005 and the crew list had been changed to five persons. The list was then withdrawn for the end-of-year holiday period. When it was renewed, by telephone, on 03rd January 2006, there was a misunderstanding. When it was stated that the crew list should be renewed "as before", the official from the maritime authorities put five crewmembers on the list thinking this meant that the sick crewmember was still ill whereas, in fact, he was rejoining the vessel. The mistake was all the easier to make as the sick seaman was the brother – and thus had the same name - of another crewmember on the latest list.

This difference between the number of persons on the crew list and the number of persons actually on board made the conduct of the rescue operation more difficult.

The skipper had not had a medical fitness examination for four years and two months, another crewmember for three and a half years. The others possessed valid medical certificates.

4.2 *SICHEM PANDORA*

The crew of the *SICHEM PANDORA* comprises 15 members.

The deck officers and chief engineer are Russian. The other crewmembers are Latvian, except for the 2nd engineer who is Estonian and the Electrician who is Ukrainian.

The master holds an unrestricted master's licence, issued on 30th July 2002 and renewed until 18th May 2006 by the Russian Federation.

The Chief mate who was on watch at the time of the accident, holds an unrestricted chief mate's certificate, issued on 30th October 2001 and renewed until 13th September 2006 by the Russian Federation.

The rating on watch at the time of the accident holds an unrestricted able seaman's certificate enabling him to stand the navigation watch, issued on 08th May 2002 by the Republic of Latvia.

5 SEQUENCE OF EVENTS

(all times are UTC + 1)

5.1 *KLEIN FAMILIE*

Note : the times concerning the *KLEIN FAMILIE* are based on the statements made by the sole survivor, who did not have a watch. They are therefore imprecise. The way they have been estimated is explained in paragraph 6.2 below.

5th January 2006

- Around midnight, the crew of the *KLEIN FAMILIE* arrive on board to bait the lines.
- 0345 : the *CALYPSO*, another longliner based in Cherbourg set sail. The two vessels often worked together.

- Around 4 o'clock, the skipper of the *KLEIN FAMILIE* went on board. He inserted batteries into the lanterns of the marker buoy poles, which functioned permanently from that moment on (flashing lights).

- Around 0415 the *KLEIN FAMILIE* set sail with the skipper at the helm. It was the season's first trip for cod fishing. The trip to the fishing grounds would normally take three to four hours before the lines were set one hour before low water slack. It was planned to return to port towards 1500 or 1600 and to put out to sea again at 0500 the following morning. The crew carried on baiting the lines until the West jetty was passed and then paused for a snack.

- Around 0450 the *KLEIN FAMILIE* passed the CH1 buoy and the crew turned in. The future survivor took the starboard bunk, forward, directly below the access ladder. The skipper was still in the wheelhouse at the helm. A rating remained on deck, aft, to keep an eye on the fishing gear.

- About 6 o'clock / 0630, the last VHF contacts were made between the *KLEIN FAMILIE* and the *CALYPSO*.

- Shortly before 8 o'clock the *KLEIN FAMILIE* was struck violently. It was still dark. The survivor was thrown out of his bunk, swamped by torrents of water through the hatchway and heard the screeching and grinding of metal. He managed to climb out of the crew's quarters without really knowing how. All he could see was the roof of the wheelhouse with the aerials and liferaft. He could make out the looming mass of a ship, probably blue, with pipes on its deck. He swam to the wheelhouse to which the liferaft was fastened. He pulled out about ten metres of the liferaft painter, but had to give up, exhausted by cold and shock. He saw the rating who had been on watch on the afterdeck clinging to a floating ball. The survivor began to swim towards him but then heard the sound of the liferaft inflating. He swam over to it, climbed on board and called out to his crewmate to join him. The latter refused because he was afraid of sinking as he was wearing boots and was not wearing any flotation device. The survivor slipped into the water again and tried to swim towards his crewmate. He gave up when he realized the liferaft and floating ball were drifting in opposite directions. He swam back to the liferaft and neither saw nor heard anything more. He picked up a paddle and managed to recover a lifebuoy fitted with a floating light. According to his statement the sea was fairly rough with a 2 metre swell.

- Day was beginning to break and it must have been about 0805, the survivor sighted a ship and waved the light but to no avail.

- After about an hour – it was now daylight, meaning it was about 0845 – the survivor came across a pack containing distress rocket flares and safety equipment. Seeing that three ships were coming towards him, he set off a rocket flare, then a second as the ships got closer.

- 0848, the vessel *ALBLAS* reported to MRCC JOBOURG sighting two red flares to her starboard side in the north-east lane of the Off Casquets TSS. The vessel *STEINES* confirmed the sightings.

- 0852, PAN messages were transmitted, in English and in French, by MRCC JOBOURG.

- 0854, the vessel *ALBLAS* reported sighting a liferaft astern of her. She altered course towards it, followed by the *STEINES*.

- From 0902 onwards airborne and seaborne resources were deployed : FALCON 50, Air Search One from Guernesey, a French customs helicopter, a Dauphin helicopter from the civil defence service, the Gendarmerie patrol boats *GÉRANIUM* and *GLAIVE*, as well as the Guernesey and Alderney lifeboats, *HUNTZEBORG* et *PETITE JULIE*.

- 0912, the *STEINES* reported one person alive in the liferaft. The *ALBLAS* commenced the rescue operation.

- 0945, the *ALBLAS* reported to MRCC JOBOURG that the survivor had been picked up.

- 0946, the survivor confirmed the sinking of the *KLEIN FAMILIE* with 5 persons on board : 3 missing, one man overboard and one survivor.

- 0950, the FALCON 50 was designated OSC for the airborne resources.

- 1041, the customs helicopter reported the presence of numerous debris in position 49°51.26 N, 002°36.93 W.

- 1055, it reported the position of the drifting liferaft as 49°51.32 N, 002°37.09 W.

- 1135, the survivor was winched up on to the civil defence Dauphin helicopter and flown to Cherbourg hospital.

- 1220, the maritime authorities in Cherbourg indicated that there were six persons on the *KLEIN FAMILIE*, according to the statement made by the survivor.

- 1730, all seaborne resources were stood down.

- 1740, the SAR operation ended.

6th January 2006

- 1450, a wreck was located in 70 metres of water in position 49°51.448 N, 002°37.137 W by the sonar of the minesweeper *CROIX DU SUD*.

7th January 2006

- 1318, the wreck was formally identified by the self-propelled mine disposal vehicle of the *CROIX DU SUD*.

- 1645, divers from the *CROIX DU SUD* went down to the wreck and shot videos of her.

9th to 12th January 2006

- Divers from the French mine disposal unit for the Channel area shot more video footage.

- The ROV ULISSE (*Unité Lourde d'Intervention Sous-marine de Surveillance et d'Expertise* - underwater surveillance and survey heavy intervention unit) was deployed from the *ARGONAUTE,* a support vessel chartered by the French Navy.

5.2 *SICHEM PANDORA*

28th December 2005

- 0720 local time (UTC +1), the *SICHEM PANDORA* left the port of SFAX in Tunisia, in ballast, bound for FLUSHING in Netherlands. She was to load a cargo of paraffin for

MONTREAL, the charter party stipulating that the vessel should arrive in FLUSHING on the 6th January 2006 before 2400 UTC. Draughts on departure were 3.5 metres forward and 5.9 metres aft.

5th January 2006

- 0400, the *SICHEM PANDORA* was proceeding on course 060° 42 miles from the en trance to the northeast lane of the Off Casquets TSS. The watch changed. According to the log book, there was a northeast force 4 wind, sea state was 3, visibility was 7 miles and the sky was overcast. During the watch, the rating made two rounds in the superstructures at 5 o'clock and 7 o'clock.

- 0649, she entered the northeastbound lane of the TSS and the watch officer altered course to 075° under autopilot. According to record ings made by JOBOURG TRAFFIC, the course change was made between 0548 and 0555 UTC. The course recorder on the *SICHEM PANDORA* indicated 0600 UTC which made it about twelve minutes fast compared to MRCC JOBOURG.

- 0750, according to the statement of the watch officer, a white flashing light similar to that of a fishing buoy marker was sighted ahead and slightly to port, at a distance which the rating estimated at between one and two miles and the officer one mile. The latter who was standing near the starboard radar switched over to manual steering and told the rating to put the helm hard over to starboard. The rating altered course by 10° stages every 5 to 10 seconds. The officer went and stood on the port side and when the flashing light was abeam, ordered the helmsman to alter back to the original course. According to the recordings made by JOBOURG TRAFFIC the manoeuvre was carried out between 0652 and 0654 UTC, with the course becoming 100.2° and ground speed dropping from 9.5 to 7.9 knots. The vessel returned to her initial course at 0700 and normal speed was attained again at 0703 UTC. The course recorder on the *SICHEM PANDORA* timed the course change at 0700 UTC, which, allowing for the time discrepancy, gives an actual time of 0648. The officer continued to observe the flashing light on the port quarter and pointed it out to his counterpart who took over the watch at 0800.

- 2205, the *SICHEM PANDORA* was instructed by MRCC GRIS-NEZ on VHF channel 13 to divert to DUNKIRK after requisition of the Maritime Prefect for the English Channel and North Sea by the public prosecutor in Cherbourg.

6th January 2006

- 0100, Dunkirk pilot embarked in the Calais roads. Forward draught : 4.2 metres, aft draught : 5.8 metres.

9th January 2006

- The *SICHEM PANDORA* was detained in the port of Dunkirk at the request of the Maltese and French judicial authorities.

27th January 2006

- The *SICHEM PANDORA* was authorized to leave the port of Dunkirk by both the Maltese and French authorities.

6 CIRCUMSTANCES OF THE ACCIDENT

The best way to establish the circumstances in which the collision occurred is first to analyse the observations of the *KLEIN FAMILIE* and the *SICHEM PANDORA* after the accident, then to determine the most likely time for the accident and the respective positions of the vessels at that moment and finally, using this information, to form an opinion as to the most plausible circumstances for the accident.

6.1 Observations

KLEIN FAMILIE

Information was gathered during several dives on the wreck using an MDV, a ROV and divers, as well as from the survivor's statement.

The wreck was lying on her port side in 63 metres of water, with her bow pointing more or less towards the east.

Towards the bows, it was seen that the wheelhouse had completely disappeared. The stem was twisted to port. On the starboard side the frames and side shell and bulwark strakes had been ripped away from about fifty centimetres abaft the stem over one third of the vessel's

length, up to the bulkhead separating the fish hold from the engine spaces, which itself also seemed to be severely damaged. These frames and strakes formed a panel lying on the seabed alongside the vessel and seemed to be completely separated from the rest of the hull. Less than one metre from the after end of this panel, the line hauler was still in place, seemingly intact.

The keel, floors and bottom strakes were still in place.

On the port side forward, the frames and side shell are missing from one metre abaft the stem over one third of the vessel's length. What appears to be a two or three metre length of bulwark handrail was still attached to the stem.

Lying vertically on the seabed ahead of the panel formed by the frames and starboard side shell was a parallelepipedal block about one metre high. This could have been a hatch cover with its coamings or the wheelhouse control console. On top of it there was a piece of wood which seemed to be a bulwark handrail with two stays.

On the starboard side of what had once been the wheelhouse, the engine and clutch controls could be seen, with the levers in opposite position.

From these observations of the forward part of the *KLEIN FAMILIE* it can be inferred that her forward third was struck just abaft the stem by a round-shaped object such as a bulbous bow : a straight stem would have sliced through the keel. The shock occurred from port to starboard, smashing the port frames and side shell to pieces and ripping off their starboard side counterparts, while leaving the bottom strakes and floors intact. The fact that the line hauler remained attached to the frames and bulwark and the state of the bulkhead between the fish hold and engine spaces showed that the impact occurred forward of the wheelhouse, which was destroyed and the roof of which was torn off as this was one of the few parts of the vessel which the survivor was able to see.

On the work deck, the bins containing the longlines were still in place, although some of them had tipped over, explaining the noises of metal the survivor heard. The tangled fishing lines protruding from them showed that the vessel had not commenced fishing operations and was still en route to her fishing grounds. This is borne out by the fact that the survivor was still in his bunk.

A large part of the awning over the work deck was torn off.

The gantry was apparently intact and the radar reflector was still in place.

There was a breach in the lower strakes of the transom, through which the steering gear compartment could be seen.

The propeller and rudder blade were intact. The rudder blade was turned slightly to port. The damage to the transom, which was unconnected with the damage to the bows, seemed to have been caused when the vessel hit the sea bottom.

The underwater images showed a bright flashing light at the stern on the starboard side, outside the hull, which may be the marker of the pole stowed astern.

SICHEM PANDORA

Divers observed traces of green and yellow paint on starboard side, on the bulbous bow as well as below the waterline.

At the time of the collision, the forward draught was 4.2 metres, always supposing that there were no ballast movements between the supposed time of the collision on 5th January and arrival at the Dunkirk pilot station at 0100 the following morning.

The upper third of the bulbous bow would therefore have been above the waterline.

6.2 The supposed time of the accident and the positions of the vessels

It is assumed that the position of the wreck of the *KLEIN FAMILIE* corresponds more or less to the position where the collision occurred : as the survivor said, when he emerged from the crew's quarters, all he could see was the roof of the wheelhouse with the liferaft and the radio aerials. It is therefore highly likely that the wheelhouse was torn from the hull, which, no longer having any reserve of buoyancy, must have sunk almost immediately under the weight of the engine and the various other equipment.

The hypothesis which puts forward the idea that, after the collision, the *KLEIN FAMILIE* could have drifted sufficiently close to the surface to be struck a second time and destroyed once and for all, is not realistic : the resting crew would have had time to get out of the crew's quarters and the skipper might have had time to transmit a distress message. The suddenness of the event, as described by the survivor, could in no way fit into such a hypothesis.

The position of the wreck, as measured, is 49°51.4N , 002°37.1W. The accident must have happened within a few tens of metres, at most, from this position.

Having established this, it was necessary to determine the time of the collision and any connections that existed with the position of the vessels in the area. Concerning this last point, it must be said that the positions of the various merchant ships in the area were established using radar recordings from JOBOURG TRAFFIC. The *KLEIN FAMILIE* was not, however, detected by this radar because of her low equivalent radar surface area and her distance off : her course was put together using the position of the wreck, her characteristics, tidal and wind conditions and various statements.

The *KLEIN FAMILIE* (see annexe B)

Determining the time of the accident using elements from the *KLEIN FAMILIE* could be done with two different approaches : basing it either on the longliner's particular way of working which is closely linked to the tides, or on what was said in the survivor's declarations with regard to the progression of daybreak.

The first approach is based on the way longliners work : they set their lines, sailing with the current, between half an hour and an hour before low water slack, according to the tidal coefficient. The operation takes between twenty minutes and half an hour and must be finished before slack water. In the area where the wreck of the *KLEIN FAMILIE* lies, the SHOM publication 562 UJA "*courants de marée dans le Golfe Normand-Breton",* giving tidal information for the area indicates that slack water occurs 2 hours before high water at Saint Malo, corresponding to 3 hours 40 minutes before high water at Cherbourg. This gives a current of 3.1 knots setting 251° at 0650, 2.4 knots setting 250° at 0720 and 1.8 kno ts setting 250° at 0750 with the tide turning at 0850.

The *KLEIN FAMILIE* would therefore have had to set course to westsouthwest and begin setting her lines at 0750. We do not know whether the skipper intended to set his lines as one longline or divide them into two lines, which would have had an effect on the time needed; nor do we know exactly where he intended to fish. Whatever his intentions may have been, the operation had to be finished before 0850.

Presuming that the *KLEIN FAMILIE* took the shortest route via the *Basse Bréfort* buoy, she would have passed the CH1 buoy at 0450 on 5th January 2006, taking into account the fact that she sailed at about 0415 and that the distance between the outer harbour and the CH1 buoy is 5.4 miles which would take 36 minutes to cover at 9 knots.

Using this hypothesis, the *KLEIN FAMILIE* would have arrived at the position of the wreck at 0802.

Two factors need to be taken into consideration : for the purposes of our calculation, we suppposed that the *KLEIN FAMILIE* , on leaving the outer harbour had set course directly towards the *Basse Bréfort* buoy to leave it to port, but she might also have gone towards the CH1 buoy which is 0.4 miles or three minutes longer. Arrival time at the position of the wreck, with a speed of 9 knots would then have been 0805.

The second factor is the estimation of the speed through the water as being 9 knots. The 15 knot easterly wind would certainly have had an effect on the speed taking into account that the *KLEIN FAMILIE* was riding high out of the water and had a large sail area because of the awning which covered two thirds of her length. Allowing for these elements, her speed through the water could be estimated at 9.5 knots which meant she would have reached the position of the wreck at 0750.

From this it can reasonably be assumed that the *KLEIN FAMILIE* arrived at the position where the wreck was found sometime between 0750 – with a speed through the water of 9.5 knots, allowing for the effect of the easterly wind and following the direct route from Cherbourg outer jetty and the *Basse Bréfort* buoy – and 0805 – with a speed through the water of 9 knots, passing via the CH1 buoy and making no allowance for the wind or considering that it was offset by the state of the sea. It also seems reasonable to suppose that the effect of the wind was greater than that of the sea, which was from the starboard quarter and that **it is more likely that the time of the accident was 0750 rather than 0805.**

The second approach is to link the survivor's statements and the position of the ships in the area to the times of daybreak.

For Cherbourg on 5th January 2006, the IMCEE (Institut de mécanique céleste et de calcul des éphémérides – *Institute of celestial mechanics and the calculation of astronomical tables*) gave the following times :

astronomical dawn	:	07 hrs 05 min 40 sec UTC +1
nautical dawn	:	07 hrs 44 min 32 sec UTC +1
civil dawn	:	08 hrs 25 min 18 sec UTC +1
sunrise	:	09 hrs 04 min 31 sec UTC +1

As the sky was very cloudy, the beginning of daybreak can be placed somewhere between nautical dawn and civil dawn, that is around 0805.

If the accident had happened around 0805 the survivor would have noticed that day was beginning to break, but he declared very positively that it was totally dark at the time of the accident.

He mentioned that day was beginning to break when he sighted a cargo vessel and waved the floating light in the air.

Referring to the radar recordings from JOBOURG TRAFFIC, the cargo vessel was most probably the *MARIE SCHULTE* which was 2.5 miles to the west and passed 0.5 miles from the position of the wreck at 0812.

The logical conclusion is that **the *KLEIN FAMILIE* was in collision at about 0750 and not around 0805.**

After a length of time which he thought was about an hour, the survivor sighted a group of three vessels and noticed that it was daylight. This moment would have been between civil dawn, 0825 and sunrise, 0904, or around 0845. The group of ships was made up of the *ALBLAS*, the *STEINES* and the *KINGFISHER,* according to the radar recordings from JOBOURG TRAFFIC. The rocket flares fired by the survivor were sighted by the *ALBLAS* and the *STEINES* at 0848. Counting back one hour from 0848, we have 0748.

This is further confirmation that the collision occurred around 0750.

Both analyses, one based on the tidal currents, the other on the times of dawn, tend towards a common conclusion, namely, the time of the accident was around 0750.

SICHEM PANDORA (see annexes C.2 and C.3)

The radar recordings from JOBOURG TRAFFIC concerning the *SICHEM PANDORA* give her position in latitude and longitude, course and ground speed every sixty seconds.

They place the *SICHEM PANDORA* at 07 hrs 50 min 07 sec on 5th January 2006 in position 49°51'12'' N, 002°37'44'' W, or using decimal notation : 49°51.2' N, 002°37.7' W.

The *SICHEM PANDORA* was then bearing 250° distance 0.4 miles from the position of the wreck over which it passed 2 and a half minutes later with a ground speed of 9.5 knots. This corresponds exactly to the moment at which the radar recordings from CROSS JOBOURG show a sudden 30° course change to starboard and with the indications of her course recorder.

At 08 hrs 05 min 07 sec, again according to the CROSS radar recordings, she was in position 49°51'50''N 02°34'18'' W, that is, bearing 075° 1.9 miles from the position of the wreck; her speed was 7.6 knots corresponding to the decrease in speed due to the zigzag manoeuvre.

The *SICHEM PANDORA* was in close proximity to the position of the wreck at 0750.

The other vessels (see annexes C2 and C3)

JOBOURG TRAFFIC drew up a list of 11 vessels which passed close to the position of the wreck, or ten, if the *SICHEM PANDORA,* dealt with above, is excluded. The aim was to discover whether they could have been at the position where the wreck of the *KLEIN FAMILIE* was discovered, at 0750.

The charts appended in the annexes to this report to illustrate this analysis place the vessels with regard to the position of the wreck of the *KLEIN FAMILIE* by tenths of a mile to the north or south of this position. Copies of the radar screen images can also be found in the annexes and complete the illustration.

The *MSC LEA* passed 0.1 mile to the north of the wreck position at 0645. She cannot have been in collision with the *KLEIN FAMILIE* at this time as the latter would have been north of the Channel Islands, between the Casquets and Alderney, unless she had set sail from Cherbourg an hour earlier than was the case. The same is true of 0750 : the *MSC LEA* was in position bearing 075° 19 miles away.

If the *KLEIN FAMILIE* had followed a more northwesterly course (315°), she could have cut the *MSC LEA'S* track at about 0720. Assuming the two vessels collided and that the *KLEIN FAMILIE* did not sink straightaway the tidal currents could not have carried her to the actual wreck position before the tide turned. If she had gone straight down, she would have been in *MSC LEA*'s 0720 position.

The hypothesis of a collision with the *MSC LEA* does not therefore hold water. She was inspected in Antwerp on 8th January 2006 and no traces which could have been attributed to a collision were found.

The *BELORUS* passed 0.6 miles further north at 0730. For there to have been a collision at the wreck position, the *KLEIN FAMILIE* would have had either to set sail 20 minutes earlier, i.e. before 4 o'clock, which does not correspond to the declarations of either the survivor or the skipper of the *CALYPSO*, or make a ground speed of 13.2 knots. Now, in order to reach the wreck

position at 0750, the *KLEIN FAMILIE'S* ground speed was 11.9 knots with an estimated speed through the water of 9.5 knots allowing for the wind. Her speed through the water would therefore have had to be 10.8 knots which seems hardly possible given her characteristics and the prevailing sea and wind conditions.

Assuming that the *KLEIN FAMILIE* had followed a more northwesterly course (315°), a graphical representation shows that, with a speed through the water of 9.3 knots, which is totally plausible, she could have encountered the *BELORUS* at 0750. With a higher ground speed, the *BELORUS* would already have gone by, lower, and she would not yet have gone by. At 0750, the *BELORUS* whose ground speed was 2 knots, had covered slightly less than 0.7 miles compared to her positon 0.6 miles to the north of the wreck. Assuming there was a collision with the *KLEIN FAMILIE*, in the event the *KLEIN FAMILIE* had sunk immediately, she would have been in a position bearing 075° 0.7 miles from the position of the col lision, in the event she had drifted just below the surface, she would lie in a position bearing 250° more than a mile away from this position owing to the effect of the ebb tide, or in other words, one mile northeast and mile westnorthwest, respectively, of the actual position of the wreck.

A collision with the *BELORUS* was therefore not possible.

The *HELLAS WARRIOR* passed 0.5 miles to the north of the wreck position at 0750. The radar recordings show that she was north of the *SICHEM PANDORA* which she overtook at a speed 2 knots higher than the *SICHEM PANDORA'S*, and that she altered course to starboard to pass the *BELORUS* which was making a speed through the water of only 4 knots. Her involvement can be ruled out : the only point at which the two vessels could have met at 0750 is 0.5 miles to the north of the actual position of the wreck. If the vessels had collided, the *KLEIN FAMILIE* would have been at this position after going straight down or bearing 250° 1.8 miles from it after drifting near the surface.

The *HELLAS WARRIOR* was inspected in LE HAVRE on 6th January 2006 and no traces consistent with her being involved in a collision were found.

The *VIPER* and the *TORPO* passed well to the south at 0745, at 1.6 and 1.3 miles respectively. If their positions are compared to the track of the *KLEIN FAMILIE* between the wreck position and the *Basse Bréfort* buoy, it can be seen that both these ships only cross this track at around 0820, in daylight. The *VIPER* was inspected in HULL on 9th January 2006 and the *TORPO* in SZCZECIN on 16th January 2006 and no traces consistent with their being involved in a collision were found.

The *SEASHARK* passed at 0800, much further to the north, and the *SD LOIRE* at 0807, much further to the south.

Any vessels following the *MARIE SCHULTE* which came through at 0812 and was probably the first merchant vessel sighted by the survivor, cannot have been involved : day was breaking while the shipwreck occurred in total darkness.

None of the vessels in and around the position of the wreck between 0750 and the beginning of daybreak could therefore have been involved in the collision.

6.3 The circumstances of the collision

Analysis of the statements made by those involved, the tidal streams and the radar recordings from JOBOURG TRAFFIC all point to the conclusion that the *SICHEM PANDORA* collided with the *KLEIN FAMILIE* at 0750 on 5 th January 2006 at the position where the wreck of the latter was subsequently discovered.

The *KLEIN FAMILIE* was proceeding with a speed through the water of 9 to 9.5 knots on course 283°, crossing the northeastbound lane of th e *Off Casquets* traffic separation scheme at an angle of 30°.

The *SICHEM PANDORA* was proceeding on course 075° at a speed through t he water of about 11.5 knots. She saw the flashing light on the marker pole stowed forward of the wheelhouse very close on her port bow. The watch officer switched to manual steering and executed a zigzag manoeuvre to starboard, changing course to 100° in one minute.

The bulbous bow of the *SICHEM PANDORA* probably struck the port shoulder of the *KLEIN FAMILIE,* sliding over the keel and floors and destroying the foredeck and wheelhouse as it went by towards the starboard side which it then pushed causing a large section of the starboard side shell frames and strakes forward to break off from the hull.

As the *SICHEM PANDORA* swung to starboard, the foredeck, the wheelhouse, or at least its roof as well as the marker poles stowed forward of it, passed to port of the *SICHEM PANDORA.* When the watch officer saw a flashing light on his port beam, no doubt that of the marker pole but possibly the floating light of the lifebuoy, he altered course back towards his original course.

Meanwhile the *KLEIN FAMILIE'S* hull, now completely open over its forward third, lost all buoyancy and sank like a stone under the *SICHEM PANDORA* pivoting to the right due to the inertia

of the movement of the *SICHEM PANDORA'S* course change. This would explain why the wreck was discovered pointing to the east.

7 DETERMINING AND COMMENTING ON THE CAUSES OF THE ACCIDENT

The method used for determining the causes of the accident was that used by the *BEA*mer in all of its enquiries in compliance with Resolution A.849(20) of the IMO as amended by Resolution A.884(21).

The contributory factors were placed in the following categories :

- **natural causes ;**
- **equipment ;**
- **the human element.**

The *BEA*mer investigators listed the possible factors of each category and attempted to define their nature ; were they :

- **certain, probable or hypothetical ;**
- **trigger, decisive or contributory ;**
- **incidental or structural.**

Their goal, after careful examination of the factors, was to rule out those which had no bearing on the events and retain only those which, with some degree of probability, could be considered as having participated in the course of events. They are aware that this means they may have left aside some of the questions raised by the accident. As their aim is to prevent this type of accident from happening again, they have favoured an impartial inductive analysis of those factors which, by their structural nature, could lead to the same thing happening again.

7.1 Natural causes

The weather forecast given in the bulletin issued by METEO-FRANCE at 0300 UTC for the night of 5th January was for an easterly wind force 3 or 4 locally 5 with a slight swell of 0.5 to 1 metres in the English Channel.

Observations made at la Hague at 0300 UTC on 5th January 2006 were : wind : east 16 knots gusting to 27 knots, atmospheric pressure : 1025 hPa falling.

Visibility was about 7 miles and the sky was overcast.

High water at Cherbourg was 0023 UTC +1 on 5th January 2006 with a tidal coefficient of 85 and low water 0707 UTC + 1, and the next high water at 1239, coefficient 80,

This factor was not considered to have contributed to the accident.

7.2 Equipment

No equipment failure or technical problems were observed on either of the two vessels. But the BEAmer investigators observed two equipment deficiencies on the *KLEIN FAMILIE*, one concerning the lanterns, the other the radar reflector.

7.2.1 The lanterns on *KLEIN FAMILIE*

The BEAmer investigators were unable to determine with complete certainty whether the *KLEIN FAMILIE* was showing her regulation fishing lights even though she was proceeding without being engaged in fishing, but this is common practice and was probably the case.

What cannot be disputed, however is the fact the lights on the poles marking the buoys at the ends of the lines had been working since the vessel set sail as there was no way of switching them off.

By using these flashing lights, the *KLEIN FAMILIE* contravened Rule 20 b) of the International Regulations for Preventing Collisions at Sea which stipulates that "*during such times* (between sunset and sunrise) *no other lights shall be exhibited, except such lights as cannot be mistaken for the lights specified in these Rules or do not impair their visibility or distinctive character, or interfere with the keeping of a proper look-out* ."

One of the flashing lights on the *KLEIN FAMILIE* was about three metres above deck level forward of the wheelhouse while the other was about one metre astern of the transom at bulwark height. The underwater images of the wreck showed that these lights continued to work underwater.

The forward flashing light was situated well above the navigation lights : white masthead light and sidelights, and even perhaps above the fishing lights, the after one was at the same height as the stern light.

In view of the brightness of these lights, the efficiency of the navigation lights situated right next to them could only be reduced, even to a watchkeeper observing them through binoculars. Above all, they could easily be mistaken for marker buoy lights, which is what they in fact were, by an observer who had not realized beforehand that they were moving.

The fact that the flashing lights on the longline marker buoy poles were in operation while the *KLEIN FAMILIE* was under way and proceeding was a source of confusion in determining what was actually carrying them. This was a **contributory factor** to the shipwreck.

7.2.2 The radar reflector carried by the *KLEIN FAMILIE*

The *KLEIN FAMILIE* was equipped with a radar reflector fitted over the radar gantry.

This equipment is compulsory for fishing vessels up to 12 metres in length having non-metallic hulls - article 227-6.03 of the supplementary regulations to the Order of 23rd November 1987, as amended, concerning the safety of vessels.

It is not however compulsory for vessels of more than 12 metres in length (sections 226 and 228 appended to this Order).

The skipper of the *KLEIN FAMILIE* was aware of the fact that his vessel was difficult to detect by radar, due to the material she was built of and her low deadworks and superstructures, all of which gave her a weak radar "signature". For this reason he had installed a radar reflector on the stern gantry.

The radar reflector was octahedral in shape and mounted vertically. It comprised three planar squares mounted at right angles to each other to form a diamond shape.

A study carried out by QuinetiQ on behalf of the MAIB (*Marine Accident Investigation Branch)* showed that this type of reflector has a small radar cross section for an orientation of 0° (1.29 m3) which decreases to 0.5 m3 for orientations between 5 and 20° and does not comply with the technical specifications of the International Standards Organization ISO 8729 on marine radar reflectors.

This study can be consulted on the MAIB website in a report published in 2007 concerning the yacht *OUZO*.

If the *KLEIN FAMILIE* had been equipped with a radar reflector which complied with the ISO 8729 standards its radar cross section would have been greater and she would have been easier to detect by radar.

The small radar cross section of the *KLEIN FAMILIE* made her difficult to detect by radar and was a **contributory factor** to the accident.

7.3 The human factor

7.3.1 Watchkeeping on the KLEIN FAMILIE

The *KLEIN FAMILIE* entered the traffic separation scheme *Off Casquets* at an angle of 30°, which is not consistent with Rule 10 c) of the International Regulations for Preventing Collisions at Sea : "*A vessel shall, so far as practicable, avoid crossing traffic lanes but if obliged to do so shall cross on a heading as nearly as practicable at right angles to the general direction of traffic flow."*

This was no more consistent with Rule 10 j) also concerning navigation in TSS's : "*A vessel of less than 20 metres in length or a sailing vessel shall not impede the safe passage of a power-driven vessel following a traffic lane."*

The *BEA*mer investigators were unable to determine whether the skipper of the *KLEIN FAMILIE* sighted the *SICHEM PANDORA* or detected her on radar. According with the *CALYPSO*'s skipper, one of the radars was fitted with an alarm zone set at 1,5 miles. Visibility was good, however the location of a marker flashing light in front and above the wheel house could certainly impair the visibility of the navigation lights of a ship even in the vicinity. There was no manoeuvre to avoid collision with the *SICHEM PANDORA* in accordance with Rule 17 a) ii) as the latter showed no signs of manoeuvring.

Non-compliance with the International Regulations for Preventing Collisions at Sea and poor visual lookout were **two first decisive factors** to the accident.

Given the time of the collision and the positon of the *KLEIN FAMILIE* in the TSS, it is certain that she was about to set her lines although she was proceeding along the middle of the northeastbound traffic lane of the TSS.

To set her lines with the current, that is towards westsouthwest, she would have had to proceed in a direction practically opposite the general direction of traffic flow in the traffic lane of the TSS, contrary to Rule 10 b) i) of the International Regulations for Preventing Collisions at Sea and would have impeded the safe passage of other vessels as she was engaged in fishing contrary to Rule 10 i) of the same regulations.

7.3.2 On the SICHEM PANDORA

The declarations made by the officer and rating on the 4 to 8 watch stated that they saw a fishing marker buoy on the port bow of the *SICHEM PANDORA* at a distance of one to two miles according to the rating who sighted and reported it before the officer, one mile according to the officer and that they detected nothing on the radar. In actual fact, the reaction of the officer in switching from automatic to manual steering and making a zigzag manoeuvre showed that he knew that the object was much closer as this type of manoeuvre is only carried out at very close quarters.

As indicated above, the flashing lights of the *KLEIN FAMILIE'S* buoy poles may have misled the watch officer and rating on the *SICHEM PANDORA*. But if they had been keeping a proper visual lookout, they should have seen these lights much further away and observing that they were moving should have looked at them through binoculars and then looked for the corresponding echo on the radar screen.

The S-band and X-band radars were both working and had alarm zones set on two miles. The watch officer stated that the alarm had sounded for an overtaking vessel between 7 and 8 o'clock; referring to the radar recordings from CROSS JOBOURG, this could have been the *HELLAS WARRIOR.*

If their radar watchkeeping had been correctly carried out, the *SICHEM PANDORA* should have detected the *KLEIN FAMILIE* on radar. The radar echoes from the latter were probably no more than intermittent due to her rolling motions and the differences in height of her radar reflector as a result of this, not to mention its poor performance : its radar cross section was small as explained in chapter 7.2. This may explain why the radar alarm did not sound. However, these intermittent echoes should have appeared beyond the sea clutter, certainly at more than three or four miles, and a correct adjustment of the sea clutter control would have enabled them to be seen much closer.

If a proper visual lookout has been maintained, the watch officer and rating would have seen the flashing lights at a greater distance – visibility was about seven miles and there was

neither rain nor showers – and seen that they were moving. They would probably have seen them before detecting any radar echoes, which would only have been appearing intermittently. This should have encouraged them to fine-tune their radar settings and try to find an echo corresponding to what they could see, and from that, deduce that it was a ship.

In actual fact, the flashing lights misled them because they only saw them at the last moment when they were right upon them and managed to convince themselves that it was a fishing marker buoy. Nevertheless, there were doubts about the light in the watch officer's mind, he continued to observe it even when it had passed abaft the beam and pointed it out to his successor at the change of watch.

The fact that the watch officer and rating on the *SICHEM PANDORA* did not keep a proper lookout was the **third decisive factor** in the shipwreck of the *KLEIN FAMILIE*.

7.4 Other factors

7.4.1 Personal flotation devices (PFD's)

Following the last annual survey on 18th November 2004, the list of observations included the remark : "the wearing of flotation devices is recommended"

It is quite normal that the survivor, who was sleeping, was not wearing a flotation device. The same is true of the three crewmembers who were lost and who were also sleeping in the crew's quarters. The survivor was able to hold out thanks to an intensive practice of swimming during his leisure time combined with exceptional self-control.

The skipper, who was alone in the wheelhouse, had no reason to be wearing a PFD, as he was not exposed to the weather or the cold. If he had been wearing a PFD, it probably would not have saved his life as it is likely that he was killed by the stem of the *SICHEM PANDORA* which struck the *KLEIN FAMILIE* in way of the wheelhouse.

The seaman who stayed on deck abaft the wheelhouse to keep an eye on the fishing gear had no reason to be wearing one either, as he was sheltered by the awning. But if he had been wearing one, it is possible that he might not have panicked when hanging on to his floating ball and might have been able to reach the liferaft with the help of the survivor.

7.4.2 Absence of an Emergency Position Indicating Radio Beacon

Following the survey of 11th March 2005, the inspector from the ANFR (National Frequencies Agency) ordered the vessel be equipped with an emergency position indicating radio beacon before 1st January 2006, date at which they became mandatory for 3rd category fishing vessels (up to 20 miles from shelter).

If an EPIRB had been carried, it would have enabled MRCC JOBOURG to be alerted at least one hour earlier and given them the position of the shipwrecked vessel. This would probably have enabled the seaman on watch on the afterdeck to be saved, always supposing he was wearing a PFD. It was also have increased the chances of locating the survivor, who was only rescued because his rocket flares were sighted by two merchant vessels who were keeping a proper lookout.

7.4.3 Factors to be borne in mind when navigating in traffic separation schemes

Navigation in traffic separation schemes is governed by rules which all vessels must comply with at all times, whatever their type.

Fishing vessels

Whether they are proceeding or engaged in fishing, fishing vessels must cross traffic separation schemes at as small an angle as possible, that is to say, at right angles to the general direction of traffic flow.

Whether they are proceeding or engaged in fishing, they must keep a sharp lookout and bear in mind at all times the fact that they may hinder other traffic if they are not following the general direction of traffic flow.

A fishing vessel engaged in fishing in a traffic separation scheme must be aware of the fact that she may hinder other vessels and must not consider herself to be privileged as would be the case in the open sea. She must bear in mind that a merchant vessel may also be subject to technical constraints preventing her from manoeuvring in much the same way as a fishing vessel is constrained by her fishing gear.

Merchant vessels

Merchant vessels navigating in TSSs must keep a sharp visual and radar lookout in order to detect vessels which are not following the general direction of traffic flow. In particular they must bear in mind that they may meet small vessels, and in the case of vessels engaged in fishing, that the latter are restricted in their ability to manoeuvre even if are not privileged in the Colregs meaning of the term.

Non-observance of these rules was a **contributory factor to the accident.**

8 CONCLUSIONS

The *SICHEM PANDORA* was proceeding, on autopilot, in the northeastbound lane of the *Off Casquets* TSS with an officer and rating on watch on the bridge.

The *KLEIN FAMILIE* was proceeding on a westnorthwesterly course crossing the TSS at an angle of 30°with the skipper alone in the wheel house. She was of wooden construction, low in the water and equipped with a poorly performing radar reflector.

As well as her navigation lights, she was showing the flashing lights of her fishing gear marker buoys, one forward placed well above her navigation lights, the other at the stern at the same height as her stern light.

As visual lookout on the *SICHEM PANDORA* was inadequate, the *KLEIN FAMILIE* was only sighted at the last moment and mistaken for a fishing marker buoy. The *SICHEM PANDORA* carried out a zigzag manoeuvre in an attempt to avoid her.

The **first decisive factor** in the shipwreck was the poor visual lookout carried out on the *SICHEM PANDORA*, with the small radar cross section of the *KLEIN FAMILIE* as **a contributory factor**, the presence of the flashing marker lights and poor lookout on the part of the skipper being the **two other decisive factors**. Non-observance of COLREG regulations governing the navigation in TSS on both ships was **the last contributory factor**.

9 ACTION TAKEN

Wearing PFDs on board vessels has been made compulsory in certain circumstances by Act N°2007-1227 of 21st August 2007 *"concerning the prevention of risks in maritime professions and the well-being of seafarers at sea and in harbour."*

10 RECOMMENDATIONS

Navigating in traffic separation schemes

10.1 Lookout

The *BEA*mer recommends all professional bodies in the fishing and shipping industries to remind their members that it is necessary to keep a particularly sharp lookout when navigating in traffic separation schemes and that the rules governing TSSs impose special obligations.

10.2 Training

They recommend maritime training establishments involved in the training of watch officers and lookouts to lay great emphasis on the special nature of navigating in TSSs and the obligations it imposes.

Visual identification of fishing vessels

10.3 The *BEA*mer recommends professional bodies in the fishing industry to remind their members that the best safety measure with regard to merchant vessels is for the latter to be able to identify them as fishing vessels, to ascertain whether or not they are engaged in fishing and to determine their course.

Fishing vessels must avoid using any lights or marks which may impair the visibility and range of their fishing and navigation lights.

When proceeding, their fishing lights must always be switched off, and conversely, be switched on when they are engaged in fishing.

Lights which could have special meanings such as flashing, quick flashing or rotating lights should not be used as they could lead to confusion regarding the type of fishing vessel or its activities.

10.4 The *BEA*mer asks the maritime administration to issue instructions to its shipping inspectorates indicating that they should pay particular attention to the implementation of these provisions.

Detection of fishing vessels by radar

10.5 The detection of small non-metallic vessels is difficult even with only a slight sea running.

The *BEA*mer recommends the maritime administration to extend the requirement concerning radar reflectors to non-metallic fishing vessels of more than 12 and up to 24 metres in length and to permit, in sections 226 and 227, only those radar reflectors which comply with ISO standard 8729 to be carried. It will be recalled that, at the moment, only fishing vessels of less than 12 metres with a non-metallic hull (section 227) and vessels having a gross tonnage of less than 150 (SOLAS Convention Chapter V Rule 2.1.7) are required to carry a radar reflector.

The fitting of an automatic identification system (AIS) does not, in itself, justify not fitting a radar reflector : indeed, a vessel's safety cannot be considered satisfactory unless, first and foremost, her navigation lights and perhaps her fishing lights can be observed visually without ambiguity (in daylight her aspect and possible fishing marks) and unless, additionally, she can be detected by radar. An AIS system can be considered as nothing more than an additional means of confirming what has been observed visually and by radar, and possibly of facilitating VHF contact in the event of imminent danger.

10.6 The problem of detecting the presence of small vessels is not limited to fishing vessels. The *BEA*mer has come across cases of pleasure craft having a small radar cross section, either because they were not equipped with radar reflectors or because those they were carrying were poorly designed. The *BEA*mer recommends the Mission for Pleasure Boating and Nautical Leisure Activities to undertake their own analysis of this problem.

LIST OF ANNEXES

Annexe A

Decision to open an inquiry

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

Bureau d'enquêtes sur
les événements de mer

Paris, le 05 JAN. 2006
N/réf. : BEAmer/IGSAM/MTETM
000002

BEA mer

DÉCISION

Le directeur du Bureau d'enquêtes sur les événements de mer ;

Vu la loi n°2002-3 du 3 janvier 2002 relative aux enquêtes techniques après événements de mer ;

Vu le décret n° 2004-85 du 26 janvier 2004 relatif aux enquêtes techniques après événement de mer, accident ou incident de transport terrestre ;

Vu l'arrêté ministériel du 17 février 2004 portant nomination du Directeur du Bureau d'enquêtes sur les événements de mer ;

Vu l'arrêté ministériel du 18 Juillet 2005 portant délégation de signature au Directeur du Bureau d'enquêtes sur les événements de mer ;

Vu le SITREP N°0004 NP 0501 établi le 5 Janvier 2006 par le CROSS JOBOURG

DECIDE

Article 1 : En application de l'article 14 de la loi sus-visée, une enquête technique est ouverte concernant le naufrage, survenu le 5 Janvier 2006, dans le Dispositif de Séparation de Trafic des Casquets du navire de pêche *KLEIN FAMILIE*, immatriculé à Cherbourg sous le N° 221187.

Article 2 : Elle aura pour but de rechercher les causes et de tirer les enseignements que ces événements comportent pour la sécurité maritime, et sera menée dans le respect des textes applicables, notamment le titre III de la loi sus-visée et la résolution A.849 (20) de l'organisation maritime internationale.

L'administrateur en chef
de 1ère classe des affaires maritimes
Jean-Marc SCHINDLER

Ministère des Transports,
de l'Equipement,
du Tourisme
et de la Mer

BEAmer

Tour Pascal B
92055 LA DEFENSE CEDEX
téléphone : 33 (0) 1 40 81 38 24
télécopie : 33 (0) 1 40 81 38 42
Bea-Mer@equipement.gouv.fr

Annexe B

Radar recordings of *KLEIN FAMILIE'S* track

Annexe B1 : Estimated ship route

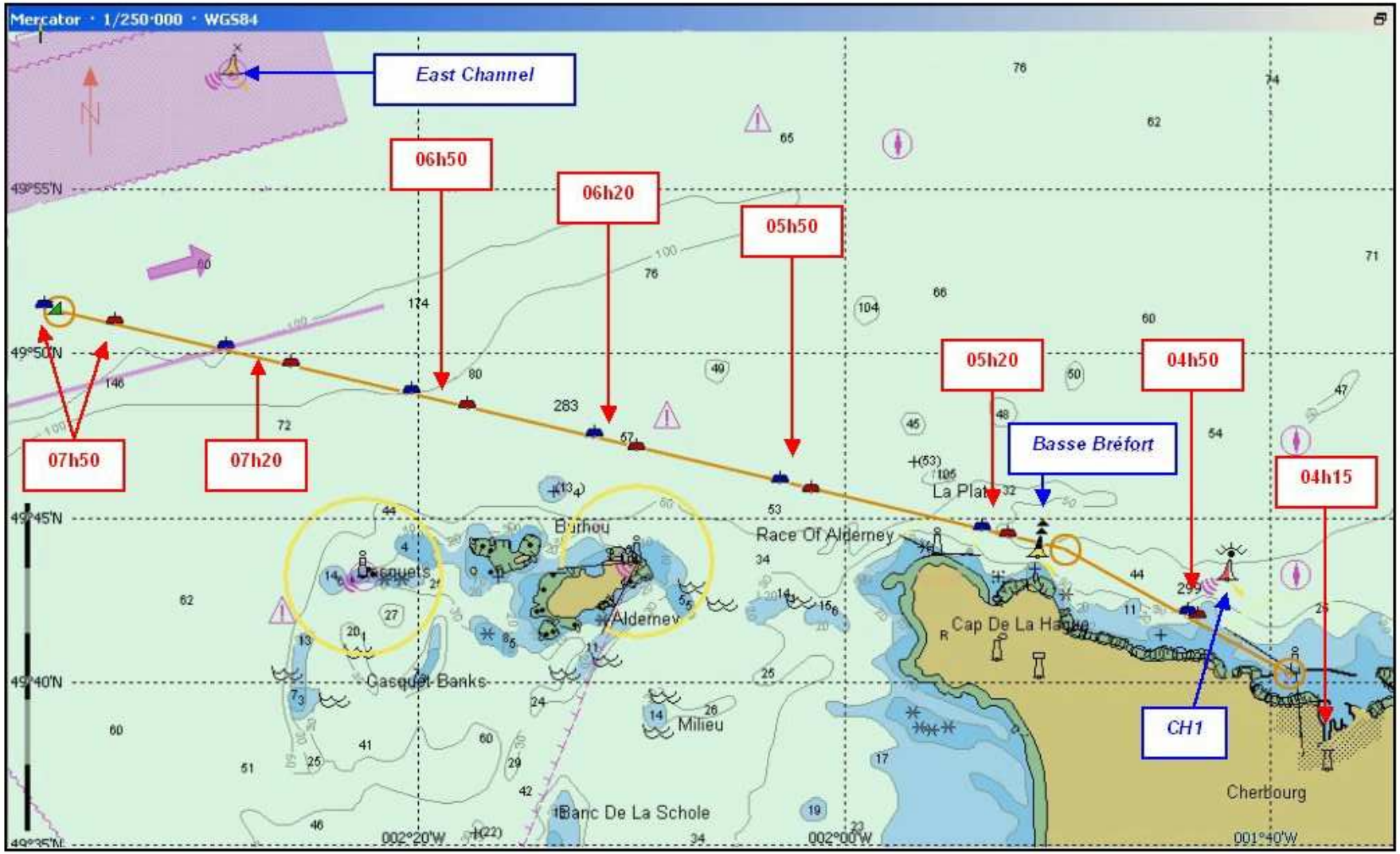
Annexe B2 : Respectives positions of *KLEIN FAMILIE* and *MSC LEA*

Annexe B.1

Estimated ship route

Route estimée du *KLEIN FAMILIE* (heures en TU+1) :

- à 9 nœuds sans tenir compte du vent,
- à 9,5 nœuds en tenant compte du vent.

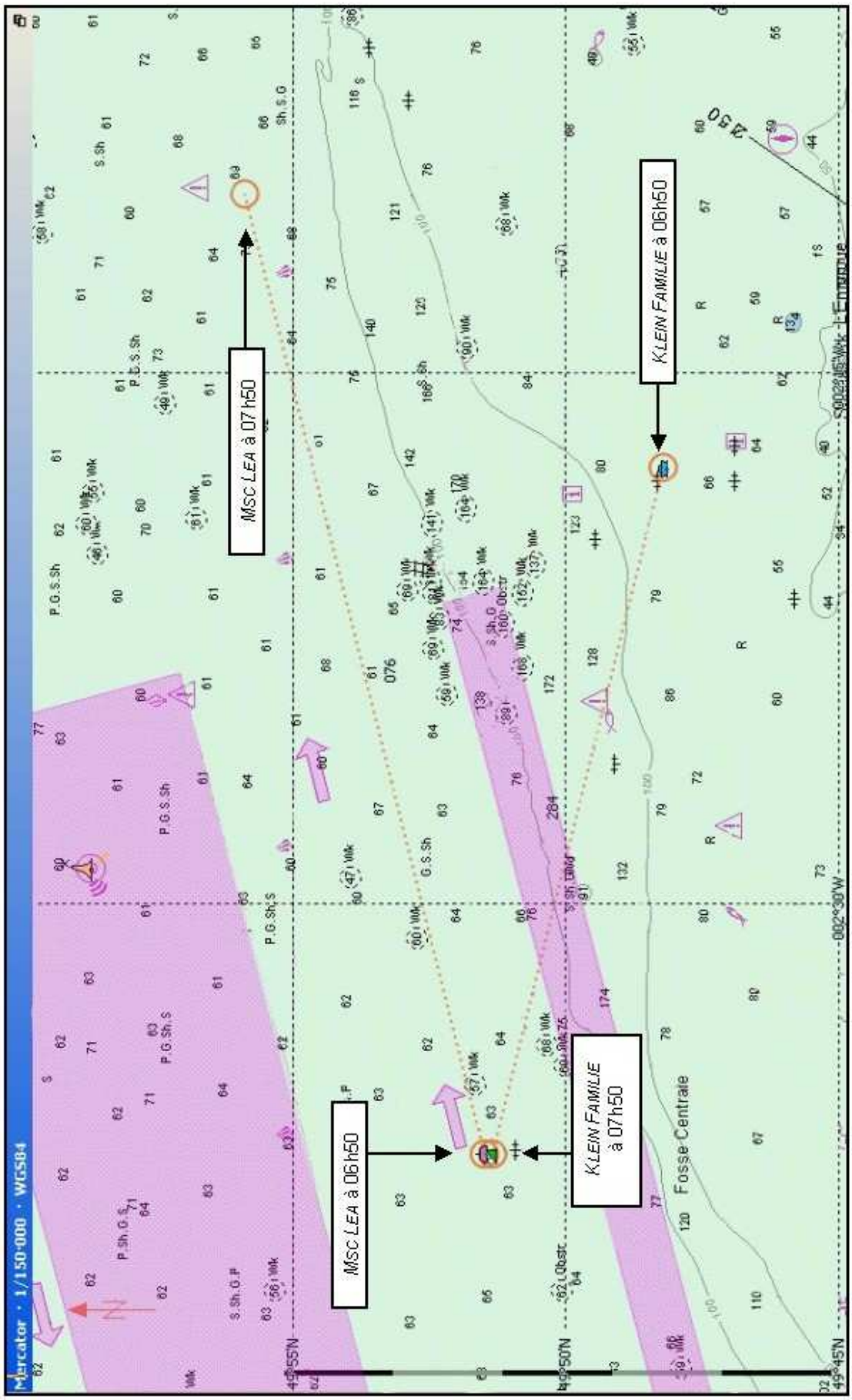


Vs = 9,5 nœuds
Vs = 9,0 nœuds
Épave

Annexe B.2

Respectives positions
of *KLEIN FAMILIE* and *MSC LEA*

Positions respectives du *KLEIN FAMILIE* et du *MSC LEA*



Annexe C

Charts

C.1 : at 0750

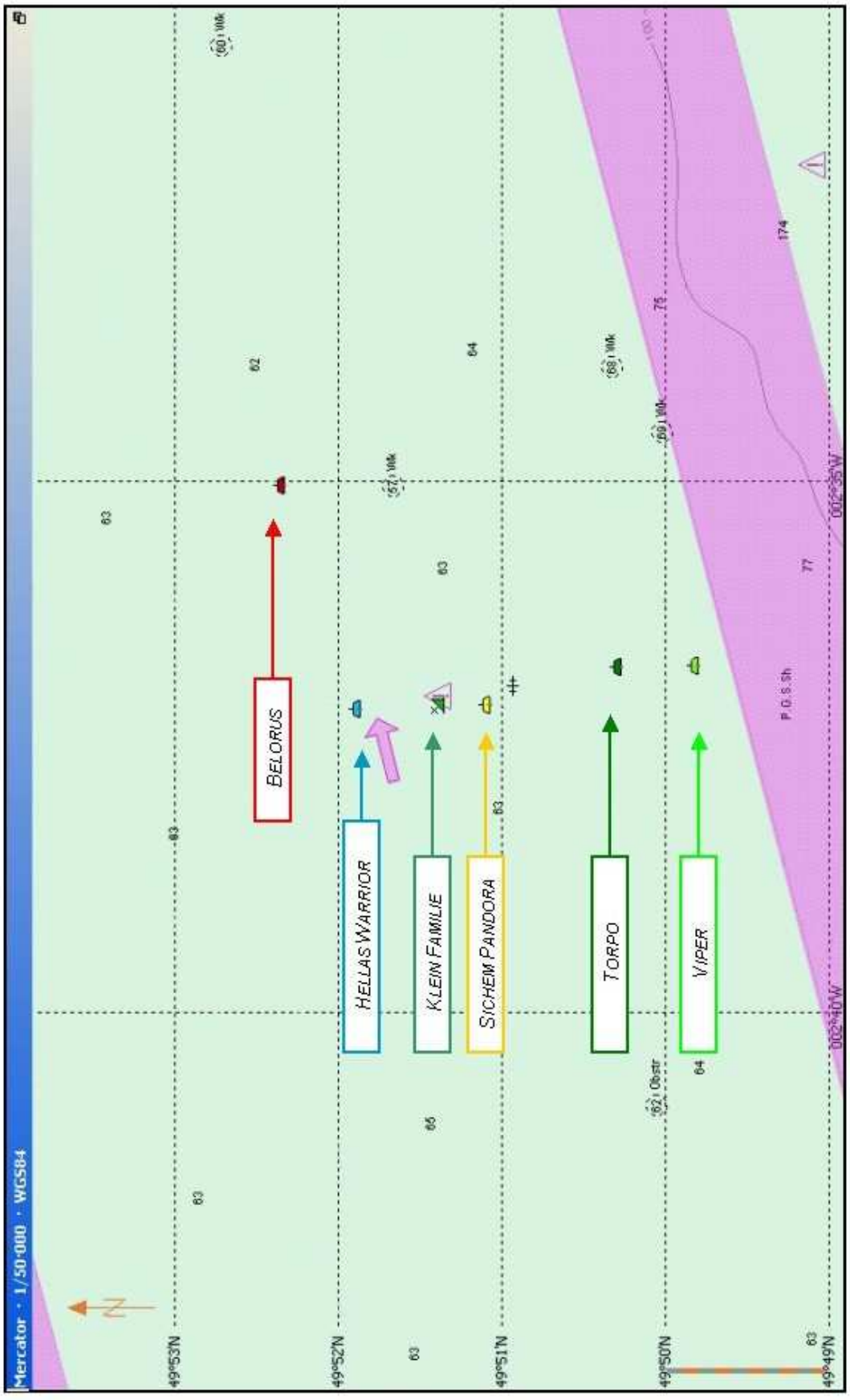
C.2 : with reference to the position of the wreck

C.3 : screen copies from CROSS JOBOURG radar

Annexe C1

At 0750

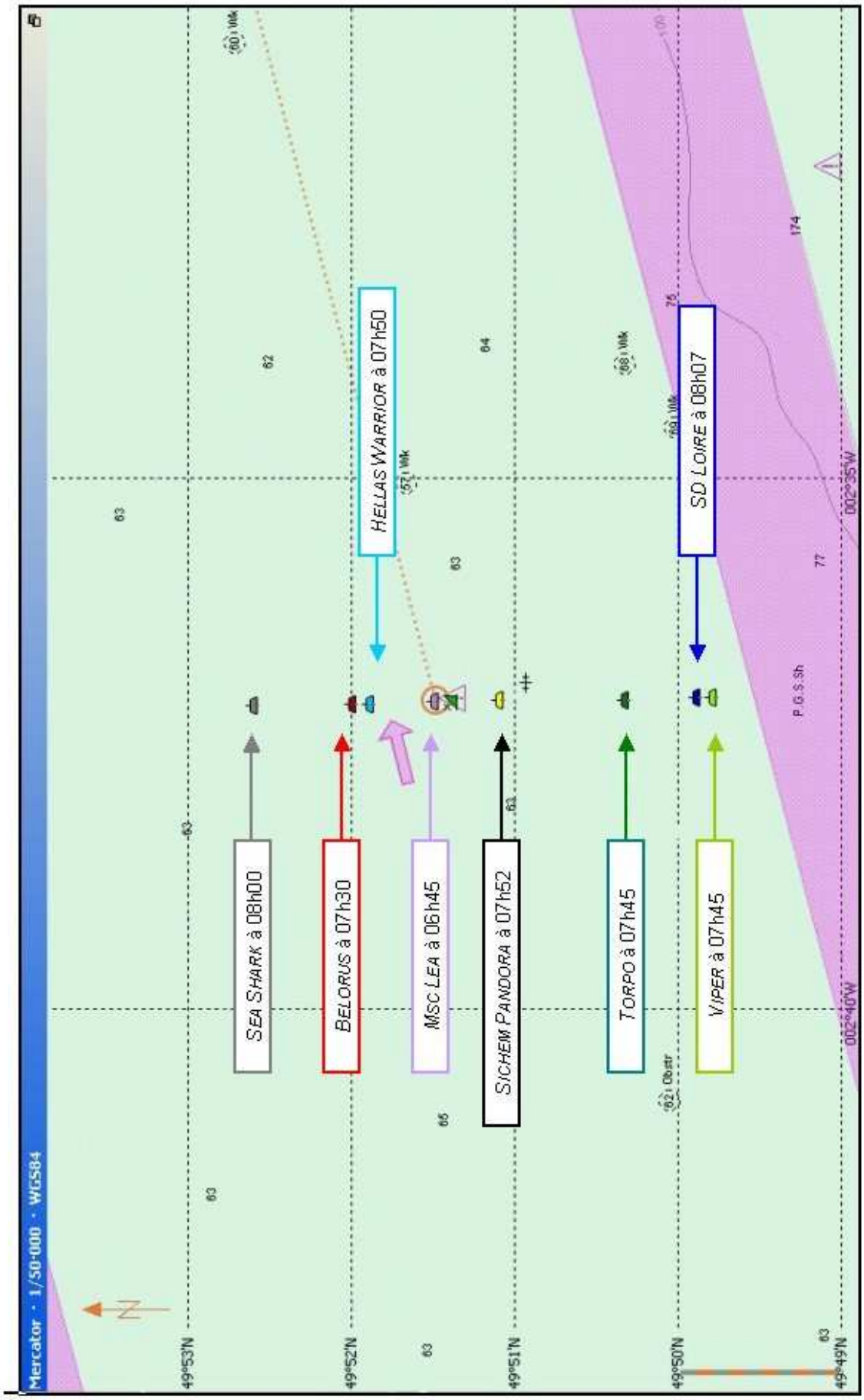
Position des navires à 07h50 (TU + 1)



Annexe C2

With reference to the position of the wreck

Position des navires par rapport à la position de l'épave



Annexe C3

Screen copies from CROSS JOBOURG radar

Centre
Régional
Opérationnel de
Surveillance et de
Sauvetage de
Jobourg

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RÉPUBLIQUE FRANÇAISE

Liste des navires (voie montante) passant à proximité du lieu de découverte de l'épave à partir de 05H30 GMT jusqu'au passage de l'ALBLAS

Nom navire	N° de piste SYTAR	N°IMO	Heure (GMT) approximative	Vitesse (nœuds)	Point de passage **approximatif**/ épave
MSC LEA	197	9162643	05:45	17	0.1 milles/nord
BELORUS	146	9340855	06:30	2	0.6 milles/nord
VIPER	167	8511029	06:45	5	1.6 milles/sud
TORPO	170	8908791	06:45	4	1.3 milles/sud
HELLAS WARRIOR	206	9221891	06:50	12	0.5 milles/nord
SICHEM PANDORA	199	9050412	06:52	10	0.3 milles/sud
SEASHARK	214	9298193	07:00	11	1.2 milles/nord
SD LOIRE	210	9357274	07:07	11	1.5 milles/sud
MARIE SCHULE	177	9230775	07:12	6	0.5 milles/nord
I.D CONTENDER	205	8608602	07:30	12	0.25 milles/sud
PIONER BELORUSSII	222	7733656	07:37	12	Sur l'épave

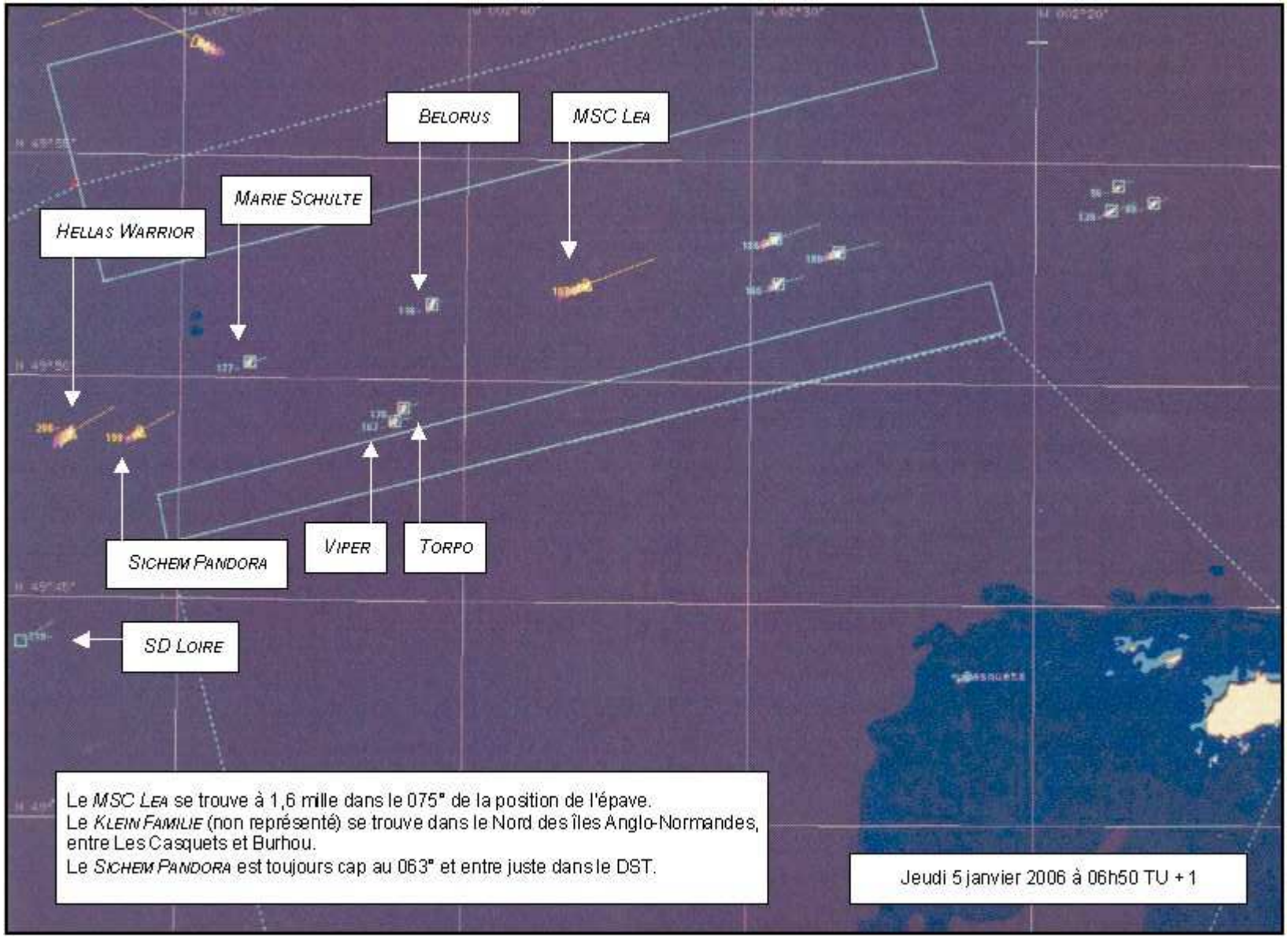
L'ALBLAS se trouvait environ 4 milles derrière le PIONER BELORUSSII et faisait route à 10 Nds

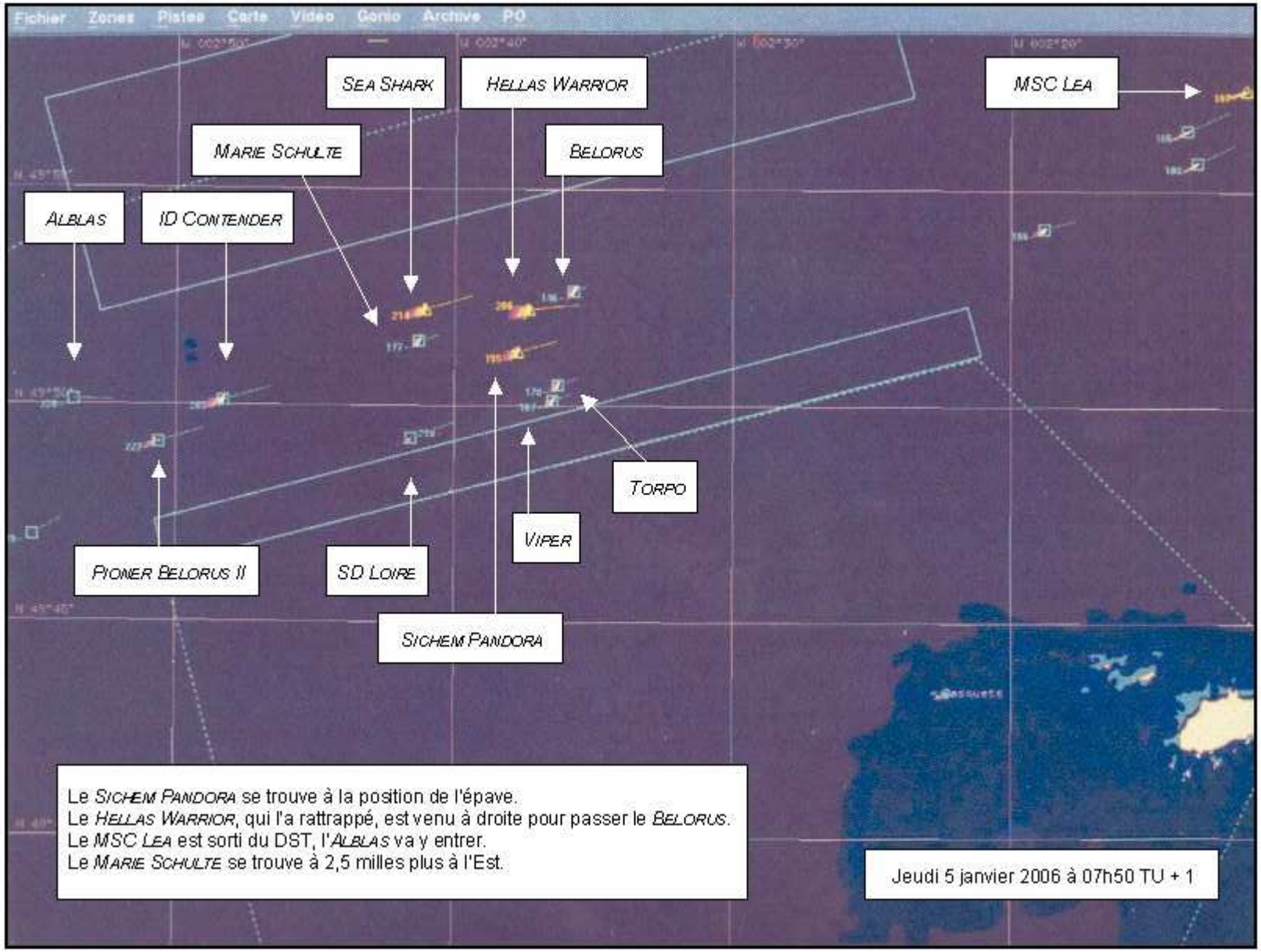
Navires se trouvant à proximité de l'ALBLAS à l'instant du tir des fusées rouges (0748 GMT):

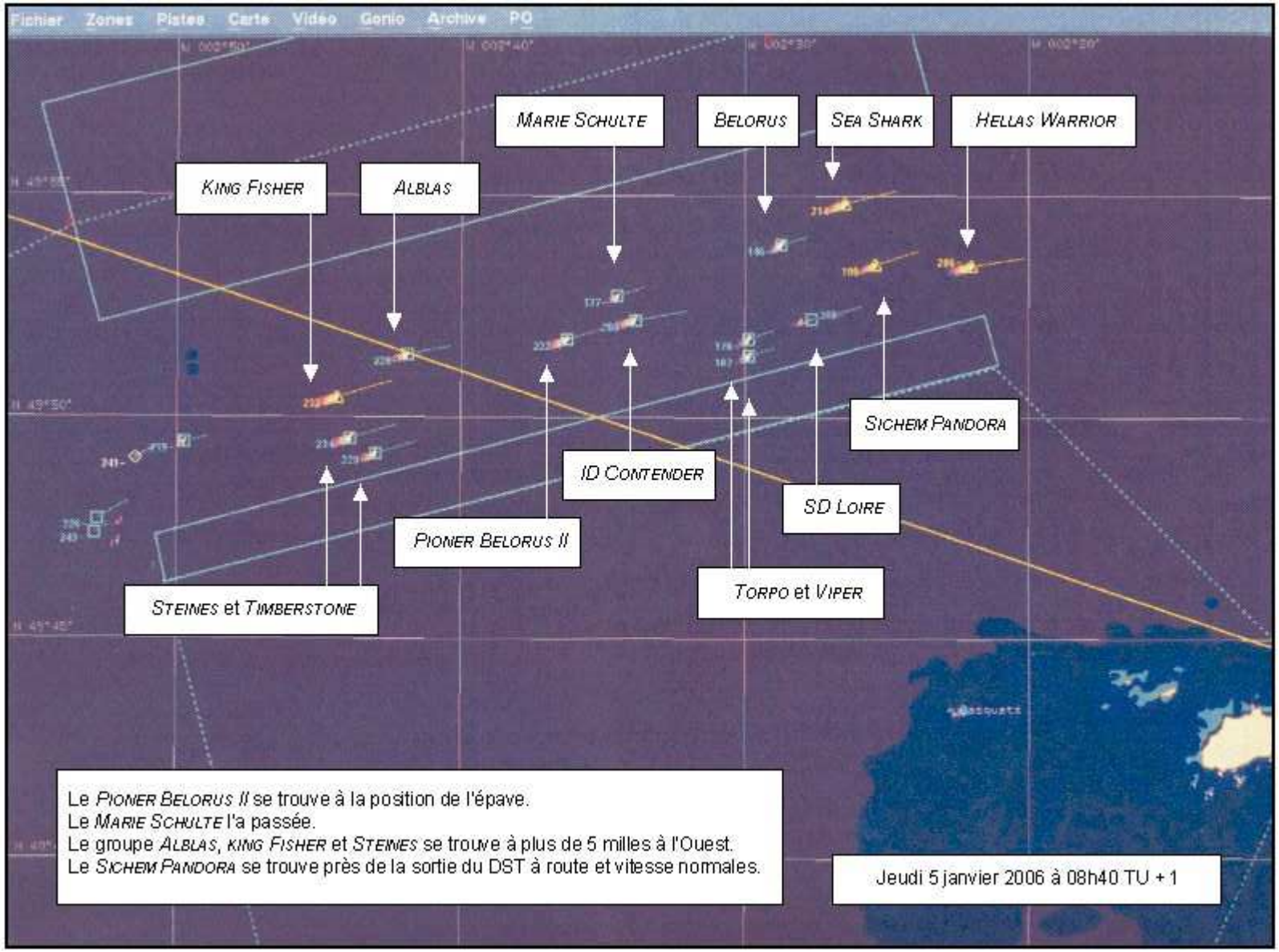
Nom navire	N° de piste SYTAR	N°IMO
ALBLAS	228	9108829
STEINES	234	7531369
KINGFISHER	232	9295050
TIMBERSTONE	229	8603389

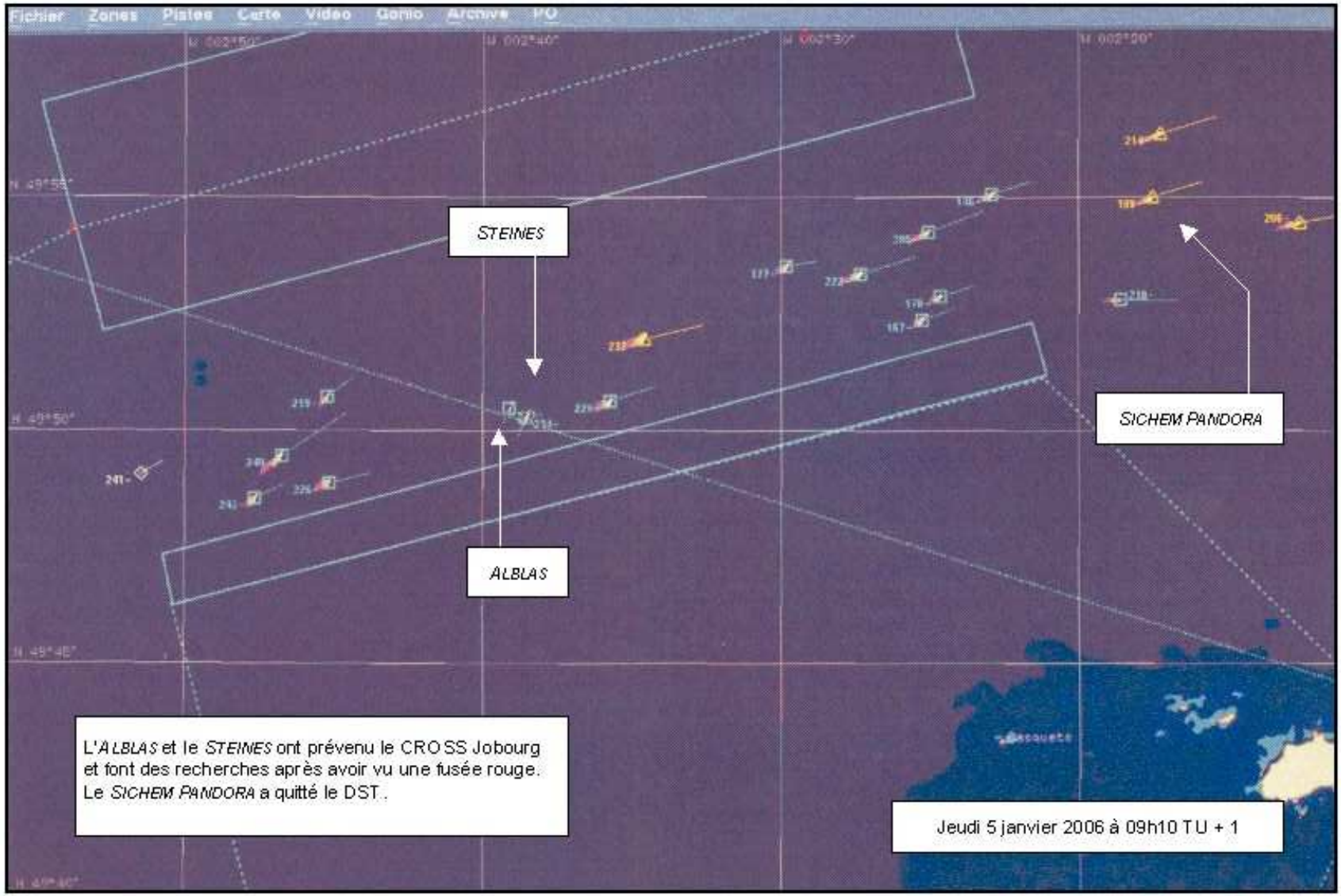
Nota : Les vitesses sont les vitesses fonds données par l'outil de traitement

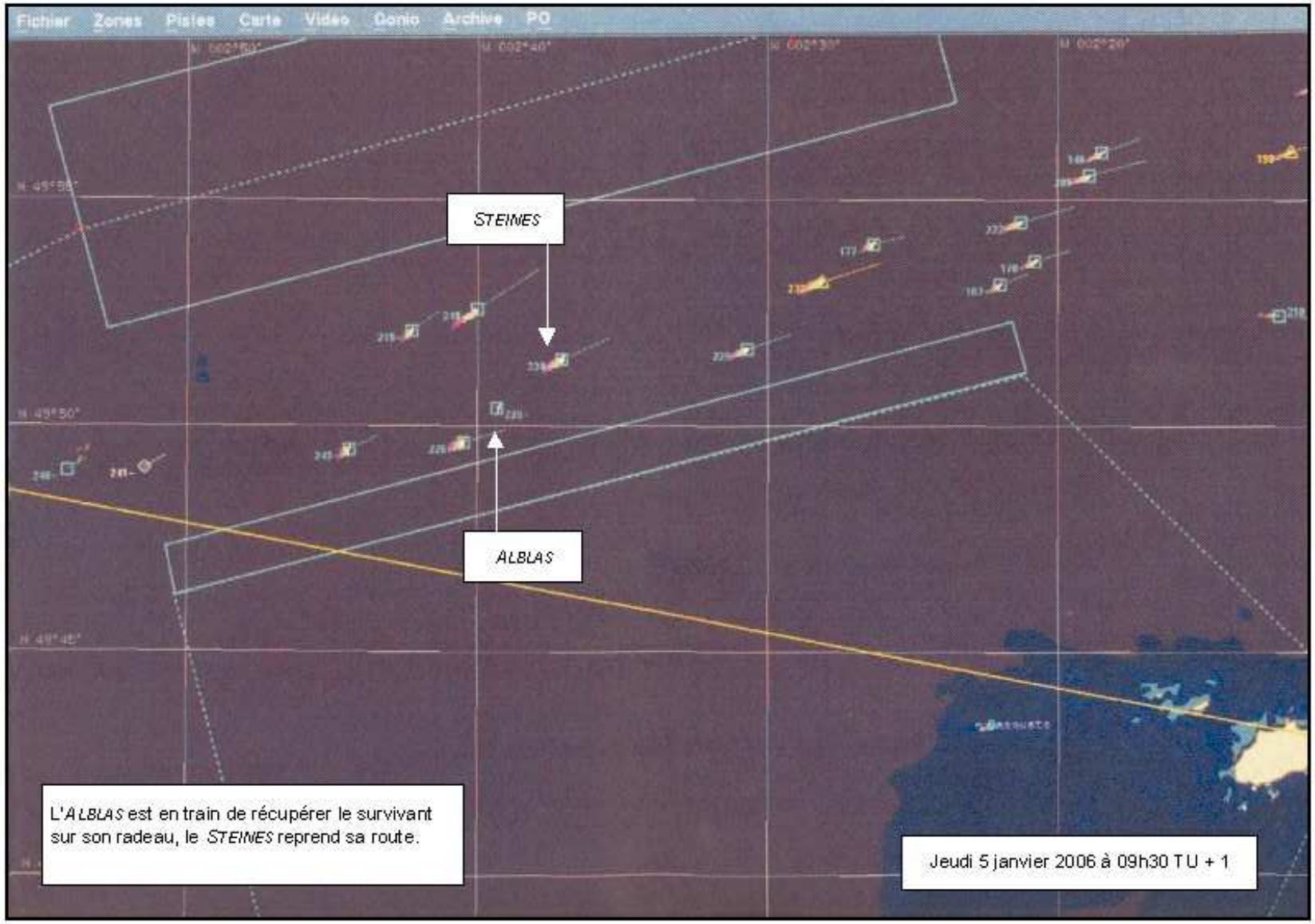
Source SYTAR traitement radar SOFRELOG

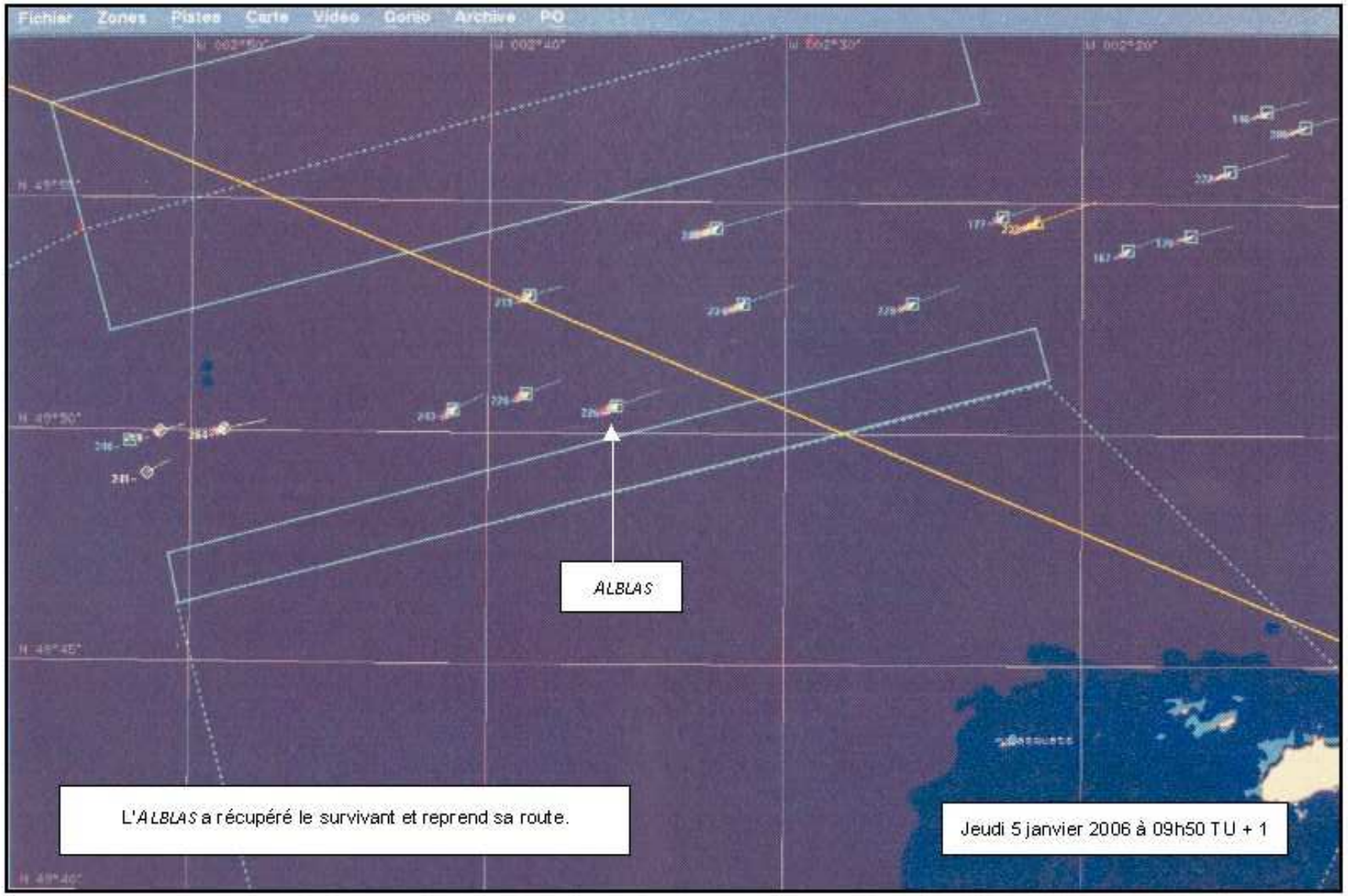

BELORUS
MSC LEA
MARIE SCHULTE
HELLAS WARRIOR
SICHEM PANDORA
VIPER
TORPO
SD LOIRE
Le MSC LEA se trouve à 1,6 mille dans le 075° de la position de l'épave.
Le KLEIN FAMILIE (non représenté) se trouve dans le Nord des îles Anglo-Normandes, entre Les Casquets et Burhou.
Le SICHEM PANDORA est toujours cap au 063° et entre juste dans le DST.
Jeudi 5 janvier 2006 à 06h50 TU + 1


Fichier Zones Pistes Carte Video Gonio Archive PO
SEA SHARK
HELLAS WARRIOR
MSC LEA
MARIE SCHULTE
BELORUS
ALBLAS
ID CONTENDER
TORPO
VIPER
PIONER BELORUS II
SD LOIRE
SICHEM PANDORA
Le SICHEM PANDORA se trouve à la position de l'épave.
Le HELLAS WARRIOR, qui l'a rattrappé, est venu à droite pour passer le BELORUS.
Le MSC LEA est sorti du DST, l'ALBLAS va y entrer.
Le MARIE SCHULTE se trouve à 2,5 milles plus à l'Est.
Jeudi 5 janvier 2006 à 07h50 TU + 1


Fichier Zones Pistes Carte Vidéo Gonio Archive PO
MARIE SCHULTE
BELORUS
SEA SHARK
HELLAS WARRIOR
KING FISHER
ALBLAS
SICHEM PANDORA
ID CONTENDER
SD LOIRE
PIONER BELORUS II
TORPO et VIPER
STEINES et TIMBERSTONE
Le PIONER BELORUS II se trouve à la position de l'épave.
Le MARIE SCHULTE l'a passée.
Le groupe ALBLAS, KING FISHER et STEINES se trouve à plus de 5 milles à l'Ouest.
Le SICHEM PANDORA se trouve près de la sortie du DST à route et vitesse normales.
Jeudi 5 janvier 2006 à 08h40 TU + 1


Fichier Zones Pistes Carte Video Gonio Archive PO
STEINES
ALBLAS
SICHEM PANDORA
L'ALBLAS et le STEINES ont prévenu le CROSS Jobourg et font des recherches après avoir vu une fusée rouge.
Le SICHEM PANDORA a quitté le DST.
Jeudi 5 janvier 2006 à 09h10 TU + 1


Fichier Zones Pistes Carte Video Donio Archive PO
STEINES
ALBLAS
L'ALBLAS est en train de récupérer le survivant sur son radeau, le STEINES reprend sa route.
Jeudi 5 janvier 2006 à 09h30 TU + 1


Fichier Zones Pistes Carte Video Sonso Archive PO
ALBLAS
L'ALBLAS a récupéré le survivant et reprend sa route.
Jeudi 5 janvier 2006 à 09h50 TU + 1

Ministère de l'Ecologie, de l'Energie, du Développement durable et de l'Aménagement du territoire

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