

Major Technological Risk

An Assessment of Industrial Disasters

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►III. Thursday, March 16, 1978: the Amoco Cadiz◀

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III. THURSDAY, MARCH 16, 1978 : THE AMOCO-CADIZ

On March 16, 1978, the *Amoco-Cadiz*, an oil tanker of more than 230,000 gross weight tonnes, flying the Liberian flag, ran aground on the shallows about four miles* from the small Brittany port of Portsall on the coast of Nord Finistère. Its cargo of 230000 tonnes of crude oil spread on the sea causing the pollution of more than 400 km of beaches from Pointe Saint Mathieu in the West to the island of Bréhat in the east.

This pollution, exceptional as to the volume of oil spilled as well as to the stretch of coastline affected, struck the Brittany coast which had already, for eleven years, been victim to disasters of the same kind. But those, despite their seriousness, had not so far reached a comparable scale(1, p. 5).

Those who have not seen the shoals of drifting fish, those oil coated birds in their agony, those rocks looking sad in the slimy setting that enveloped them, those oyster banks affected right down into their sediments, those who have not touched the sand soiled right into the bowels of the beaches and the seaweed stained and abandoned in blackness, those who have not admired the dignified and courageous Brittany people fighting, sometimes up to their waists in that mire of despair - they can hardly get the measure of such a disaster.

In order to understand one must also have seen the spectacle of that steel monster, broken but still proud of her prow pointing towards the coastline; the defeated monster that flouted the soldiers and all those of good will who went there, from Pointe Saint-Mathieu to the Isle de Bréhat to extirpate untiringly, drop for drop, the harm which the next wave would bring back upon them.

There was a magnificent spirit of solidarity which transformed the cry of alarm and impotence of a civilisation which had been overcome by the creation of its own genius (2, p. 4).

1. THE STRANDING**

1st : The facts as they seem to have occurred out at sea

08.00 h :***

The *Amoco-Cadiz* which belonged to the Amoco company whose registered office is in Chicago, flying the Liberian flag and skippered by the Italian Captain P. Bardari, was to the southwest of the island of Ouessant. Coming from the Persian Gulf it was going to Rotterdam via Lyme Bay (GB). It went up the northward lane of traffic**** at a speed of 9.5 knots.

*The distance is doubtless somewhat overstated in this report.

**We take up - summing up sometimes - the attempt at reconstruction facts presented in the report by the Senate Commission of Enquiry (1, pp. 15-52).

***The hours are given at GMT i.e. one hour after the official French time at the occurrence.

****Defined by the Intergovernmental Maritime Consultative Organisation (IMCO), this device is more commonly known as the 'rail'

The tug *Pacific*, an ocean-going salvage vessel equipped with 10000 HP, registered in Hamburg and skippered by Captain H. Weinert, a West German, left the port of Brest at 08.24 h. The weather forecast was bad, predicting southwesterly or westerly winds force seven gusting to force 9 and perhaps to gale force 10 later.

9h45 : Running at 14.5 knots the *Pacific* was rounding the headland of Saint Mathieu and approaching the channel of Le Four.

The *Amoco-Cadiz* was about 7.5 miles north of Ouessant. The helmsman told the captain that the vessel was off course: There was a breakdown of the steering system, it was blocked in a position that steered the vessel to portside.

Captain Bardari had the engines stopped and decided to call for assistance. He drafted a so-called safety TTT* message saying that the *Amoco-Cadiz* "was no longer manoeuvrable" and asking other vessels to stand by.

10h20 : The message was sent by telegraph (09.50 h) and by radio (10.00 h). The station Le Conquet-Radio picked up the telegraph message at 10h20.

11h05 : The *Amoco-Cadiz* made contact with Radio-Conquet ; it enquired about the nearest tug station. Captain Bardari unable to contact the ship's owners in Chicago because of the time difference tried to alert the Amoco company's representatives in Genoa, this via Radio-Conquet (11h15). But he did not succeed.

11h20 : Attempts at repairing the blockage having been unsuccessful, Captain Bardari requested tug assistance ; this request was transmitted by Radio Conquet.

11h28 : The *Pacific*, about thirteen miles away, turned round and made contact with the tanker; it offered its services on the basis of the assistance type contract**(Lloyd's open form). The *Amoco-Cadiz* asked them to wait.

12h08 : The chief officer of the *Pacific* asked the *Amoco-cadiz* again whether she accepted the Lloyd's open form. All he received for an answer was the address of the ship's owners in Chicago. In fact, Captain Bardari was trying to inform the ship's owners of the situation.

12h20 : Since its call was received the *Amoco-Cadiz* had already drifted about two miles to the southeast.

*First degree in the scale of accident messages (see following foot note).

**This form of arrangement permits avoidance of negotiations prior to assistance operations ; in case of successful salvage the amount of remuneration is fixed by arbitration, usually in London (1, p. 1681.)

It had crossed the southern limit of the northward lane. It rolled heavily under the influence of winds that gusted to force 8-10. Its captain made contact with the tug and informed it of a "breakdown of steering, engines in good order" and "his intention to be tugged".

The tug put itself to within about 400 metres starboard of the *Amoco-Cadiz*. Captain Weinert talked "to somebody from the tanker who by (his) accent seemed to be English".

Despite the bad weather the island of Ouessant was clearly visible.

13h15 : This was the very beginning of preparatory operations for tugging. The two ships were about 5 miles north-northwest of Ouessant; the wind blew from the northwest ; the seas were high ; a weak current ran towards the island. The *Amoco-Cadiz* had still not accepted the offer of assistance. Shortly after 14h00 the *Pacific* began to pull.

The *Amoco-Cadiz* then refused a re-newed offer of assistance ; this did not improve relations between the two captains and for a moment seemed to affect the tugging operation, according to the skipper of the *Amoco-Cadiz*. Nevertheless, the tugging continued, but not without some difficulty : the master of the *Pacific* confirmed (at 15h00) that he did not know the position of the tanker's rudder or whether the engines of the *Amoco-Cadiz* were working. A second tug, the *Simson*, however far away, took course towards the two vessels.

15h15 : A new contract proposal made by the tug was strongly rejected by the tanker's skipper.

16h00 : The *Amoco-Cadiz*, having received approval from Chicago, accepted the Lloyd's open form. On the basis of the statements made by the tug's skipper, four and a half hours had passed since the first offer of service.

The Captain of the *Amoco-Cadiz* for his part maintained that he only wanted a tugging contract and that the captain of the tug had changed the nature of the contract during the tugging (to be precise : at 14h35).

16h05 : Captain Weinert was informed that the *Simson* expected to arrive by 23h00. He in turn informed Captain Bardari.

According to the tug's skipper this was the only occasion during the whole day when he was directly in contact with his counterpart from the tanker. He learned then that the engines of the tanker were in working order but he still had not received an answer as to the position of the rudder.

16h15 : The tugging chain snapped at the tanker end. The wind was straight west, force 8, pushing 9-10. There was a heavy swell. The waves were close to 8 metres (high, deep). The current began to return (it now bore west-southwest). The tug stopped its engines and began to recover its tow. It informed the tanker that it would make a new attempt as quickly as possible and suggested the tanker should reverse its engines. It received no answer. Captain Bardari had the engines reversed.

17h05 : The crew of the *Pacific* began preparations for a second attempt at tugging. The *Pacific* was stopped and pitched heavily. Two sailors were injured.

Preparations continued (17h35) and conversations with the tanker took place (16.23, 17.15, 17.59 h).

18h20 : Contact between the *Amoco-Cadiz* and Chicago via Le Conquet-Radio. Captain Bardari informed his interlocutor of the situation. He told him *in particular* that "if all other methods fail then the ship will drift towards the coast and distress measures will have to be taken".

19h06 : The tug approached the tanker. The wind which had veered to northwest had become stronger; the swell was strong ; the current got stronger. Three attempts to launch a line failed : 19.10, 19.15, 19.20 h. A mechanical accident led to a fourth failure. The *Amoco-Cadiz* dropped its portside anchor (20h04). A fifth rocket was launched, and the tug could at last make fast (20h55) which had proved difficult because of another mechanical accident (20h28).

20h55 : The *Amoco-Cadiz* requested the tug to pull softly ; the tanker could not lift its anchor. After a two minute breakdown of the rudder the *Pacific* began to pull slowly (20h57).

21h04 : The tanker ran aground astern for the first time. Its engines were flooded. The lighting was cut and the radio contact broke off. Captain Weinert reported this to Hamburg (21h13).

21h39 : The stern of the *Amoco-Cadiz* hit the seabed a second time.

21h43 : Weinert called Hamburg and put "all engines full ahead". The tanker fired red flares. It began to lose oil. The black tide had started.

21h50 : The *Pacific* requested a helicopter to evacuate the crew.

21h55 - 22h00 : The engines of the *Pacific* were stepped up to full strength. The tanker had now definitely run aground.

22h12 : The tug line snapped.

22h30 : The *simson* arrived on the scene.

Midnight: Helicopters from the Navy arrived and began to evacuate the crew with a winch.

1h45 : Forty two people out of forty four had been rescued. Captain Bardari and one officer stayed on board. They were evacuated at 05h03.

2nd : The facts as they seem to have been perceived on land

a) The perception of events at Radio-Conquet

Traditional functions of the station. Like all maritime radio stations along the French coasts Radio-Conquet had two principal functions : to ascertain a communications service between ships and the land and between ships ; to ascertain a lookout service for the safety of human life at sea (this on coded frequencies and according to coded procedures*).

The XXXs called "emergency messages" constitute the second degree in the coded scale of incidents or accidents which vessels may transmit by radio. A XXX signifies that something serious is happening on board but that neither the safety of the vessel nor that of its crew is involved. No XXX was sent by the *Amoco-Cadiz*.

The distress messages which alone have the effect of starting interventions constitute the third and last degree in the scale of accidents which vessels in difficulty may transmit by radio. No distress message was received from the *Amoco-Cadiz* on March 16 before 23h18 (1, p. 31)

Information received by the station :

Radio-Conquet picked up the end of the TTT message (see preceding footnote) indicating a breakdown of the steering system ; despite calls for repetition of the message the transmitting vessel whose identity was not known did not answer.

11h05 : The *Amoco-Cadiz* made contact with the station, then made a request for assistance which was to be relayed by Radio-Conquet (11h20).

11h15 - 18h41 : During these hours the station put the *Amoco-Cadiz* in touch with Genoa (11h15) and twice with Chicago (for fourteen minutes at 11h30 and for six minutes at 18h35). It also put the Pacific in touch with Hamburg seven times (altogether over forty minutes of communications) and transmitted messages between the tug and the tanker, the *pacific* and the *Simson*.

19h50 : The second in command of the Portsall lifeboat telephoned Radio-Conquet to

*For the messages there is an established grading system: A TTT is a so-called 'safety' message. A TTT constitutes the first degree in the coded scale of incidents or accidents which vessels may transmit by radio. The purpose of the TTT is to inform other vessels of an incident on board that may present a danger to the vessels cruising in the vicinity. The TTTs are frequent and are not considered alarming in themselves.

advise that he had noticed "a light at about two miles from the rocks of Portsall".

20h00 : Le Conquet transmitted this information to CROSSMA* who replied : OK, well received. But is the light on land or is it a distress signal? Le Conquet replied : No, no distress signals but the two vessels are very close. CROSSMA replied : OK, navigation lights. Le Conquet then gave the telephone number of the second in command of the Portsall lifeboat to CROSSMA.

20h16 : CROSSMA alerted Radio-Conquet that the sub-master of the station of the National Lifeboat Society at Portsall "after a patrol had stated that there was a ship being towed by another".

21h00 : Questioned by the Operational Centre of the Navy (COM) Le Conquet confirmed that the *Pacific* was towing the *Amoco-Cadiz* and did not indicate that the latter was in difficulty.

21h13 : The *Pacific* called Hamburg and talked for eight minutes : at 21h43 the *Pacific* called Hamburg again and talked for five minutes.

21h50 : The *Pacific* requested a helicopter for the *Amoco-Cadiz* ; Radio-Conquet transmitted the message to CROSSMA (22h00).

22h00 : Radio-Conquet established a connection between the *Amoco-Cadiz* and Chicago (connection relayed by the *Pacific* ; the tanker explained its distress situation and the fact that it was losing oil but did not issue a distress signal.

22h34 : The *Pacific* requested a call to Hamburg and talked for five minutes.

23h18 : The *Amoco-Cadiz* sent out a SOS call which Radio-Conquet transmitted to CROSSMA (23h22).

b) The impression of the events by the Navy

Duties of the Navy. Among the duties of the Navy the Senate Commission mentioned the following two responsibilities besides the more classical ones of policing, assistance and rescue:

In the terms of Article 16 of the law of July 7, 1976 concerning the prevention and repression of maritime pollution the state and therefore the competent authorities, among them the Navy, are authorised to intervene for the purpose of prevention in cases of breakdown at sea occasioned by a vessel that could create serious and imminent danger likely to affect the coastline.

*Regional Operational Surveillance and Salvage Centre for the Channel, located at Cotentin (Joburg).

In the terms of a more recent law (however preceding the accident of the *Amoco-Cadiz*, the decree of March 9, 1978 concerning the organisation of actions by the state at sea, the port-admiral had conferred upon himself a very general responsibility as representative of the Prime Minister and of every minister. He has general administrative police authority at sea and is invested with a general responsibility in all fields in which the state acts.

The look-out facilities of the Navy are mainly the signal stations: there were four of them in the area concerned with the *Amoco-Cadiz*. The Operational Centre of the Navy (COM) is in charge of carrying out military operational missions and missions of "public service"; it has to watch permanently "the situation of vessels in the Atlantic area" (Order of April 30, 1974).

Information received by the Navy

9h23 : The signal station at stiff (Ouessant) intercepted a message which it could hardly understand and the origin of which it could not make out. "Engine... keep ... clear ...". It did not report to COM. At 11h15 the signal stations communicated between themselves about the communications from the *Pacific* and calls in English. A look-out was set up.

13h16 : The signal station at Stiff, having heard the *Pacific*, asked it what was happening. The *Pacific* replied that it was towing the Liberian tanker *Amoco Cadiz*. The signal station informed COM immediately and requested the position of the vessels. The deputy officer on duty at COM did not consider this information to be alarming and did not react.

13h20 : The signal stations at Stiff and Molène heard the beginning of a communication in English but the interlocutors were using a frequency which the signal stations had neither the technical means nor the duty to survey.

14h00 to 18h30 : The signal stations followed the positions of the *Amoco-Cadiz*. The station at Molène requested information from the one at Creac'h (Ouessant) when it saw the convoy at 15h00. Creac'h answered: "tanker in tow, no reason for alarm". Neither Stiff nor Creac'h considered it necessary to inform COM which was unaware of the course of the convoy.

18h30 : In accordance with regulations the signal stations ceased their look-out at sunset.

20h34 : The signal station at Saint-Mathieu which keeps look-out during the night was informed by a private party that a convoy consisting of a tanker and a tug seemed to be immobile, very near the coast, off Portsall. The signal station alerted COM. COM was also alerted at 20h35 by the look-out of the Molène station who, having finished his duty normally, nevertheless noticed lights rather near the coast and called COM.

20h40 : COM took a number of measures (calls to vessels, alert, and later rescue operations) .

3rd : Impression of events received by CROSSMA (Ministry of Transport)

a) *Duties of CROSSMA*. This administration is mainly in charge of the prevention of accidents at sea, maritime assistance, maritime rescue, functions which are not immediately connected with a problem like that of the running aground of a tanker; however, Article 16 of the law July 7, 1976 concerning the prevention and repression of maritime pollution confers on the state, and thus on services like this one, the right of summons in cases of damage at sea which might cause serious and imminent danger and affect the coastline.

b) *Information received by CROSSMA*. Informed by the second in command of the life-boat at Portsall of the presence of unusual lights two miles from the rocks of Portsall, the station Radio-Conquet transmitted this information to CROSSMA Joburg. CROSSMA asked "whether the lights are on land or whether they are distress signals". Le Conquet explained that they were not distress signals but that the two vessels were very close to the rocks. CROSSMA replied : "OK, they are navigation lights". Le Conquet gave CROSSMA the phone number of the second in command of the life-boat at Portsall from whom the information came. CROSSMA then requested additional information from the rescue station at Portsall. It received the answer that those responsible had gone out for a while to watch the situation. At 20.10 h the rescue station at Portsall called CROSSMA back and indicated "that it is a false alert; the lights are those of a tanker under tow by the tug *pacific*".

20h16 : CROSSMA for its part reassured the station Radio-Conquet by advising that "the second in command of the life-boat at Portsall after a patrol along the coast has stated that there was a ship being towed by another".

21h42 : COM, informed by the signal station at Aber Wrac'h that a red signal rocket had been launched by the tanker, told CROSSMA that a tanker of 230000 tonnes was about to run aground.

22h48 : The rescue station at Portsall advised that a fishing boat was going to the site where the vessel had run aground.

23h10 : CROSSMA alerted the sea rescue station of Ouessant and then the one at Molène.

23h28 : CROSSMA was informed that Polmar-Sea had been put into operation.

2. SEARCH FOR EXPLANATIONS

The Senate Commission underlines before giving its analysis:

Rather than looking for "scapegoats" it intends to carry out a useful, calm analysis but without complacency towards the organisation and actual functioning of the administration concerned.

1st : Search for explanations about the events at sea

The Commission of Enquiry gave the following facts(1, pp. 54-59).

- Difficult atmospheric conditions : waves, frequently coming up to 9, even 10 metres ; the strongest gusts of wind were registered at the most critical moments of the towing operation.
- At the outset, worrying but not disastrous technical conditions: the tanker's engines were in working order ; the tug was near the *Amoco-Cadiz* when the latter asked for assistance.
- A laborious communication between the two skippers : at least one of them had difficulties expressing himself in English ; they were only rarely in direct contact. The technical information on operations in connection with the towing went rather badly. There was, among other things, divergence between the two skippers on the tactics to be adopted for carrying out the towing successfully. On the other hand, the respective skippers kept mostly in touch with their ship's owners.
- At no time did either the captain of the *Pacific* or that of the *Amoco Cadiz* think it necessary to ask for help. At 21h43, more than an hour and a half after running aground, the tanker launched red signal rockets. The first request stating serious difficulties was made around 21h50 22h00. It was then that the *Pacific* asked Radio-Conquet for helicopter assistance to evacuate the tanker.

2nd : Search for explanations about the part the authorities concerned played or could have played

a) *Radio-Conquet*. The analysis of the senate report on the enquiry reads as follows:

By means of radio messages which they heard or received, transmitted or sent during the whole of March 16 those responsible at the maritime radio station of Le Conquet, which comes under the direction of the international telecommunications network, were in a position to know fairly fully what was happening at sea (1, p. 30).

- The station was in a position to know that the *Amoco-Cadiz* was being damaged on account of the TTT message overheard at 11h20. This message confirmed after all the significance of the incomplete message of which the origin could not be identified and which had been received at 10h20.
- The station was informed that an attempt to assist the damaged vessel was under way.
- Those responsible at the station seemed to be in a position to appreciate that the attempt at giving assistance was not taking place in the best of circumstances. This evaluation would appear to have been possible without violating the secrecy of private communications. In fact, the station gathered in transit a number of unusual communications coming from the convoy formed by the *Amoco-Cadiz* and the *Pacific*. They are here recalled to memory: message from the *Amoco-Cadiz* to Genoa at 11h15; to Chicago at 11h30 (eighteen minutes), at 18h35 (six minutes), at

22h00 (twenty one minutes) ; messages between the Pacific and the Simson at 13h07 ; from the Pacific to Hamburg at 11h35, 13h40, 15h55, 16h20, 17h15, 18h03, 21h13, 21h43, 22h34. In addition, certain information was brought directly to the attention of those responsible at Le Conquet. Thus at 13h07 the *Simson* after having asked Le Conquet to advise the *Pacific* that it wanted to make contact, specified that it was on its way to the *Pacific* at full speed. At 19h56 the second in command of the life-boat alerted Le Conquet about a disquieting fact in this context: the presence of a light two miles off the rocks at Portsall (1, p. 60).

So, Radio-Conquet had knowledge throughout the day on March 16, 1978 of a large number of facts, in themselves of various degrees of seriousness but the convergence of which was of a disquieting nature. In addition, those responsible at the station were not unaware of the weather situation which was hardly propitious to the execution of an assistance, even in good conditions, to be given to a ship of more than 200,000 tonnes, fully loaded, by a single tug even though it was publicly known to be the most powerful in the area (1, p. 61).

The information that was spreading about after 20h00 did not give rise to any doubts. Still at 21h00 when COM addressed a request to Radio-Conquet the reply was just that the *Pacific* was towing the tanker *Amoco-Cadiz* without any hint about the difficulties of the tanker.

It appeared that in applying a very recent regulation Radio-Conquet like all exterior services or public establishments who had competence at sea seemed to have a duty to inform the port admiral. This duty to inform seems to have been capable of being interpreted rather vaguely. Article 5 of the decree Nr. 78-272 of March 9, 1978 concerning the organisation of actions of the state at sea stipulates in fact that "the authorities on land, the exterior services and public establishments of the state that have competence at sea shall keep the port-admiral informed of matters likely to be of importance at sea and shall communicate to him all the relevant information on regulations in force and on decisions taken".

All these details lead one to be astonished at the prolonged silence of Radio-Conquet towards the diverse administrative authorities with responsibility at sea. From the communications which were passed about during the day on March 16, 1978 the maritime radio centre of Le Conquet seemed in fact to have been in a position to conclude that something serious was happening offshore (1, pp. 61-62).

However, in order to understand the attitude of Radio-Conquet we must draw attention to four more aspects:

- The extremely large number of communications channelled through the station : this necessarily led those responsible at Radio-Conquet to minimise the seriousness of events of which they had knowledge.
- The absence of any distress message on the basis of regulations in force, until the decree of March 9, 1978, the station was not held to alert the authorities.
- The customary rule of responsibility and freedom of decision of all ship's masters : the skipper of a ship is the only judge of the situation, and inasmuch as he does not officially request assistance or inasmuch as he does not communicate the difficulties he is faced with he

is assumed not to need any particular help.

- The private and confidential nature of the communications which transit through the station.

The whole question, the senate enquiry report concludes, is to see whether respect for the principle of secrecy of private communications could have overruled the application of the principle to inform the port-admiral which was established in the decree of March 9, 1978 and of which it is after all not certain whether the directions for its application had been brought to the knowledge of those responsible at the maritime radio station of Le Conquet by circular letter or instruction before March 16, 1978 (1, p. 63).

The Navy. The Navy for its part received only little information, did not have a sufficient structure to deal with such non-military information and in any case did not have the proper means to foresee the running aground. Even if Article 16 of the law of July 7, 1976 concerning the prevention and repression of maritime pollution and the recent decree of March 9, 1978 conferred upon it responsibilities for summons and assistance, the Navy could hardly carry out such a mission successfully.

A few explanatory facts may be added (1, pp. 66-68):

- The Navy was never informed by the vessels themselves.

- On account of the weather situation (which at the same time increased the risks and difficulties of navigation or assistance) and of other priority duties no vessel or plane patrolled the sector involved during March 16; the communications between the tanker and the tug were therefore not picked up.

- On account of the gale the indirect sources of information of the Navy (fishing boats, boats from other administrations) could not play their usual part.

- Only the station of Radio-Conquet had solid information on the situation but this was not transmitted to COM.

- All through the afternoon of the 16th the signal stations registered information that could have seemed abnormal as to the course pursued by the *Amoco-Cadiz* and the *pacific*. They were actually in a position to tell that the two vessels moved only very slowly and were outside the shipping lane, on the land side.

- Being responsible for the application of the regulation concerning the passage of vessels the Navy could have been worried following receipt of information at 13h35 coming from the signal station at Le stiff: the convoy was in an abnormal position. A tolerance might be admissible for a small vessel but not for a tanker of more than 300 metres length. Rule 10 (par. d) of an order of June 30, 1977 was clear: "the coastal shipping lanes must not normally be used by through-traffic." The size of the vessel in difficulty, its position, the weather conditions, the nature of the assistance operation should have been taken into account and consequently have caused concern.

However, (1, pp. 68-69):

- There was an error in the assessment of the speed and direction of the convoy which information had been transmitted to COM ; this may largely be explained by the fact that they had been arrived at from observations registered by the very rudimentary means then at the disposal of the signal station.

- The non-reaction to the information transmitted by the signal station at Le Stiff (13h50) may partly be explained by the fact that at the time there was at COM no group charged with the surveillance of commercial traffic. COM was mainly an echelon for the centralisation of military type information.

- The order of June 30, 1977 spelled out that the signal station had to report infringements to the surveillance vessel; on March 16, 1978 no vessel was on surveillance duty in the shipping lane.

But in addition and lastly (1, pp. 69-71) :

- Even if the Navy could and should have intervened offshore in the area concerned on that day, particularly in view of Article 16 of the law of July 7, 1976 (there certainly was serious and imminent danger for the coastline in the sense of Article 11-4 of the Brussels Convention of 1969), it did not have the tugging facilities that would have been adequate to the requirements of the *Amoco-Cadiz*.

c) *CROSSMA* : They were informed even more belatedly than the Navy and had, according to them, no means of intervention that would have been adequate to the situation that existed on March 16, 1978, no matter what duties seemed to have been given them, mainly those of the decree of April 30, 1974 (1, p. 74; 48) .

3. POLLUTION

The essential points to note concerning the pollution* caused by the *Amoco Cadiz* are the following :

- Light oil containing one third aromatic substances which evaporate but also spread easily in sea-water with contents of high toxicity for the living environment.

- A very short distance between the location of the wreck and the coast (less than two miles).

- A massive quantity of hydrocarbon spilled within a few days : 223000 tonnes in less than two weeks , i.e. a discharge of 18000 to 20000m3 per day which had a disastrous effect on the environment (1, p.107).

From the time of the stranding, oil flowed towards Portsall and its vicinity, pushed by the winds which blew at gale force from the north northwest and covered the coast in oil. On March 17, a circular area around the wreck with a radius of four miles was polluted.

*See map of maximum spread of the oil slick p. 89 (3, p. 16 or 4, p. 21).

On the 18th, a north-north-easterly wind pushed the slick southwards : it reached the cape of Saint Mathieu and threatened the offshore area of Brest. On the 20th the wind changed from northeast to west and pushed the oil slick to the northeast, sparing the offshore area of Brest ; the oil reached Roscoff during the night. In the afternoon of the 21st it arrived in the bay of Lanniau ; the gale increased again in force after a relative lull. On the 23rd the north coast of Brittany was affected up to Sillon de Talbert in the east : two thirds of the cargo had already been discharged into the sea.

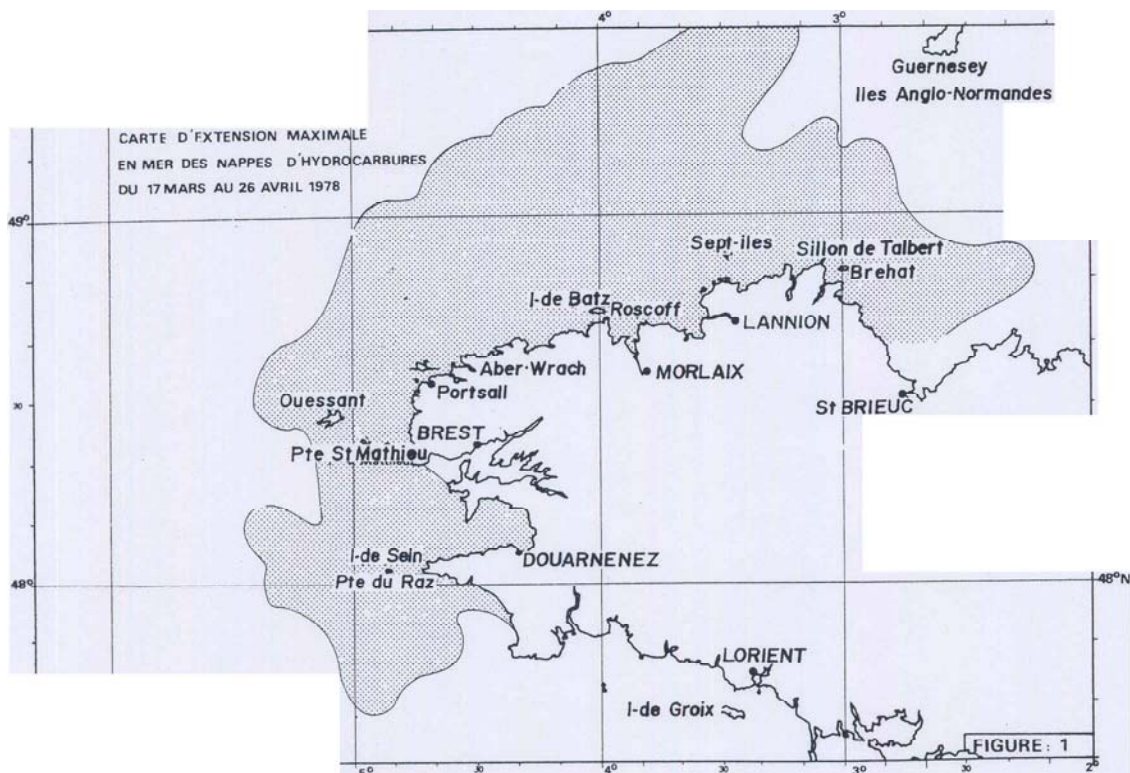


Fig. 12: Map of maximum extension of hydrocarbon slicks on the sea.
(Source: National centre for the exploitation of the sea)

Then (March 25-26) the equinoctial tide came and carried the slicks high up on the rocks and beaches, to places which only another equinoctial tide could again reach. The estuaries were particularly affected. Offshore very large areas of oil slick drifted east and for a while threatened the bay of Mont St. Michel, Jersey and Cotentin.

On March 29 the winds changed again; some places, such as Perros Guirec so far spared, were polluted. The oil slicks were pushed offshore by the southwesterly wind. The largest of them (75 miles long) drifted west afterwards under the effect of a north-northeast wind. A small part of it passed the cape of Saint-Mathieu; it broke up and veered south; on April 19 some oil slicks rounded the cape of La Chèvre and touched the bottom of the bay of Douarnenez on April 21; some traces of hydrocarbon reached the bay of Audierne in May.

At the beginning of May evaporation, dissolution and the battle against the oil slicks which had been attacked with dispersants and precipitants led to a residual state that excluded notice able new arrivals on land. But the wind had already slackened considerably: the great tides which follow the equinoctial period could no longer affect the expected cleaning process.

The polluted area extended therefore from Le Conquet to Le Sillon de Talbert, some sites outside this area having suffered light attacks as e.g. the bay of Douarnenez. Inside the area very few sites had been spared (1, pp. 107; 2, pp. 206-209; 3, 4 and 5).

4. THE BATTLE AGAINST THE POLLUTION

1st : The Polmar plan

a) 1970 : A battle plan designed following the black tide of the Torrey Canyon

The battle against maritime hydrocarbon pollution had been the subject of a ministerial order issued on December 23, 1970 in response to the stranding of the *Torrey Canyon* on March 18, 1967. In short, the purpose of this order is to define the responsibilities of the administrations concerned and to coordinate their interventions. The order is explicit in a document entitled "Pollution of the sea and the coasts by hydrocarbons - Polmar Plan". The plan specifies the allocation of responsibilities to the various ministerial departments; in an annex there is especially attached a telephone directory and a list of materials and equipment for fighting pollution (1, pp. 85-87, 2, pp. 189-204).

b) 1976 : An organisation redefined after recent black tides

Following the disasters of the *Olympic Brevery* and the *Boehlen* in 1976 certain modifications were considered indispensable; decentralisation of the launching of the Polmar plan (where the 1970 law had given this responsibility to the Prime Minister); launching from the moment when there was a threat of pollution (without waiting for actual pollution), making available an intervention fund (to respond to requirements without delay), increased battle facilities and preparations.

These new lines of organisation were contained in a report from GICAMA* (spring 1977) and were adopted by the Council of Ministers on May 25, 1977 (6, p. 33).

c) 1978: The reform undertaken in 1976 is not achieved

The reform of the Polmar plan was undertaken. But it had not been achieved to any great extent, when the *Amoco-Cadiz* ran aground. On three capital points the system was found to be lacking (1, pp. 191-199; 2, pp. 200-204):

General organisation

The instructions were in the process of being worked out and the defects brought to light by the report of the government presented to parliament eighteen months earlier (during the discussion of the law of July 7, 1976) were still there (2, p. 202).

* Interministerial Group for the coordination of actions at sea by the administrations, created by a decree of April 19, 1972 for the purpose of coordinating the actions of some fourteen administrations involved (6, p. 33).

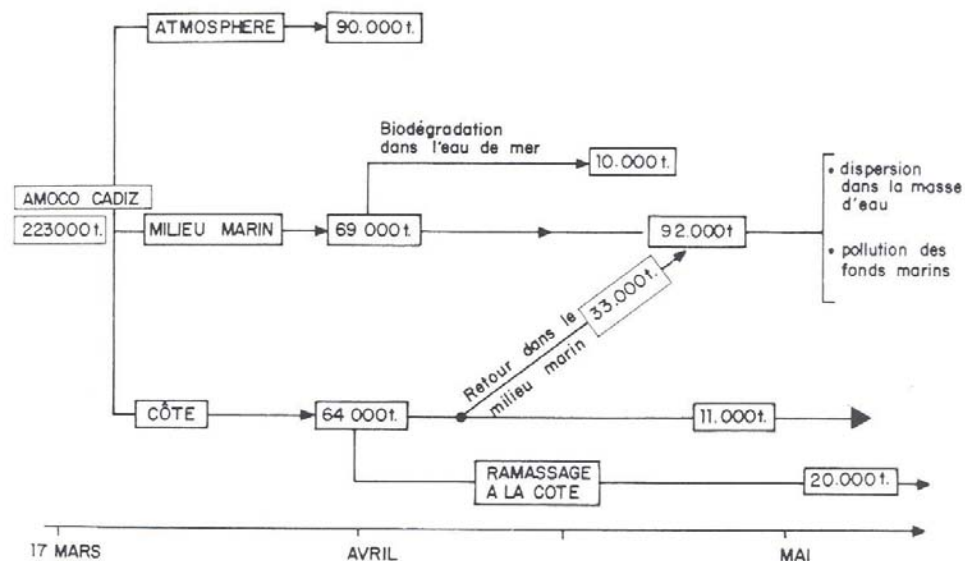


Fig. 13: "What became of the 223,000 tonnes"

The means available

The report submitted by GICAMA in 1977 remained valid; it established that all the equipment available would at best permit the containment and elimination of an accidental discharge of 5,000 to 10,000 cubic metres of hydrocarbon on the hypothesis that weather conditions and local currents permitted it. Now, since 1972 the creation of the means to combat the discharge of 30,000 tonnes of hydrocarbon had been defined as an objective. This effort of reflection had been made on a par with the procurement of equipment and material to cope with pollution (1, p. 140).

Preparation for action.

The parliamentary commission indicates:

No actual, complete and combined sea and land, exercise had been organised, neither under the rule of the order of 1970 nor since the reform of Polmar had started. Apart from this, all the envisaged hypotheses were based on limited discharges (30000 tonnes for the calculation of means, 15000 tonnes for the exercise of mobilisation in 1975) (2, p. 203).

It was with this equipment for battle, duly analysed for its insufficiencies in 1975, that the situation had to be faced :

The reforms undertaken since 1976 and the decisions taken in 1977 had theoretically permitted a better adaptation of these tools to their task.

However, the slowness of realisation of these reforms constituted a major obstacle (2, p. 204).

Summing up it appears therefore that in March 1978 we did not to have suitable equipment to combat pollution. In addition, it is obvious that in the aggregate the equipment was not up to the size of the disaster.

2nd : Application of the Polmar plan

a) Setting up the battle apparatus. The Polmar plan was put into operation by the Port-Admiral (sea operations) and the police commissioner of Finistère (land operations) on March 16, 1978 at 23h45. The Operational Centre of the Civil Defence Directorate (in Paris) held a first meeting two hours later at 01h45. The following day the interministerial commission for the battle against pollution by hydrocarbons designed the strategy to be followed ; supply of all barriers available in France to the disaster area; alerting all European maritime states ; an attempt at "lightening" the tanker as soon as the gale had blown over without setting the vessel on fire which was considered dangerous and of little avail (the inflammable parts of the cargo being the most volatile, no significant gain would have been achieved).

On March 17, while the plan Polmar-Land was directed from Quimper by the police commissioner an advanced command post (PC) was set up in the disaster area at Ploudalmézeau ; on March 19, the police commissioner for the northern coasts also put the Polmar plan into operation, three days before the first oil slicks arrived.

While there were some difficulties at the start the coordination with the mayors could be better established on Monday, March 20. The coordination between administrations, which was delicate because of the duality of the Polmar plan, could be more affectively ascertained from March 24 onwards by the appointment of Mr Marc Becam, Secretary of State at the Interior Ministry (and mayor of Quimper) as coordinator. From March 26 on, a representative of the Port-Admiral took part in the meetings held at the command post Polmar Land at Ploudalmézeau. Mr Becam held a daily press conference (1, pp. 85-92, 2, pp. 206-224).

b) The battle at sea. The idea of setting the vessel on fire was dropped as we have said. There remained the pumping of oil on to other tankers. However, in view of the weather, the scale of the disaster and the excessive time required for bringing pumping gear to the site all efforts to master the pollution at the vessel ended in deadlock (1, p. 95).

Action on the oil slicks could be envisaged in three ways :

Pumping by mechanical means, but the seas were too high to permit the use of the available equipment;

Use of precipitants, but sending the oil to the bottom of the sea was no acceptable solution, given the eventual dangers of such a 'disappearance'.

Finally the use of dispersants. These products had been considerably improved since their massive utilisation in 1967 on the occasion of the stranding of the *Torrey Canyon* (the 10000 tonnes used on the Cornish coast were responsible, rather than the oil itself, for the death-rate suffered by the maritime fauna (6, p. 23). They are now less toxic. Nevertheless, their use still necessitates precautions : the dispersed oil may become temporarily toxic ; the toxicity of the dispersants can combine with the toxicity of the hydrocarbon and produce a toxicity 4 to 5 times higher than that due to simple addition (synergic effect). This is why dispersants were banned at depths of less than 50 metres in sensitive areas (1, pp. 93-101, 2, pp. 226-239,7).

a) The battle on land. The protection of sensitive areas is effected by barriers. The insufficiency of stocks, the absence of necessary instructions for their erection, the absence of transportation equipment and especially the weather conditions have often made this first line of defence inoperable.

There remained the pumping of the coast implemented, at first by individual farmers who had usable barrels. By the end of May 65000 tonnes of products had been pumped (containing about 30000 tonnes of oil). These products had to be taken to degasification stations at Brest, Nantes, Saint-Nazaire and Le Havre.

In addition, some 185000 tonnes of solid waste were collected containing 10-15 per cent hydrocarbons. After heat sterilisation they had to be deposited in the port zone of Brest and in a cove near Trégastel (for the northern coasts). Between the beaches and the places of treatment or deposit there were intermediate storage pits arranged, mainly located outside the ecologically sensitive areas.

Finally there remained the clearing of the coastline or more or less of the most accessible parts, the most sensitive from the point of view of the tourist trade.

All this required an unprecedented effort on the part of the multiple administrations involved, the local representatives, the farmers and people living on the coast, so many times affected by an oil disaster (1, pp. 102-105, 2, pp. 240-256, 7).

3rd : Critical observations in the parliamentary reports

a) General organisation. The general opinion was that on the organisational level the coordination between administrations and between the different decision making bodies seems to have caused the most difficulties.

It was paradoxical to find that France had more powerful means for intervention in far away theatres of operation (the necessary instruments transportable by air, replacement of bridges etc) than those, even though they are more elementary, required for the installation of an adequate command post in a situation like this. The creation of a mobile command unit equipped with the means of communication and for accommodation seems imperative (2, p. 215).

While in the case of minor maritime pollutions the implementation of the Polmar plan is not called for, the role devolved on the local communities and in particular on parishes is important while it seems to be non-existent in the case of implementation of the plan if one refers to the decree of 1970. Above all, the plan does not determine the role devolved on the local communities.

Based on the facts as far as they can be established when analysing the setting up of the whole organisation a certain irresolution is noticed during the first three or four days and this despite the immediate implementation of the Polmar plans and the effective mobilisation of all administrations involved (2, p. 221).

b) The battle at sea. In addition to the criticism of the absence of available means and of delays in forwarding equipment (1, p. 95) the rule of 50 metres depths of sea for the use of dispersants was criticised by the senators :

From the start of operations all the diverse services involved had agreed on the necessity not to employ dispersants where the sea was not at least 50 metres deep as witness the joint communique of March 24 by the representatives from the Ministeries of the Environment, Interior (Directorate of Civil Defence), Navy, IFP, ISTMM and CNEXO.

Technical directives to this effect were sent the following day to those responsible for the various cleaning-up sites. However, the Commission has been informed from several sources (delegations that went to Brittany, diverse people questioned by the Commission) that this principle was actually not respected either at the start of operations or at this present time when the concentrated dispersants added to water are still used to clean rocky areas on the coast with hoses.

The Commission is surprised that such hazards should have overruled the principles which had been established as untouchable. The competent authorities have shown themselves legitimately circumspect on the consequences of the use of such substances on the coast but they did not see their way to translating their reservations into actions (1, pp. 100-101).

c) The battle on land. Once more the lack of means, the lack of organisation must be put on record. The case of the floating barriers is taken as a typical example : the administrative allocations for the purchase, the forwarding, the stocking, the installation could only lead to inefficiency (1, p. 180).

The case of the barriers underlines also the need for effective training. The term barrier is really rather badly chosen and develops an attitude which evokes rather the image of a "Maginot Line" which was associated with this work tool. A barrier must be used to channel the discharge of an oil slick towards a less sensitive area where in addition its recuperation will be easier; it is not a static fortification. What with the tides and their inversion every six hours it must be known how to place this instrument judiciously and manage it consistently (2, p. 242). This requires knowledge which cannot be conferred by a notice, no matter how well written.

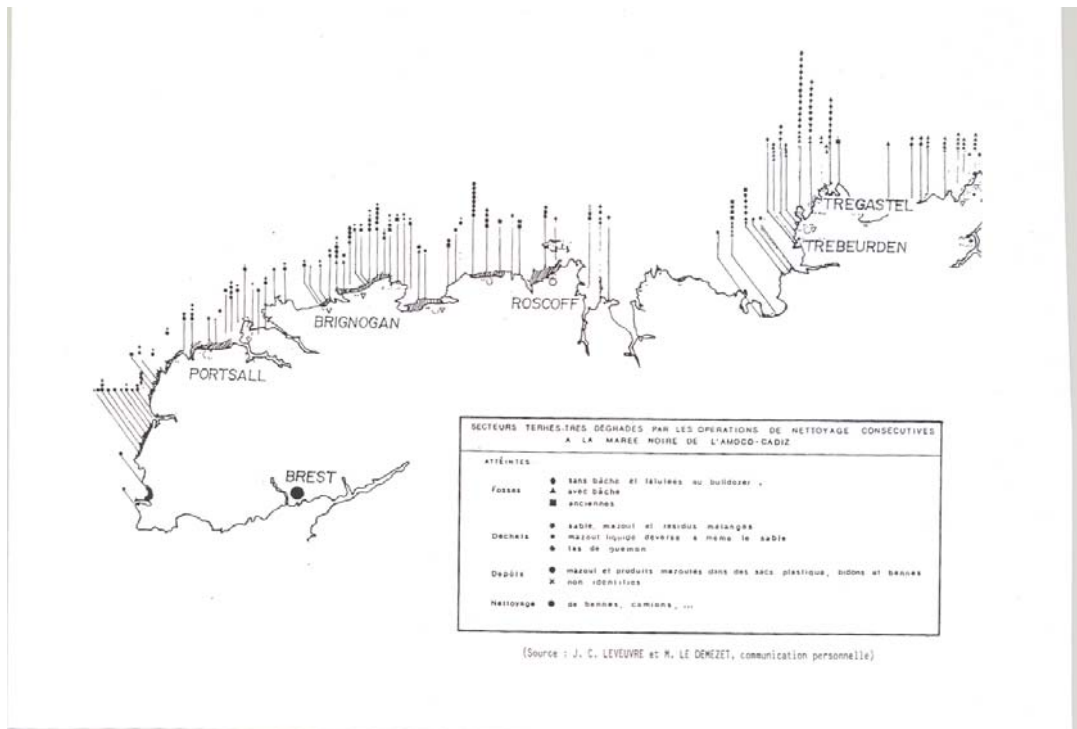
Let us still register this observation concerning the choice of location for the intermediate storage pits:

Studies made in recent years under the authority of the Ministry of the Environment with the approval of the BRGM tended to record the sensitive areas where such storage facilities were to be prescribed so as to localise the proper place (s) for such use. Those responsible at the departmental directorate(s) of agriculture from each of the two departments involved did not seem to have such documents in their possession when they had to determine these sites (1, p. 104).

5. THE BALANCE SHEET OF THE BLACK TIDE

1st : Ecological impact

Being an environment of very great riches, of great diversity, fragile and with an unstable equilibrium, attacked by multiple forces in either chronic or sudden fashion*, the coastline this time had to absorb the shock of a massive discharge of hydrocarbon**.



The most affected areas were the estuaries and the semi-enclosed bays. A massive and crushing mortality rate was registered among rock and beach animals within a radius of five kilometres around the wreck and at accumulation points up to 100 kilometres away. The waters have generally regained their 'normal' content of hydrocarbon at the end of three months except in estuaries and bays.

*According to world averages which were reexamined for Brittany, pollution by hydrocarbons occurs in a ration of 1.7 and 11 for, respectively oil tanker accidents, degasification of tankers at sea, telluric fallout (6, p. 125).

** See figure on page 91 (3, p. 34).

If the first effects of the black tide were spectacular, millions of razor fish thrown up by the sea, more than 4,000 birds gathered, some ten million fish killed, one could draw up a provisional balance sheet of moderate seriousness during the months following the disaster. The mortality rates registered are localised, selective, incomplete, in the order of 3 per cent of the total fauna, less than 5 per cent of the flora (8, p. 337). The high seas in the area of the stranding, the moderate and selective use of detergents, the gathering of the spilled oil have been favourable factors (3, p. 46, 81).

The situation can be described by quoting some points taken from the works of Cl. Chasse (6, p. 127):

- The very fertile field of large algae, some 400 km², "three times more productive per hectare than our best forests on land", is practically intact.
- The benthic animals have occasioned uneven losses. A third of the coastline lost more than 50 per cent of its biomass while another third lost less than two per cent. The total loss of maritime animals is estimated at 260000 tonnes of gross fresh weight.
- Plankton of which there is still little in March was not much affected.
- The very mobile fauna of fish and of large shellfish were altogether very little affected: it took to flight. High mortality rates, very localised, were confined to species of little economic importance.
- The number of birds killed is estimated at between 15000 and 20000.

In addition to this 'mortality section' of the balance sheet the problems of pathology and change of ecological equilibrium need to be examined:

- The animals that survived were contaminated at rates of 200, even 500 and sometimes 1500 ppm (above 100 ppm a species is uneatable on account of its taste). With the sanitation of the area, decontamination worked within a few weeks but in areas where sediments remained strongly affected by hydrocarbons no restitution of this kind was possible.
- A reduction of vitality, emaciation, reduced resistance of some species was also noticed ; species which disappeared did not come back ; necroses were observed, tumours affected certain fish.
- The ecological equilibrium was affected: proliferation reduction, concentration* of certain species (6, p. 127).

Hydrocarbons had been trapped in substantial quantities in mudbanks, deposited on sand before being covered again by new layers of sand (carried mainly by the equinoctial tide of March 25/26, 19781, infiltrated the sediments in depth. On account of this no final balance sheet can be drawn up. After March 17, 1978 it became necessary to establish a programme of studies over several years to follow the ecological impact of the disaster (9).

*Whence unusual fishing catches, rose-coloured shrimps for instance which do not indicate a proliferation of the animal (and may bode ill for future catches).

The specialists stress the need for this ecological follow-up over a long period of time (because of the slowness of the return to equilibrium), the importance of uncertainties that remain (problems of reproduction, recolonisation, reutilisation of the most affected areas which were sometimes the most ~ valuable). one remembers these lines from a CNEXCO report which show the difficulty of the task and the tenacity required for the success of the attempt if one considers the still higher risk of a new black tide:

The deficit caused among several species will balance off over the years if the environment is not again polluted. It is tempting to try and remedy this state 'of affairs by going ahead with repopulating, introducing larvae or young shellfish, flat fish and bivalves produced in enclosures. However, it is necessary to keep in mind the fact that alimentary support (invertebrates) constitutes a limiting factor the equilibrium of which cannot be artificially restored. It seems illusionary, for many species, to go ahead with massive repopulation with either adults or young ones without first evaluating the profitability of such actions based on existing economic and biological data. An experimental study of this kind with the help of a computer model is in progress for flat fish and oyster beds. In all cases it would be useful if the follow-up on the evolution of the haliotic stocks were continued until 1983 (3, p. 51).

2nd : Effects on human health

Two groups of the population were involved : the inhabitants (by respiratory contact) and people working on the beaches (respiratory and skin contact). The conclusions reached by specialists agree (1a, 11, 12) with regard to short and medium term effects :

During the acute phase an important number of troubles have been observed which can be qualified as minor, even if their, rapidly receding, existence was a genuine nuisance to people affected. on medium term, consulting term, however, we must point but that these results give no indication on future consequences of this pollution (10, p. 15).

For the long term effect precisely it does not seem that sufficient financial means have been allocated which would permit the desire0 analysis; rightly or wrongly, some people deplore that useful scientific work in this field has not been particularly encouraged (6, p. 135, 12, p. 40).

3rd : The economic consequences

The various studies carried out and published, in particular* the one by CODAFF** of 1979 (13) and the synthesis advanced in 1980 DY the magazine OCTANT (published by INSEE, 14, p. 451 permit the drawing up of the following balance sheet:

*Various sources indicated hereafter: 1, pp. 115-122; 2, pp. 265-268; 6, pp. 163-166, 181-191; 13; 14, p. 45; 15 pp. 1-9).

**Departmental Committee on Development and Housing for Finistère.

a) Sea economy

The pollution of ports and fishing ports has resulted in a halt of all activities. Five hundred to six hundred professional fishermen out of a total of 1,800 (for the locations of Brest, Morlaix and Paimpol) were affected by the consequences of the black tide. After March 16 most of the fishermen gave up their activities. The resumption occurred only gradually after the end of April; it was generally resumed at the beginning of June. Much of the fishing tackle had been damaged, often made unusable.

- The marketing of cockles and shellfish involving about a hundred occasional fishermen who drew additional income from this had become impossible on account of the bad taste of the species which had been affected by hydrocarbons.

- The breeding grounds, the coast north of Finistère has the largest area of breeding grounds in France, had been polluted in their submerged parts (which required restoration work since the walls had been soaked with hydrocarbons); for the non-submerged parts the supply of seawater required delivery by road tankers.

- Oyster farming was the sector most affected. A large part of the stocks had to be destroyed in the oyster beds (the total number of oysters which could not be supplied to the market: 1500 tonnes of which 250 tonnes from punts) and in the bay of Morlaix (500 tonnes destroyed the first time, 4600 tonnes thereafter). Installations and equipment were damaged in the area of Wrac'h and particularly in the area of Benoit; the cultures had to be relocated (30000 ffrs/hectare). The environment, sometimes still more polluted, made the resumption of activities difficult*.

- The harvest of algae impeded, at a time, could nevertheless be accomplished as far as Laminaria were concerned. The loss figures show no serious disruption for 1978. For this there are two reasons: the mechanisation of the boats and the fact that in 1978 too the jiggers absorbed the algae green while discharging the drying-out agents and making them ready for harvesting. For the lichens, the fucus harvested at much lesser depth than the Laminaria, the balance sheet looks much worse.

- The black tide has therefore had a general impact on the economy of the sea.

Employment in oyster fisheries was particularly affected. If the measures of indemnification have permitted to suspend lay-offs for forty nine out of a total of about -three hundred (13, p. 2) short-time working was nevertheless introduced in the most severely affected sectors (two hundred and eighty nine on June 9 out of a total of three hundred and eighty two). As a consequence, business located upstream and downstream suffered the backlash of the crisis; naval repairers, suppliers of fishing equipment, the fish trade, fish transport. The halt of business reduced income to zero while fixed expenses remained.

~ *A burned-out factory can be rebuilt; an eco-system as rich as an oyster bed cannot be so easily rehabilitated.

Comparing the periods March to August in August 1977 and 1978 one can measure the average loss registered (in weight and in value): fish minus 4 per cent and minus 30 per cent, shellfish minus 32 per cent and minus 26 per cent, oysters - minus 80 per cent and minus 60 per cent.

In addition to the immediate losses which no doubt indemnification will deal with there are the medium term problems and the uncertainty about the future. This is mainly a question of re-establishing equilibrium as far as eggs, larvae and young fish, which are much more vulnerable than fully grown ones are concerned. There is also the question of decontamination in the depths of the most affected areas, which are in some instances the most productive.

b) The tourist trade. The losses in the hotel industry were heavy (100 million ffrs)*. A considerable drop in the number of foreign visitors was noticed (90 per cent for certain periods). Camping sites were equally affected, operating at only 50 per cent of their capacity in July. Furnished apartments faced a drop of 60 per cent in June and 20 per cent in July. True, the poor weather conditions during the first half of July may have caused a negative effect but they could not disguise the essential cause of this drop in business.

c) Consequences which need evacuation in depth and in the long term. The black tide from the *Amoco-Cadiz* has hit a fragile economic entity (85,000 unemployed registered with the local employment agencies of Brest and Morlaix of which 45/per cent were aged under twenty-five). What will be the lasting effect of the shock? What will be the long term effects on economic life? What will be the attitude of the investors in respect of a sector of the economy which depends strongly on the quality of the environment?

4th : The financial aspect - Compensation

For the immediate battle against the pollution (staff, supply of services, ships, planes, helicopters, equipment purchases) total expense exceeded 415 million ffrs (2, p. 281). To this must be added the amounts provided for the redevelopment of sites (Decision by the Interministerial Council for the Development of the Area of July 18, 1978): 17.35 million ffrs.

Compensation has been paid or provided for to those affected and to the tune of about 45 million ffrs : the sea fishermen received a provisional compensation of 1,244 ffrs per fortnight of their idle time (15 March to 30 July 1978) and afterwards a complementary compensation for the rest of the year. The hotel owners apparently succeeded in making an arrangement with the authorities. The situation is more delicate with regard to the oyster farmers; the amounts suggested are in fact based only on part of the losses, destruction of stocks, cleaning up, keeping on staff while they could not work, transfer of oysters. Other items must be considered such as the reestablishment of the concession areas**, equipment maintenance, losses due to default in the growth of the oysters, loss of business during the partial lay-offs etc. People in the trade estimate their overall losses at about double the amount so far established by the authorities.

*Tourist bookings 1978 in percentage of those for 1977: April/May 30-40 per cent; June 50-55 per cent; first half of July 60-70 percent; second half 80-90 per cent (13, p. 16).

**Initial reinstatement is programmed and in the process of implementation.

5th : Legal action

As regards penalties, an investigation opened by the examining magistrate at Brest led to the indictment of the skippers of both vessels (tanker and tug); the decision was upheld in an appeal hearing on October 27, 1979.

In civil law the French government has started proceedings against the companies (Amoco International and Standard Oil of Indiana) who owned the vessel in the court of Chicago. It claims 460 million ffrs in damages and interest. The court has declared itself competent on September 22, 1979 and has refused the two companies in litigation the right to limit their responsibility. This legal action by the state has been joined by the districts of Finistère and Côtes-du-Nord, fifty communities in Finistère and hotel owners' associations. Such lawsuits are extremely costly, extremely drawn-out and doubtless hazardous ; these difficulties are strongly felt by the plaintiffs (16). These latter ones have nothing like the financial strength of their adversaries who are hardly bothered (quite on the contrary, as some of the plaintiffs point out) by the prospect of spending large amounts on court proceedings.

6. CONCLUSION: THE ABSENCE OF A SYSTEM OF PROTECTION

In order to understand the incapacity of the various parties involved in the inexorable drift of the giant oil tanker one must get down to the fundamental causes without being hindered by the search for some scapegoat. With the Senate Commission of Enquiry we shall hold on to four essential factors which have caused this impotence.

1st : The mentality of seafaring people

Here we are facing time-honoured traditions. If at sea there is self sacrifice when a human life is at stake the seafaring man, on the other hand, being solitary, dignified and brave, does not call for help until there is danger to human life (2, p. 94). The rule "after God, the skipper is the only master" remains very much alive and powerful. The traditions at sea can therefore still be summed up like this: absolute solidarity in case of danger to human life; no intervention in case of distress (2, p. 95). If one applies this to the events of March.16, 1978, the members of the senate note, many of the attitudes find their explanation in this. "The law of the sea means confidence in the skipper and not defiance ... No distress call, no intervention" (2, p. 95).

2nd : The hardly responsible use of the maritime environment

If mentalities are still impregnated by the "chivalrous" spirit invoked above behaviour at sea is also guided by other, much less noble, notions; "the constant search for private and instant profit", the Senate Commission of Enquiry spells out (1, p. 157). The sea, "common heritage of mankind" as the United Nations wanted to define it? Or the sea looked at rather as a "res nullius", a simple support for ships, justifying its users in their search for reduced cost of investment and exploitation, for multiple financial and fiscal advantages, weak or even non-existent regulations, so many factors found in states which complacently lend their flag (without these latter having a complete monopoly in this business).

From the point of view that the sea is a heritage one can readily explain the phrase by the French Minister of the Interior, Ch. Bonnet, evoking the inexorable drift of the tanker and its tug: "Negotiations which I shall not hesitate to call sordid" (17). From the point of view that the sea is simply a liquid mass permitting the traffic of ships and the discharge of cumbersome refuse one can better understand an event like that of March 16, 1978. More so still as the systems of prevention and combat largely failed, as the Commissions of Enquiry emphasised.

3rd: Administrative insufficiency of government action at sea

As the report by the delegates stresses this must be understood in depth without going for an easy search for a guilty party. In other words : the problem which arose on March 16, 1978 sat still on the fence without blame being attributed. Thus, as for Radio-Conquet, one must not accuse unjustly :

Considering the principle of secrecy of the communications and of the private and purely commercial nature of the assistance relations, it was not exactly within the competence of Radio-Conquet, not even, as it seems, within its possibilities and in any case not at all within its habits to evaluate the seriousness of a situation from telephone conversations or, as a general rule, to take an interest in the safety of shipping; at least not until the publication of the decree of March 9, 1978 which placed responsibility on all land-based authorities and on all exterior services and establishments of the state who have competence at sea to keep the Port-Admiral informed of all business likely to be of particular importance at sea, no law submitted the maritime radio stations to a general information duty on events of which they could have knowledge.

However, on March 16, the decree had been published in the *Journal Officiel* of the 11th, no particular instruction to this effect had as yet been received (2, pp. 95-96).

In general, the delegates indicate :

What we are dealing with is a complicated system in which information is shared between diverse agents who ignore each other more or less, in which an information which is somewhere cut into pieces, circulates badly, and so causes finally and paradoxically the ignorance of the authority which has the competence to intervene. A sometimes Incoherent system, always marked by a pretended coordination which has to replace the unity of command which is indispensable in the face of danger, first potential, then actual. A system in which one administration which has powers but no means is called upon to request these from another administration which evaluates the opportunity to grant these means and, conversely, an administration which has the means but not the information which would cause it to put them to work or the power to use them. Altogether a divided system deprived of all synthetic function.

In this respect it must be recognised that all the information collected, and which agrees on the respective parts assigned to the Navy, the merchant navy, the post and telecommunication authorities concerning life at sea and its problems show at which point reform is needed (1, p. 223).

4th : The laxity of measures for surveillance of shipping and the deficiencies of the means of intervention

On March 16 no ship was on duty controlling the area of Ouessant when the under-equipment of fixed radio and radar installations made this completely hazardous from the coast.

Finally, supposing that the information would have made intervention on the *Amoco-Cadiz* possible, the National Defence Forces had neither specialised crews to attempt a repair of the damage nor tugs in a nearby position and with sufficient power to prevent the stranding (2, p. 97).

To overcome these difficulties, and above all the first one, is an arduous task. To do this the mentality at sea needs to be reversed. And to do that one needs precise laws which spell out the responsibility of the seafaring people. Firm orders are needed which permit the circulation of information between the men on land and the commanding authority and mobilises the government services at all levels. They must be given the means required
(2, p. 97).

Article 16 of the law of July 7, 1976 aimed exactly at these difficulties and deficiencies; it provides :

In the case of damage or accident at sea incurred by any vessel, aircraft, fishing tackle or platform carrying or having aboard noxious substances or hydrocarbons and being capable of creating serious and imminent dangers likely to affect the coastline or connected interests in the sense of Article 11-4 of the Brussels Convention of November 29, 1969 on the intervention on the high seas in case of an accident involving or capable of involving a pollution by hydrocarbons, the owner of said vessel, aircraft, fishing tackle or platform may be summoned to undertake all necessary measures to end these dangers.

In case such summons has no effect or not the desired effect within the time allowed or as a matter of course in an emergency the government may take the necessary measures at the expense of the owners or recover the cost from the latter (2, p.93).

True, in the beginning the parliamentary amendment was much more striking than the text proposed by the government ; the simple case of damage (without there being necessarily "grave and imminent danger") justified the Implementation of the emergency intervention procedure (2, pp. 93-94). However, the 1976 law permitted already to expect better accident prevention.

On March 16 the laws had not yet been revised; the orders had not been given; the means were not available. The decree which sanctions the general police authority of the Port-Admiral and establishes a duty of supplying information for all services had been published five days before the drama; as for the decree which obliges the skippers of all vessels carrying hydrocarbon ,to report any damage likely to create a serious and imminent danger within the 50 mile zone and obliges on the other hand the tugs to inform the authorities of any request for help and assistance - that was published ten days after the accident.

For lack of decrees of applications, lack of precise instructions, means, Article 16 of the exercise of the power to intervene could not become effective (2, pp. 97-98).

5th A general situation that could only lead to deadlock

All these considerations lead the Senate Enquiry Commission to these concluding words : they underline that some tactical errors do not appreciably aggravate a situation when the basic determinants of it are far too negative.

The lack of reaction by administrations which had responsibilities at sea has had no influence on the stranding of the tanker *Amoco-Cadiz* on March 16, 1978 (1, p. 81).

The polmar plan was already well recognised for its insufficiencies: Even before the disaster of the *Amoco-Cadiz* occurred the authorities were perfectly well aware of the maladjustment of the means that we could mobilise. The report prepared for the government by GICAMA in 1977 spells it out quite explicitly as we have indicated earlier on (1, p. 196).

The Polmar plan could, therefore, provide no hope for a more honourable follow-up after the deadlock of prevention.

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