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Equipment And Prevention

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ABSTRACT

For prevention and fight against with marine pollution, the State Society of Rescue and Maritime Security (SASEMAR) has 21 Coordination of Rescue Centers (CCS), 6 Strategic of Pollution Bases (BEC), 6 Sub-aquatic Action Bases and sea and air media distributed along the Spanish geography.

Among the material means, in the Canary Island has one of the three rescue aircraft CN 235-300 that Spain has. This aircraft has specific pollution sensors.

1. Introduction

On the large tapestry woven around 'marine pollution', there are two fundamental and very extensive threads, 'prevention' and 'fight against with pollution'. Both are closely related, so that if the prevention thread remains current and active, the second one is minimized. In any case, we can't lower our guard or abandon the continuous preparation of specialized personnel and equipment for the fight against pollution (LCC).

Without losing sight of the final objective, which is the participation of Maritime Rescue aircraft in the prevention and fight against pollution of the marine environment, it makes notice the first 'reflection': prevent..., the best LCC.

By other side, there is a basic question that in summary is: The statistics are generated as a result of accidents; those accidents provoke the application of known methods on LCC. Once we have finished the chapter, we analyzed the data obtained and the issues given rise to new studies resulting in the adaptation of the legislation and the improvement and emergence of new techniques and equipment LCC. Before the quantum jump towards the aircraft as a essential part of prevention and the LCC, passing through the base on which rests, i.e., SASEMAR, we have to review other threads, no less important and extensive, such as the wide national and international legislation, and the statements involved on participation and they answer staggered.

2. Sasemar And The CCS's - Optimization Of Media And Technology

The State Society of Rescue and Maritime Security SASEMAR, public enterprise entity attached to Ministerio de Fomento through the Directorate-General for Merchant Shipping, has 21 Coordination of Rescue Centers (CCS), distributed along the geography of the State. In addition, SASEMAR has 6 Strategic of Pollution Bases (BEC), 6 Sub-aquatic Action Bases and sea and air media attached to each CCS and/or shared with others adjacent centers.

In the case of Canary Island, there is a CCS covering the Eastern Canary Islands SAR (CCS Las Palmas) and other one covering the Western Canary Island SAR (CCS Tenerife). **Units:**

Both centers have their corresponding intervention units assigned, as well as with others who are sharing, regardless of the physical location in the island territory.

The Tenerife CCS has 13 surface units and 3 aerial units, distributed in the following way:

- Marine media:
  - 7 EIR (Rapid Intervention Boats), known as 'Salvamares'
  - 1 multi-purpose vessel (shared)

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  - 1 rescue vessel (shared)
  - 1 patrol boat (shared)
  - 3 vessels in Convention with CRE (Cruz Roja Española)
- Air media:
  - 1 aircraft (shared)
  - 2 helicopters (shared)

3. BEC's (Strategic of Pollution Bases)

For the Canary SAR zone, it has a BEC located on Santa Cruz de Tenerife port, from which it works anywhere in the archipelago, with specialized technical personnel and specific LCC media and it own transport.

3.1. Sub-aquatic Action Bases

In the same way, it has with one of the specialized bases on the archipelago, on Las Palmas de Gran Canaria.

3.2. Interaction between specialized human team, technology, media and operations

The human group that develops its work on the prevention and the fight against with pollution, as well as to attend other needs related with marine emergencies, is personnel highly qualified that is spreads between the CCS's and the intervention units. Each one, in his scope of work, has the equipment and technology of the latest generation making it possible to deal with problems of different nature.

The interaction between the personnel, technology and the response resources, make it possible that different activities are developed with total efficiency among which we can highlight:

- Surveillance and Maritime Traffic Control (CTM)
- SAR operations
- Continuous training
- Prevention operation and fight against with pollution

We can't understand anyone of these activities without the others. As an example, a training mission serves as prevention operation or like Maritime Traffic Control, or like surveillance mission that finally becomes in a SAR Operation.

3.3. Prevention operations and LCC

It is important to highlight that the media, both air and surface, they play in a continuous way vital activities to minimize the possibility environmental catastrophes and the risks and/or the pollution effects, if it were the case; among others:

- Exercises
- Surveillance
- Direct actions of LCC

The exercises are schedules to perform them on jointly or individual way, with the goal that the media have to react to any episode, of pollution or not, to remain familiar with the equipments, make the relevant checks and carry out the deployment and maintenance of it.

The surveillance activities, realized by any media/unit, are developed in a continued way, well because you are assigned that particular mission or during the development of another mission is equally extreme surveillance. Specifically, in the case of aircraft performance, prevention and monitoring services are scheduled that it coincide in time with EMSA satellite pass (European Maritime of Safety Agency), or with maximum intensity of maritime traffic periods on certain areas.

4. Rescue Aircraft CN 235-300

This unit, with base on Las Palmas-Gando airport, and with shared use between Tenerife CCS and Las Palmas CCS, has assigned different activities, between them:

- SAR
- Surveillance
- Environment
- SOP (Support if special operations)

SAR activity, search and support on recue, describes like an intervention of aerial units to participate on search tasks and rescue support corresponding to an emergency. Between different emergencies such aircraft participation focuses on:

- Location of shipwrecks and ships or boats in danger
- Launch of survival equipment
- Launch of flares
- Launch of beacons
- Communication link center

The reason for the activity of monitoring is the supervision and monitoring of maritime traffic, as well as research and evaluation of the marine environmental pollution. Is programmed according to:

- Passage forecast of CleanSeaNet satellite system of EMSA
- Maritime traffic regular routes
- Traffic separation scheme
- Control of anchored ships along the coast in unauthorized areas

The environmental activity is derived from maritime pollution episodes requiring the intervention of the aerial units for:

- Assessment and monitoring of pollution

– Support to marine units in the collection of discharges

– CleanSeaNet satellite confirmations

SOP activity, support on especial operations, focuses on:

– Urgent transfer of special operations technicians

– Urgent transfer of intervention team

– Urgent transfer of material

These aircrafts, that there are 3 on Spain, have specific pollution sensors:

- SLAR, side looking airborne radar
- IR/UV, infra red/ultraviolet
- MWR, Microwave radiometer
- LFSL, Laser fluorosensor

Noteworthy are its scope and autonomy, 2000 miles and more than 9 flight hours, as well as cruising speed, 236 knots. Off course, there are other elements of navigation and support for the mission: surface research radar, meteorological radar, FLIR camera, AIS, record video system, etc.

As important point stands that, taking into account the range of sensors and the results of the experimental work, the first traces of a spill of hydrocarbon in water are visible from 50 ppm, hence any watching part aircraft involves a breach of the MARPOL.

4.1. Specific actuation of 'A/S Sasemar 103' aircraft

Prevention

To prevent illegal downloads and determine the possible offender, are scheduled flights that coincide with the passage and coverage of EMSA satellite (European Maritime of Safety Agency), inside of SafeSeaNet program, as well as flights in monitoring and control of illegal dumps in areas of heavy traffic or DST's.

The aircraft that operates in Canary SAR zone, operationally depends of Las Palmas CCS, named in this case CCS CAM (Rescue Coordination Center- Mission Support Center). The programmed flights are coordinated by CCS CAM, being the CCS Mission Coordinator that in whose area are to carry out the actual operations of emergency, if it is the case.

For surveillance, monitoring and control tasks, there are delimitated areas within which flights are developed (to Canary defined 6). Once known hours and coverage satellite zone the output is programmed, so that if there were any positive infraction reports, it would be possible for the aircraft the immediately observed. At the same time that we know the output and the zone we have to cover, an AIS sweep is also performed in the corresponding CCS making an effective monitoring if ships in the area.

If there is not any detection, the aircraft finished to cover the assigned zone, within the established period, and would return to base.

On the contrary, if there was information about a possible infraction, reported with the 'EMSA report', the affected CCS would be informed to take charge of the mission, while ordering the aircraft to proceed to the place and star with locating and collecting data though anti-pollution sensors and complementary equipment.

Fight against pollution (LCC)

Confirmed the event the CCS CAM, in accordance the responsible for mission CCS, facilitates data and needs for coordination. The activity defined as 'environment' implies the support of the aircraft to the intervention units mobilized to LCC and the monitoring and evolution of the spill. Besides, it will try to locate the possible offender following the established procedures for effective and unambiguous demonstration.

The aircraft must take, at least, three images/pictures. The first one, following the contaminated offender defeat, other one with the name printed at stern and a third one image from the bow in which the clean sea is observed on the track not covered. This will support to the rest of the data taken on board of the aircraft, the data obtained on the CCS's after carrying out a simulation of contamination with specific programs (OILMAP) and crossing with AIS images.

On the other hand, there are several sources that generate alarm, for example the communication of the offender himself, other ships, other aircraft, ground observers, etc. In these cases, all available technical and human resources come into play. The mobilization and coordination is initiated, studies are carried out on possible drift and behavior of the spilled hydrocarbon (OILMAP), the geographic location and the AIS tracking of the vessels in the area are made, and the PDIP (Data Integration Package Pre-flight), which is referred to the aircraft. Generally, this information packet is sent to the aircraft while is it still in the ground or already in flight, returning that same information, plus that obtained by the anti-pollution sensors and other equipment, in another package called PDEP (Post-Flight Data Collection Package)

Beginning of the mission

The CCS CAM, generates the information for the aircraft (PDIP) and receives, extracts and analyzes (PDEP), once the flight is finished.

The PDIP contains tactical information, mission data, and image files

Tactical information

– Flight plan (defeat that has to follow the plane)

– Search pattern (parallel trajectories, ...)

– Geographic points (lighthouses, platforms, airports...)

– Special points (rafts, beacons...)

– Graphical aids (search areas, contamination area reported or calculated by OILMAP, marine reserves...)

– Traces (important targets area...)

Data of the mission

- Checklist/procedures (communications, SAR units in the area, OSC...)
- Free text

Image files

- Photographs of a target, vessel...
- Any image of interest

Once the information is obtained and packaged, the aircraft is sent via SATCOM, VHF / HF, mobile or land phone, Pen Drive, e-mail. The support for receiving and sending data on board is related to specific software TX-ARQ.

Another important element within the system is the mission analysis computer, with the application called GPS (Ground Processing Station), used on board and in CCS CAM. There is an external hard disk, on board the aircraft (whose simile could be a Pen Drive), on which downloaded data is downloaded, which is downloaded to the internal hard disk, located in the CCS CAM. It is at this moment when the analysis is initiated by the specialized personnel.

All the information that is returned packaged in the PDEP contains:

- Navigation data.
- Alert.
- Images.
- Tactical information.
  - Flight plans
  - Search patterns
  - Geographic points
  - Special points
  - Graphical aids
  - Traces
  - Trademarks
  - Calculation aid

Mission reports in text and images

- Flight report: date / time, heights, bearings, speeds
- Alarms detected on different teams
- Different reports on acquired traces
- Mission summary report
- Mission reference data

Graphical reconstruction of the mission (for cases of contamination)

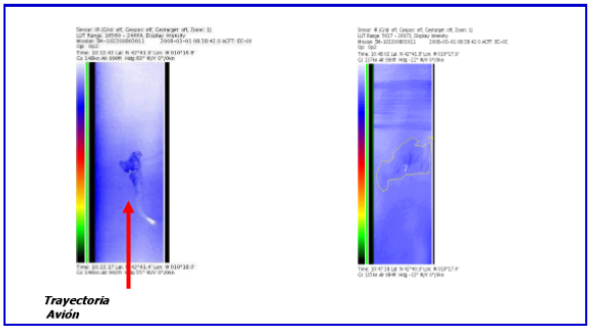
- Position of the spot(s)
- Surface of the stain(s)
- Thickness(s)
- Pictures

Finally, the result obtained after the study is sent to the competent authorities, giving them the corresponding course.

Figure 1: FLIR images at the time of the launch of the ton of fish oil and the first moments of its spill

As an example, the images obtained during an exercise, with one ton of fish oil, in Finisterre waters (Figure 1). The aircraft anti-pollution sensors (Figures 2, 3 and 4) were used; participated the B/S Don Inda, and the subsequent analysis and presentation of the study.

Figure 2: Infrared. IR captures where the detection of hydrocarbons on the surface of the water is appreciated. Sweep approximately 225 meters on each side of the plane at 1000 feet



The SLAR or lateral search radar (Figure 5 and 6), for distant detection of HC stains, is based on the attenuation of the waves. It characteristics are:

- It covers about 25 Kms on each side of the plane.
- Night operation.
- Does not determine thickness.
- Does not have diminished properties (observation on ice and blind zone).
- Flights. The most perpendicular to the direction of the wind

Figure 3: IR/UV

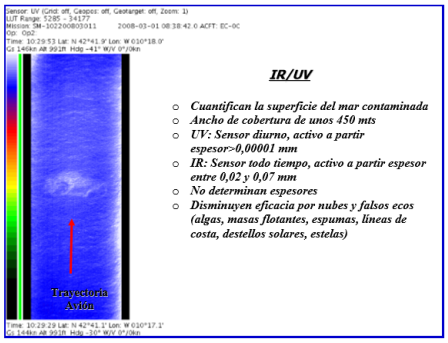


Figure 4: Microwave radiometer

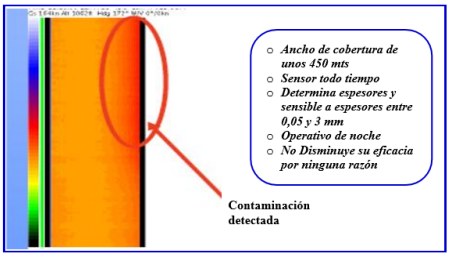


Figure 5: Georeferenced screen showing SLAR layer on the bearings carried out by the aircraft

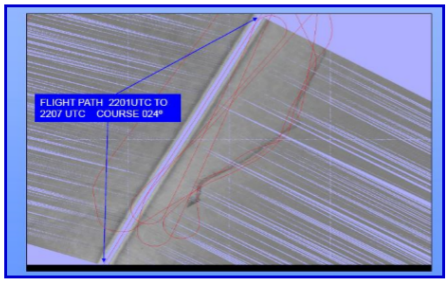
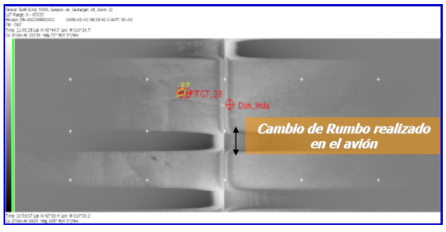


Figure 6: Capture of the SLAR where the observed pollution is shown and on which a polygon has been made to identify it (P7) and the different targets observed

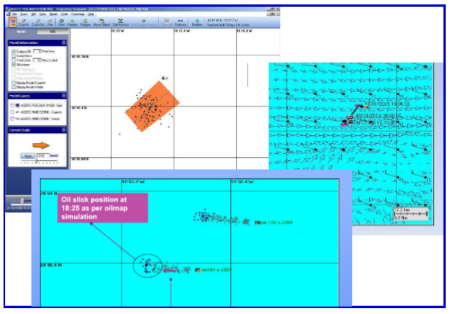


Likewise, the LFSL has the following characteristics:

- Close coverage, around 75 meters
- Is able to classify the hydrocarbon
- Sensitive between 0,005 and 0,025 mm
- Detects HC below the surface
- Operating at night
- Determines thicknesses between 0,005 and 0,025 mm
- Decreased by clouds and flight height

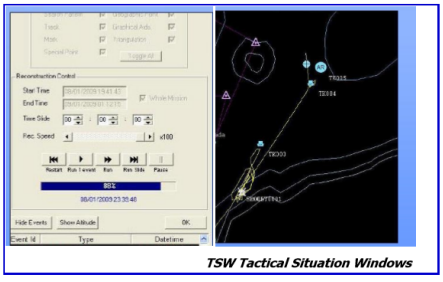
There are different OILMAP simulations (Figure 7), software where you can apply the known data of a hydrocarbon spill, integrated with parameters of wind, current, water temperature, etc., and where possible drift and behavior in the surface.

Figure 7: Images of different OILMAP simulation



Finally, a dynamic reproduction is shown in which the A / S interrogates the offending vessel. (Figure 8)

Figure 8: Dynamic reproduction



5. Conclusions

In marine pollution, if prevention is maintained and active, the fight against pollution is minimized. This can be achieved through continuous training of specialized personnel and pollution control equipment (LCC).

One of the bases on which the prevention and the LCC is supported is the State Society for Salvage and Maritime Safety, SASEMAR, a public business entity attached to the Ministry of Development through the General Directorate of the Merchant Marine, which has in Spain 21 Rescue Coordination Centers (CCS), two of which in the Canaries: A CCS covering the eastern canarian SAR area (CCS Las Palmas) and another that controls the western canary SAR area (CCS Tenerife).

In addition to other surface and air units, in the Canary Islands there is a rescue plane CN 235-300, based at the airport

of Las Palmas-Gando, and shared between the CCS of Tenerife and CCS of Las Palmas.

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