



Panama Maritime Authority
Directorate General of Merchant Marine
Marine Accident investigation Department

M/V “SUNPOWER” R- 043-2015 -DIAM
IMO No. 9521643
DATE: 26th July 2015



**REPORT ON THE INVESTIGATION
OF CARGO OVERFLOW AND POLLUTION ON**

M.V. “SUNPOWER”

IMO number 9521643

At Huelva, Spain

On the 26th July 2015

In accordance to Resolution No. 106-135-DGMM of September 9th of 2013 from the Merchant Marine General Directorate of the Panama Maritime Authority, on its second article stipulates; “Similarly investigations are not designed to exert actions criminal, civil or administrative, at which they will be subject only to the purposes stated in the Code for the Investigation of Marine Casualties and Incidents adopted by the International Maritime Organization (IMO)

GLOSSARY OF ABBREVIATIONS

A/B	Able Seaman
ABS	American Bureau of Shipping
AIS	Automatic Identification System
ARPA	Automatic Radar Plotting Aid
COC	Certificate of Competency
COG	Course over Ground
COLREG	Convention on the International Regulations for Preventing Collisions at Sea
CPA	Closest Point of Approach
DNV	Det Norske Veritas
DOC	Document of compliance
ECR	Engine control room
ETA	Estimated time of arrival
GPS	Global Positioning System
HP	Horse Power
HOURS	Hours
IMO	International Maritime Organization
ISM	International Safety Management
KG	Distance from the keel to the centre of gravity
Kts	Knots
KW	Kilowatt
LBP	Length between Perpendiculars
LR	Lloyd’s Register
LRIT	Long Range identification and Tracking
LT	Local Time
LOA	Length overall
MARPOL	International Convention for the Prevention of Pollution from Ships
MCR	Maximum Continuous Rating
MSC	Maritime Safety Committee (of IMO)
Mt	metric tonnes
OOW	Officer of the Watch
OS	Ordinary Seaman
PA	Public Address
PMA	Panama Maritime Administrator
SMS	Safety Management System
SOLAS	International Convention for the Safety of Life at Sea
STCW	Standards of Training, Certification and Watchkeeping for Seafarers
VDR	Voyage Data Recorder

INVESTIGATION OBJECTIVES

Ref. IMO Resolution MSC.255 (84)/MSC.257 (84) *CODE FOR THE INVESTIGATION OF MARINE CASUALTIES AND INCIDENTS*.

The objective of any marine casualty investigation is to prevent similar casualties in the future. Investigations identify the circumstances of the casualty under investigation and establish the causes and contributing factors, by gathering and analysing information and drawing on conclusions. Ideally, it is not the purpose of such investigations to determine liability, or apportion blame. However, the investigating authority should not refrain from fully reporting the causes because fault or liability may be inferred from the findings.

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1. SUMMARY

- 1.1 On the 24th July 2015, the vessel left Gibraltar roads destined to the Port of Huelva, Spain to load a parcel of ALSPHALT for Algeria.



Figure 1.1 – Area of accident

- 1.2 The vessel arrived to the Port of Huelva, Spain on the 25th July 2015 and dropped anchor until the following day.
- 1.3 On the early morning of 26th July 2015 the vessel heaved up the anchor and entered the Port, berthing at CEPSA Terminal.
- 1.4 Following berthing, all pre-loading checks were carried out and safety ship/shore checklists were completed.
- 1.5 Loading commenced as usual with manual opening and closing of valves on deck at one metre at a time.
- 1.6 Once all tanks are filled up one metre, ullages are taken manually and reported to the Cargo Control Rom always attended by the duty Officer.

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- 1.7 At around 21,00 hours the duty officer on the cargo control room cancelled a high level alarm from cargo tank no. 1 port which sounded without paying further attention.
- 1.8 Within seconds an overflow occurred on cargo tank no 1 port through the open hatch.
- 1.9 The emergency stop was immediately activated and loading operations stopped and SOPEP procedures initiated to clean up and minimise cargo overflow overboard.
- 1.10 This report analyses the events and the possible causes that contributed to this accidental overflow.

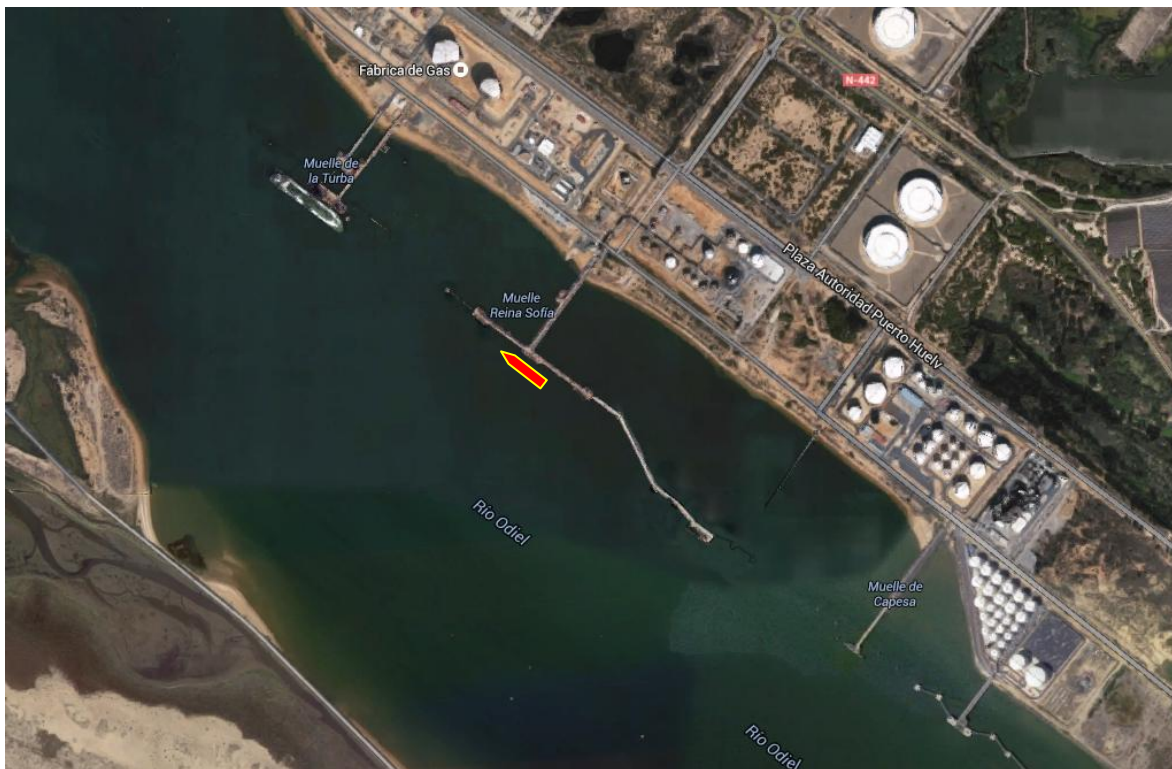
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1.1 CASUALTY DETAILS

Particulars	Details
TIME AND DATE	20:16 LT, 26th July 2015
LOCATION /GEOGRAPHICAL POSITION OF INCIDENT	Port of Huelva, Muelle Reina Sofía Berth No. 4
CREW ON BOARD	1 Greek, 2 Ukranians, 12 Georgians, 1 Albanian, 1 Romanian
INJURIES / FATALITIES/ POLLUTION	0 / 0 / YES
DATE OF INVESTIGATION	02 nd August 2015



2. PARTICULARS

Vessel

NAME	:	SUNPOWER
FLAG	:	PANAMA
PORT OF REGISTRY	:	PANAMA
OFFICIAL NUMBER	:	46288-14
CALL SIGN	:	3FBW8
IMO NUMBER	:	9521643
TYPE	:	OIL TANKER
L.O.A.	:	101.90 M
L.B.P	:	96.00 M
BREADTH	:	16.00 M
DEPTH	:	8.00 M
G.R.T	:	3,691
N.R.T	:	1,265
DEAD WEIGHT	:	4,999

- 2.1 The vessel was keel laid on January 2007 and delivered on September 2008 in China, at Ningbo Litia Shipyard.

The vessel is powered by a six (6) cylinder, Guanzhou Engine, type 8320ZCD-6, 4 strokes, which develop 2,060 kW.

- 2.2 The cargo is designed with a total of twelve (12) cargo tanks of which two (2) are slops fitted on the aft.

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2.3 The total cargo capacity of the tanks is of 4,712.62 m³ and the cargo capacities are distributed as follows,

No.	Tank Description	Frames		100% Vol	98% Vol
1	No. 1 COT Port	108	122	371.728	368.010
2	No. 1 COT Stbd	108	122	371.728	368.010
3	No. 2 COT Port	92	108	483.273	478.440
4	No. 2 COT Stbd	92	108	483.273	478.440
5	No. 3 COT Port	76	92	491.269	486.356
6	No. 3 COT Stbd	76	92	491.269	486.356
7	No. 4 COT Port	60	76	458.490	453.905
8	No. 4 COT Stbd	60	76	458.490	453.905
9	No. 5 COT Port	45	60	457.651	453.075
10	No. 5 COT Stbd	45	60	457.651	453.075
11	Slop Port	42	45	93.898	92.959
12	Slop Stbd	42	45	93.898	92.959

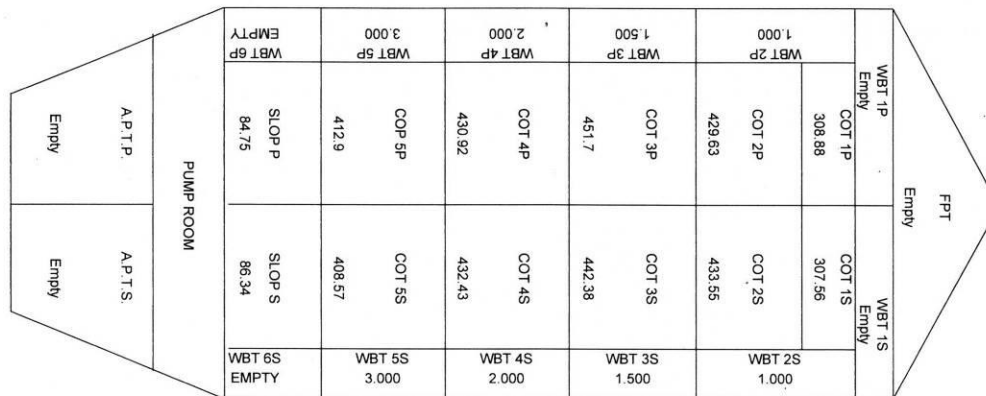


Figure 2.1–SUNPOWER General view

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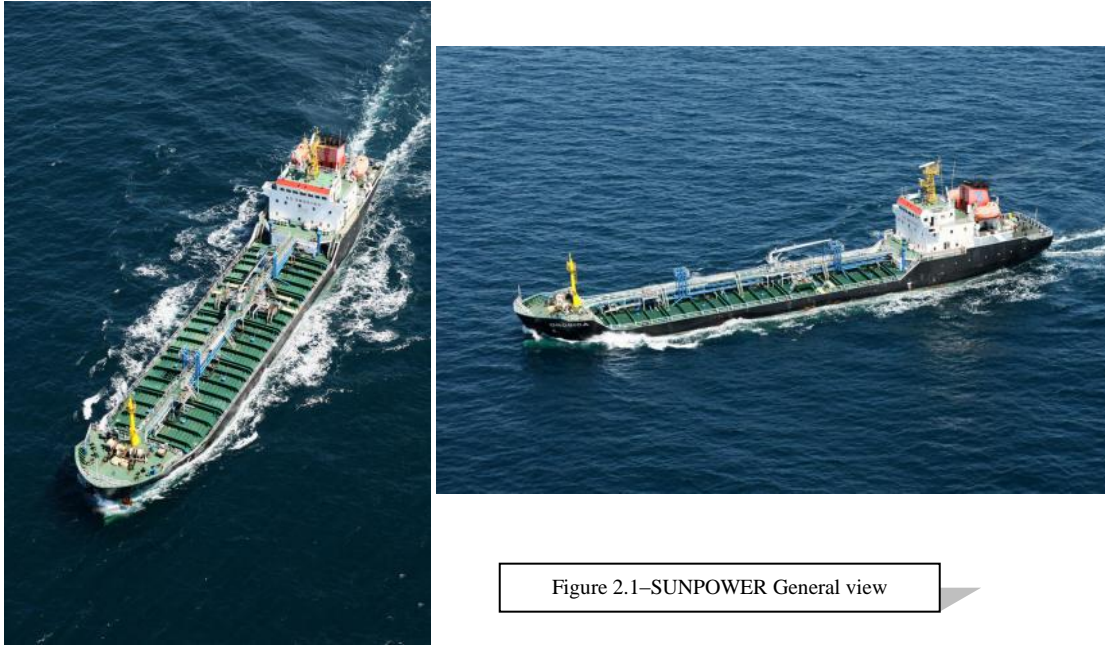


Figure 2.1–SUNPOWER General view

- 2.4 The vessel was classed with China Classification Certificate (CCS) Classification Society. At this time she holds up to date and valid statutory certificates.
- 2.5 The last Port State Control (Paris MOU) inspection was carried out in Mersin, Turkey, on the 21st April 2015. The following deficiencies were recorded:

Category	Deficiency	Number
Certificates & Documentation	CSR not up to date	1

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2.6 The following Port State Control (Paris MOU) inspection was carried out in Huelva, Spain after the incident on the 27th July 2015. The following deficiencies were recorded:

Category	Deficiency	Number
ISM	ISM, related deficiencies	1
MLC, 2006 Accommodation, recreational facilities, food and catering	Provisions quantity	1
Pollution prevention - MARPOL Annex I	Control of discharge of oil	1
Pollution prevention - MARPOL Annex I	Loading/unloading/cleaning procedures cargo spaces	1
Pollution prevention - MARPOL Annex I	Pollution report - annex I	1

At the time of the incident the vessel had not been inspected by the Panama Maritime administration

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Ship Certificates

Statutory inspections and certificates	Class/Flag	Issue date	Expiry date
CLC OIL	Panamá	2015-02-20	2016-02-20
Safety management certificate (SMC)	Bureau Veritas	2014-11-27	2019-10-16
Document of compliance (DoC)	Bureau Veritas	2014-11-20	2018-05-07
Cargo ship safety construction	China Classification Society	2014-08-13	2019-06-15
Cargo ship safety radio	China Classification Society	2014-06-16	2019-06-15
Cargo ship safety equipment	China Classification Society	2014-06-16	2019-06-15
International Air Pollution Prevention Cert	China Classification Society	2014-06-16	2019-06-15
Load lines certificates	China Classification Society	2014-06-16	2019-06-15
International Oil pollution prevention (iopp)	China Classification Society	2014-06-16	2019-06-15
Safety manning document	Panama	2014-05-28	

3 NARRATIVE OF EVENTS

- 3.1 All times noted in this report are given in the style of the standard 24-hour clock without additional annotations. Ship times used onboard were local times in Spain, i.e. UTC + 2.
- 3.2 Narrative of events is taken herewith based on crew statements gathered during the investigation.
- 3.3 The vessel was chartered by CEPSA (Compañía Española de Petróleos S.A.)
- 3.4 Prior arriving to Huelva, Spain the vessel dropped anchor in Gibraltar on the 18th July 2015 waiting for a number of spare parts.
- 3.5 Stores were received and the vessel remained in anchorage until the 24th July 2015.
- 3.6 On the 24th July 2015 at 20.45 hrs the vessel commenced to heave up the anchor and by 21, 00 hrs the anchor was aweigh and vessel proceeded to Huelva, Spain.
- 3.7 On the 24th July 2015 the vessel encountered the following weather conditions:

<u>WIND DIRECTION</u>	<u>WIND FORCE</u>	<u>BEAUFORT SCALE</u>
SOUTH WEST	11/ KNOTS	4
NORTH WEST	17/21 KNOTS	5
SOUTH WEST	4/6 KNOTS	2

- 3.8 The voyage from Gibraltar to Huelva is covered in one hundred and twenty (120) nautical miles.

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Figure 3.1–Gibraltar/Huelva

- 3.9 No rolling or pitching was reported during the voyage.
- 3.10 The vessel arrived to Huelva Roads on the 25th July 2015 and dropped anchor at 12.00 hrs and remained in anchorage for the rest of the day.
- 3.11 On the afternoon of 25th July 2015 the High level alarms were tested.
- 3.12 On the 26th July 2015 the vessel was given permission to enter Huelva Port and hence anchor was heaved up on the morning at 04.48 hrs
- 3.13 Pilot boarded the vessel at 05.12 hrs and vessel proceeded to her berth.
- 3.14 The vessel was berthed at 06.30 hrs.
- 3.15 As soon as mooring operations were completed the vessel started deballasting.
- 3.16 Loading Master arrived onboard at 07.50 hrs. Meantime the cargo loading arms were connected.
- 3.17 Tank inspection was started with charterer’s surveyor at 09.06 hrs.
- 3.18 At 09.36 hrs loading commenced and meantime at 11.30 deballasting was completed.
- 3.19 During cargo operations the Officer on duty was attending the cargo control room while the pumpman was on deck in charge of opening, closing valves.

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- 3.20 One AB was helping by taking ullages during loading.
- 3.21 All crew on duty were in close contact via VHF walkie talkies.
- 3.22 Loading operations were started on cargo tanks no. 5 on the aft topping up the tanks moving towards the forward to number 1.
- 3.23 As tanks are loaded and the cargo reaches approximately one meter from tank top the valves are closed and opened manually by the pumpman on deck to guide cargo to another tank.
- 3.24 Once all cargo tanks were topped up then they were loaded in a sequence.
- 3.25 The Ab was taking ullages as guided by the officer on duty on the Cargo Control Room.
- 3.26 The sequence of loading was as follows,

Time	Tank	Loading	Rate of loading
10.29	5P & 5S	Topping up	177 m ³ /hr
11.17	4P & 4S	Topping up	385 m ³ /hr
12.00	3P & 3S	Topping up	343 m ³ /hr
13.00	2P & 2S	Topping up	266 m ³ /hr
14.00	1P & 1S	Topping up	270 m ³ /hr
15.00	4P & 4S	Loading	347 m ³ /hr
16.15	4P & 4S	Loading	359 m ³ /hr
17.00	2P & 2S	Loading	328 m ³ /hr
18.00	2P & 2S	Loading	317 m ³ /hr
19.00	1P & 1S	Loading	355 m ³ /hr
20.00	5P & 5S	Loading	327 m ³ /hr
20.30	5P & 5S	Loading	330 m ³ /hr
21.16	Slop P & Slop S	Topping up	235 m ³ /hr

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- 3.27 While topping up the slop tanks the 98% High level alarm was activated and silenced by the duty officer.
- 3.28 At that same moment the crew on deck spotted an overflow from tank 1 Port hatch which was not fully closed.
- 3.29 The emergency stop button was immediately pressed and SOPEP procedures started to avoid pollution at sea.



Figure 3.2– Port Side Overflow



Figure 3.3– Port Side Overflow

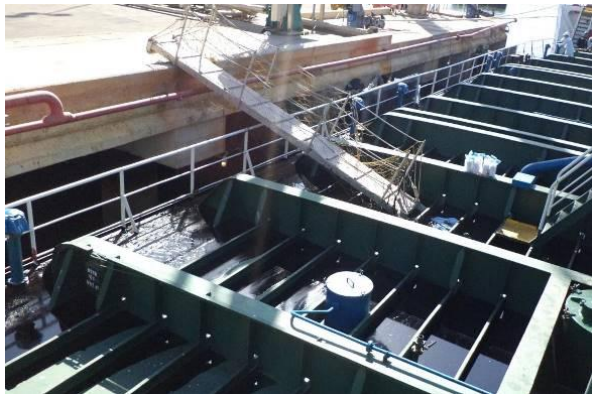


Figure 3.4– Port Side Overflow



Figure 3.5– Port Side Overflow

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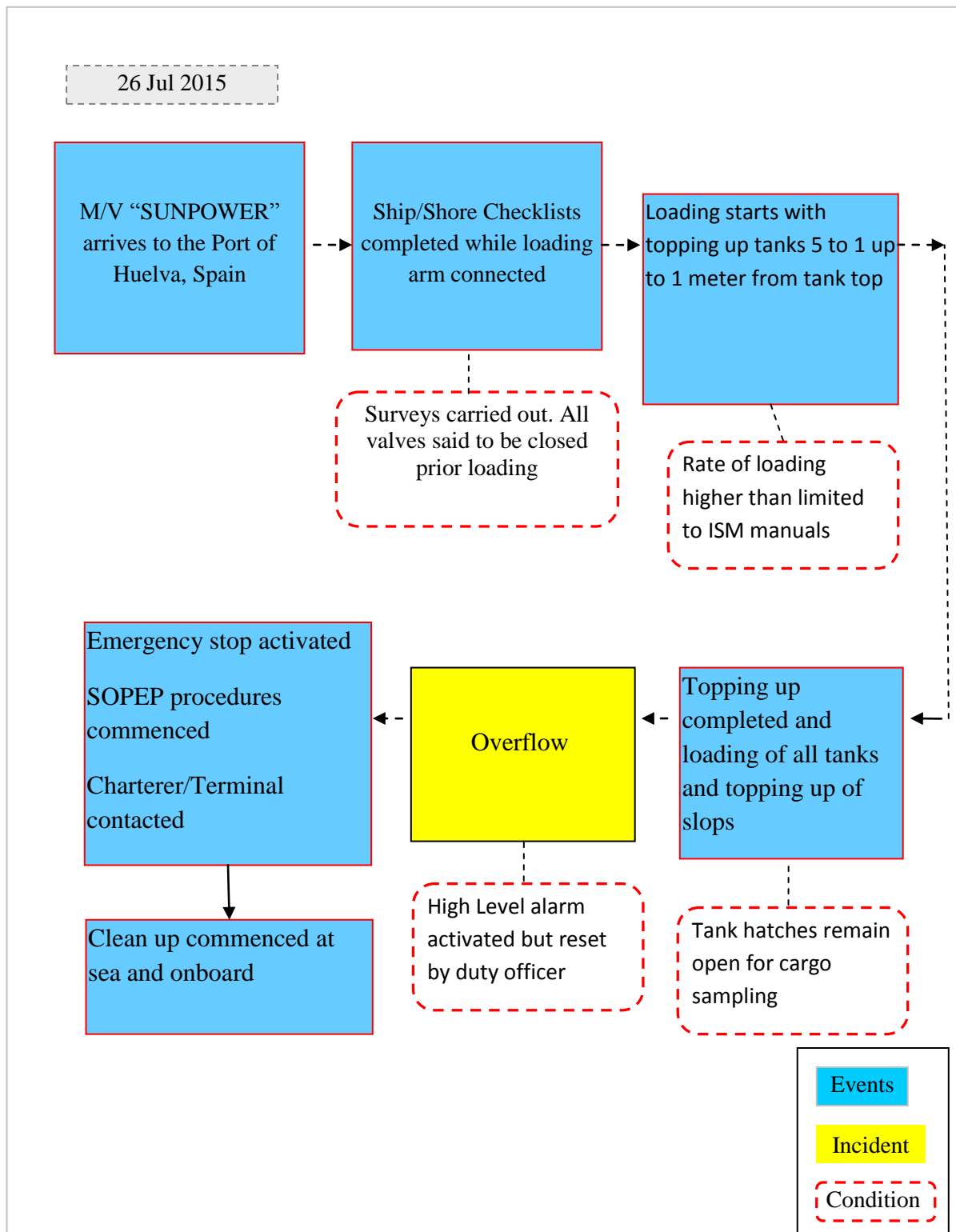
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Figure 3.6– Starboard Side

- 3.30 During cleaning and early assessment of the overflow, an unknown quantity of cargo was spotted on the water surrounding the vessel's hull on the port side.
- 3.31 Charterer emergency number was contacted followed by the Spanish national pollution number as taken from the MSC-MPEC.6/Circ.13
- 3.32 The amount of cargo spilled was estimated on 20 tonnes.

4. SEQUENCE OF EVENTS - FLOW CHART



5. POLLUTION

- 5.1 As reported an estimated quantity of 20 tonnes were collected underwater since the cargo does not float but stay afloat underwater.
- 5.2 The spilled asphalt was collected by port authority boats and stowed in large containers for disposal.
- 5.3 Port floating booms were used.



Figure 2.1–Visual High Level Alarms

6. ANALISYS

- 6.1 Officers and crew were already familiar with this loading and Terminal since this was the second voyage made with the same cargo, same charterer and under the same conditions.
- 6.2 While the vessel was in anchorage in Gibraltar to the time of arrival to Huelva normal maintenance work was carried out onboard with nothing special reported that could have contributed to this overflow.
- 6.3 High level alarms were manually tested (both 96% and 98%) by the Chief Officer and the 3rd Officer prior departure from Gibraltar.
- 6.4 Ullages were manually taken by an AB on deck in direct contact with the duty officer on the CCR.
- 6.5 Despite being fitted with a radar system, the officer on duty was observed to rely on ullage information from the AB on deck.
- 6.6 The radar reading panel is currently fitted facing backwards to the duty operator) who is normally said to be working on the computer and controlling the valves on the main console.
- 6.7 Therefore the duty officer tends to look to the console but not to the radar reading gauges.



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Duty Officer during cargo operations looking to the main console, VHF and table, leaving ullage Reading son his back



- 6.8 During the investigation the 3rd Officer mentioned that although he was looking from time to time to the radar monitor on his back he was also following his father's recommendation never trusting electronics.
- 6.9 Valves were open/closed by the pumpman on deck. Such action was confirmed verbally by the pumpman but not confirmed or re-checked by any other crew member.
- 6.10 Based on the sequence of loading, after topping up tanks no. 1 port and 1 Stbd the duty officer asked the pumpman to open cargo line valves for loading tanks nos. 5 ports and 5 stbd.
- 6.11 Once tanks were open for loading on tanks 5 port and starboard, tanks no. 1 port and 1 starboard were closed.

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- 6.12 Tank no. 1 port cargo line valve was not properly closed hence allowing cargo into the tank while topping up the slop tanks.
- 6.13 The hatch cover for tanks was not closed tight foreseen sampling on completion of loading.
- 6.14 High level alarms were somehow ignored since they were reset by the duty officer.

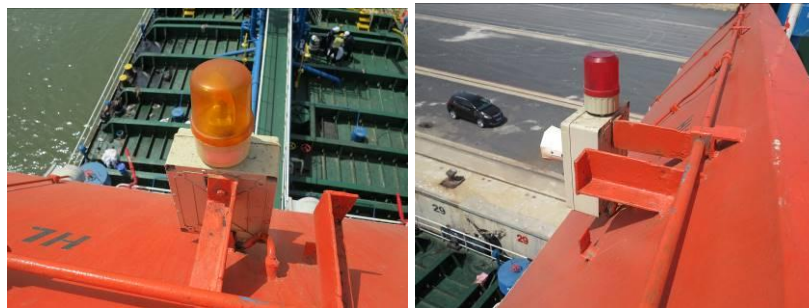


Figure 6.1–Visual High Level Alarms

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- 6.15 On discovery of the overflow the reaction and the timing to stop loading via the emergency stop button was adequate.
- 6.16 All crew had been familiarized with SOPEP procedures.
- 6.17 All SOPEP material was in good condition and was able to be immediately used..

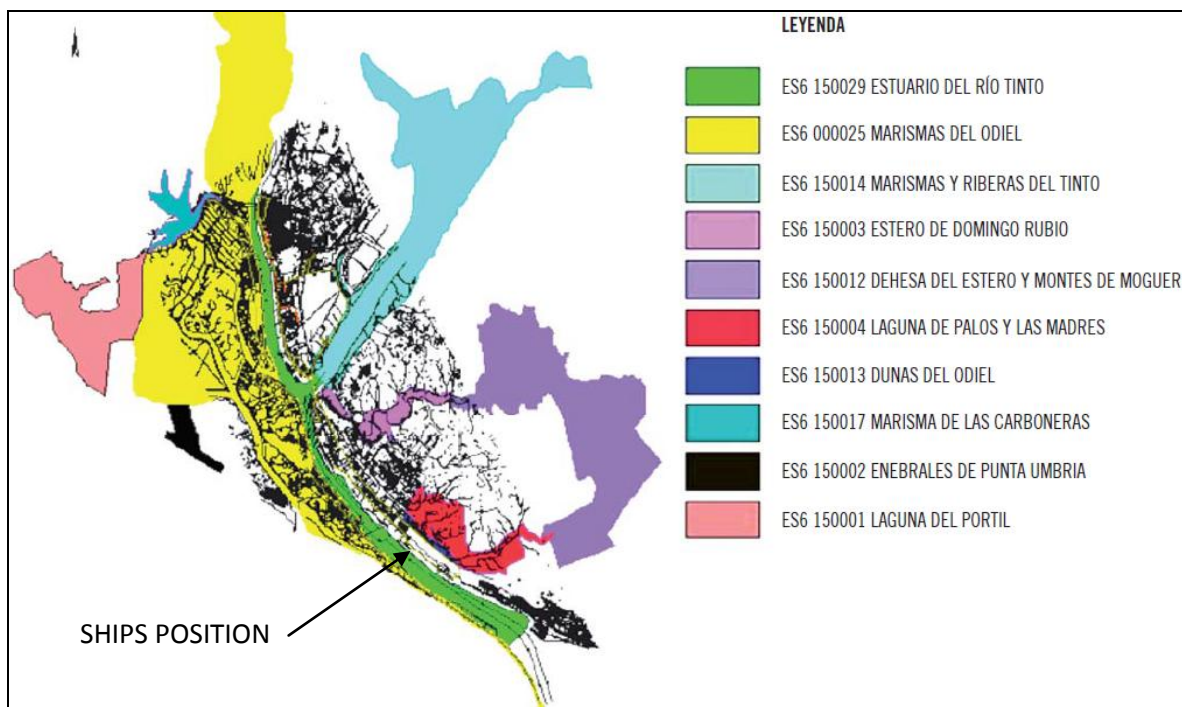


Figure 6.2–SUNPOWER SOPEP Locker

- 6.18 When calling the Spanish emergency number as given in SOPEP Annex II the captain encountered language difficulties since it was reported that the Spanish duty officer could not speak properly English. Communication was later made in Spanish with charterer representative.
- 6.19 According to the vessel's ISM topping up tanks has to be done at a rate of no more than 150.00 m³/hr but the rate was much higher than at all times during topping up.

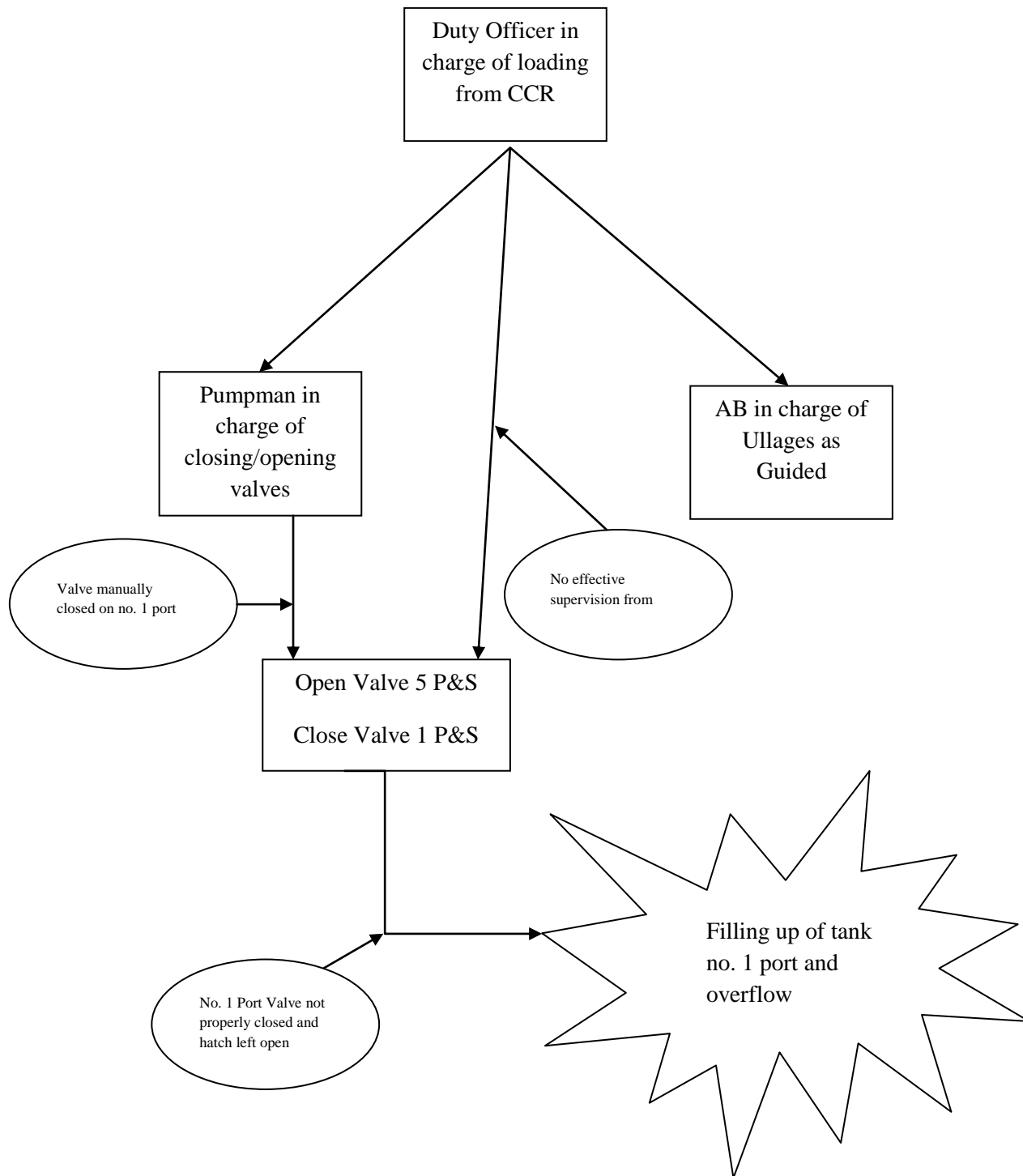
HUELVA PORT – NATURAL AREAS

- 6.20 The Huelva province contains some of the Andalucía's most ecologically important wildlife areas.
- 6.21 Within the numerous parks and despite the port facilities and the industrial area the coast of Huelva has some significant wildlife enclaves, the second largest being the Marismas Del Odiel Natural Area running along the length of the port.
- 6.22 This wetland reserve is a large estuary covering 72 km² extending along the port. It was granted the protected status on 1989



- 6.23 A total of 560 hectares of Natural Park (among the ones shown in previous picture) are within the port services premises.
- 6.24 This area is also home of the only beach in Huelva city.
- 6.25 The marismas are renowned for their rich flora and fauna and are an important stopping place for migratory birds. A third of Europe's spoonbill population lives here and in winter there are many aquatic birds here.
- 6.26 The varied habitats range from salt and freshwater marshes, salt pans to intertidal islands, lagoons and creeks. These support a wealth of birdlife, the most important being between 300 and 400 pairs of spoonbills, along with grey and purple herons, flamingoes, storks, marsh harriers, little egrets, little terns, black-winged stilts, Kentish plovers, cormorants and ospreys. During migration and in winter you can see often thousands of flamingoes and waders. There is also a wide variety of gulls.
- 6.27 There is an incredibly rich variety of vegetation in the marismas, including tamarisk, rosemary, glasswort, junipers and stone pines. On the dunes are white retama, thyme and sea lavender. In spring the marismas are smothered in blue and yellow salt marsh flowers.

7. HUMAN ERROR ANALYSIS



- 7.1 Although the root cause of the overflow was of a human nature, there are a number of factors that contributed to such incident.
- 7.2 There are four main points related to the human error considered:
- Ship Design
 - Human Factor
 - Ship Environment
 - Ship Systems

Ship design

- 7.3 The radar design of the cargo control room was such that while the duty officer is watching the main console, the radar gauge readings are behind. Therefore it was an error not to keep an eye closely on the readings shown on the panel.
- 7.4 There valves are manually closed and open on deck with no visual indication if they are open or closed. This might have contributed to the fact that the operator on deck could not have either closed properly the valve or that the valve had been left open.
- 7.5 It was mentioned during the investigation that port state control found that the radar gauge from the tank no. 1 port although at the time of our investigation the gauge was giving apparently correct readings.

Human Factor

- 7.6 Inadequate risk assessment made prior and during the loading operations.
- 7.7 Lack of proper control since radars are fitted on the control room but it was not clear if they were properly taken into consideration.
- 7.8 Ineffective supervision of deck personnel.
- 7.9 High level alarms were reset when activated without evaluating efficiently was causing the activation of the alarm.

Ship Environment

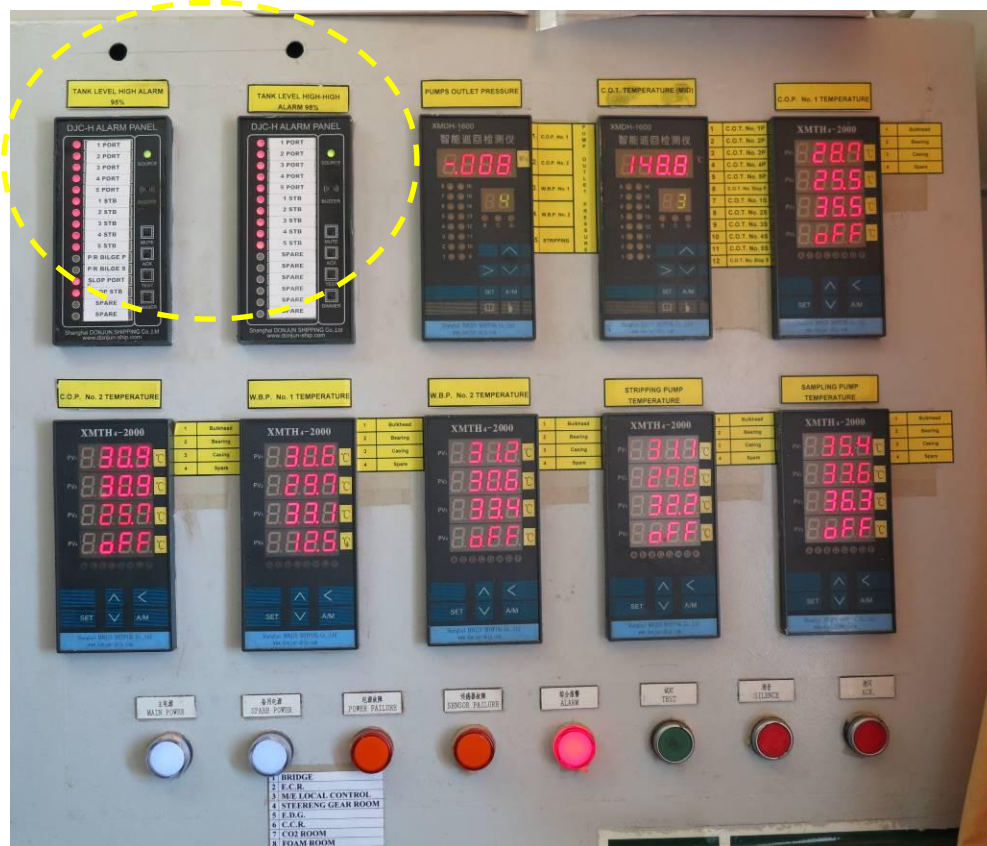
- 7.10 The design of the control room somehow contributed to the accident since the fact that the radar gauge readings are opposite to the console does not help the operator in controlling the ullages insitu while working on computer and looking at the main console.

Ship Systems

- 7.11 All valves on deck are operated manually only hence with the need of proper supervision since cannot be visualized from the cargo control room

8. CONCLUSIONS

- 8.1 The cargo tanks were open since crew had to take samples through hatches.
- 8.2 The cargo valve from tank 1 port was not closed properly. It is unclear if subsequent checks were carried out to ensure that valve was closed.
- 8.3 Ullages were not properly followed up despite having an automatic radar system
- 8.4 The high level alarm was reset immediately and not properly considered when activated.



9. CORRECTIVE ACTIONS

- 9.1 The company carried out a comprehensive risk assessment as well as an internal audit.
- 9.2 The company sent the risk assessment to their fleet for review.
- 9.3 The company came up with the following recommendations following the incident:
 - Refresher training on board for asphalt cargo operations in reference to handling manual
 - Videotel training titles to be refreshed “Shipboard oil contingency plan”
 - Instructions poster for emergency response to be refreshed to crew.
 - QHSE procedure 08-02 for emergency response to be refreshed to crew
 - Risk assessment library to include scenario for asphalt cargo sampling.

10. RECOMENDATIONS

To Owners:

- 10.1 Distribute a safety notice throughout the fleet describing the accident and including the accident in the following scheduled safety training.
- 10.2 Comprehensive internal audit focusing on the crew familiarization with the onboard SMS.
- 10.3 Ensure that all cargo tanks are closed and valves are double checked
- 10.4 Ensure that radar system ullage readings are considered by the duty officer.
- 10.5 Consider the possibility to build reading panel in main console.

To Spanish Administration Emergency Phone:

- 10.6 Ensure that duty officer is capable to communicate effectively in English.

11. ANNEXES

Appendix	Description
1	Certificate of Registry
2	Cargo Ship Safety Construction Certificate
3	Cargo Ship Safety Equipment Certificate
4	International Oil Pollution Prevention Certificate
5	Oil Pollution CLC
6	P&I Certificate
7	ISM - Document of Compliance
8	ISM - Safety Management Certificate
9	Interim Class Certificate
10	Ship Survey Status
11	Vessel's Q88 Details
12	Ships Particulars from SEA WEB
13	Q88 form SUNPOWER
14	Crew List
15	Minimum Safe Manning Certificate
16	Officer's Matrix
17	Panama Endorsement Master
18	Panama Endorsement Chief Officer
19	Panama Endorsement 2nd Officer
20	Panama Endorsement 3rd Officer
21	Panama Endorsement Chief Engineer
22	Panama Endorsement 2nd Engineer
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24	Rest Hours - Deck Department

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32	SHIP Shore Safety Checklist
33	Stowage Plan
34	Tank Capacity Tables
35	Oil Record Book
36	Cargo Safety Data Sheet
37	Loading Rate Calculation
38	Cargo Ullage Report
39	Loading Sequence Plan
40	ISM-Identification of Potential Emergency shipboard situations
41	ISM-Ship's Organization
42	ISM-Asphalt Cargoes Handling Manual
43	ISM-Carriage of Bitumen Cargoes
44	ISM-Loading Procedures
45	Quality, Health and Safety and Environmental Protection Policy
46	Drug and Alcohol Policy Statement
47	Declaration of Commitment
48	Master's CCR Standing Instructions
49	SOPEP Manual Familiarisation
50	MSC-MEPC.6Circ.12 Annex2 (SOPEP) June 2015

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