Dangerous shipwrecks of the Gdańsk Bay

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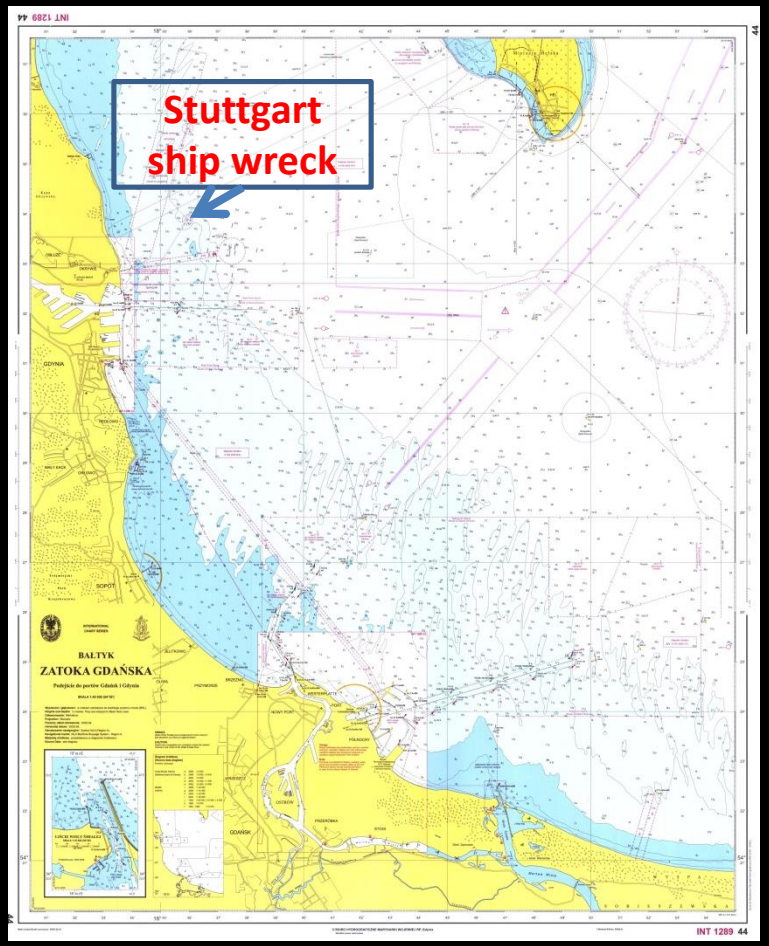
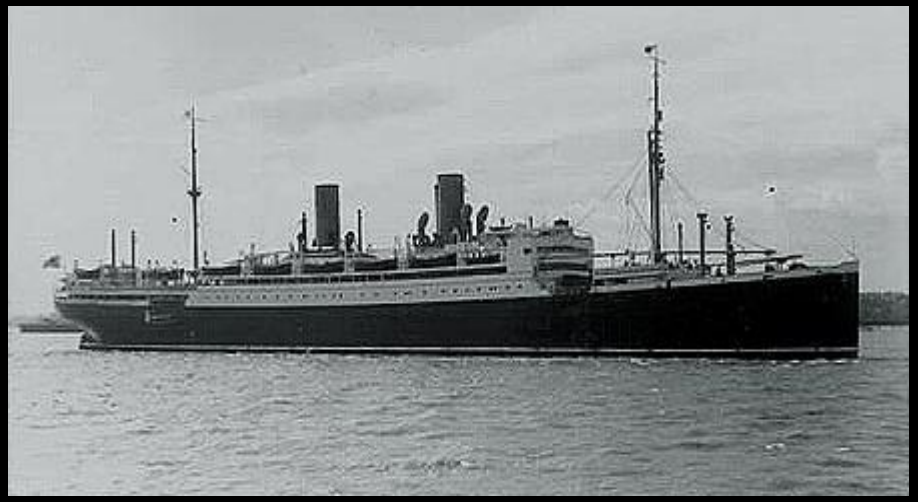
Debris of Stuttgart Hospital Ship in Gulf of Gdansk – Impact of Motor Vessel Wrecks on the State of the Marine Environment

s/s Stuttgart





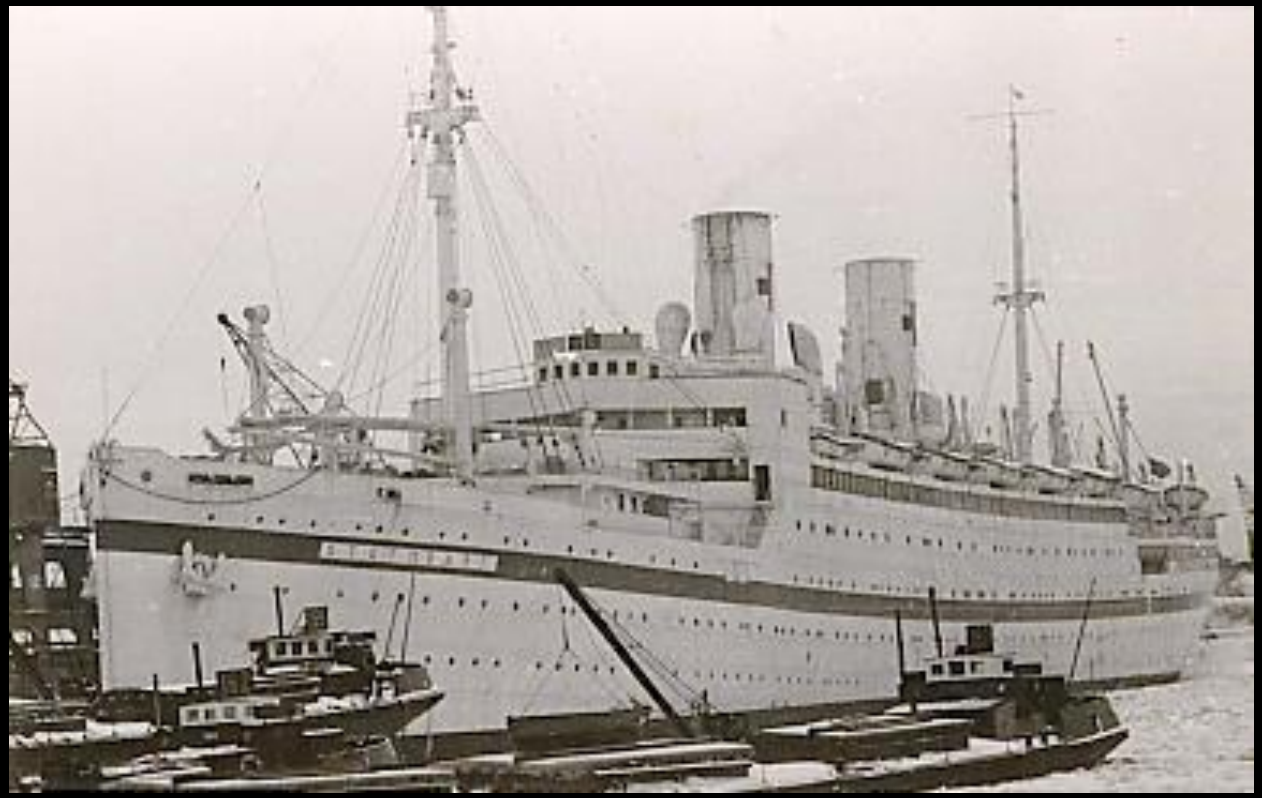
Main parameters of the ship:

- length - 171.6 m
- breadth - 19.8 m
- gross tonnage - 13387 GRT
- net tonnage - 7796 NRT

s/s Stuttgart

View of the dining room
and saloon of s/s „Stuttgart”
(before II WW)

s/s Stuttgart



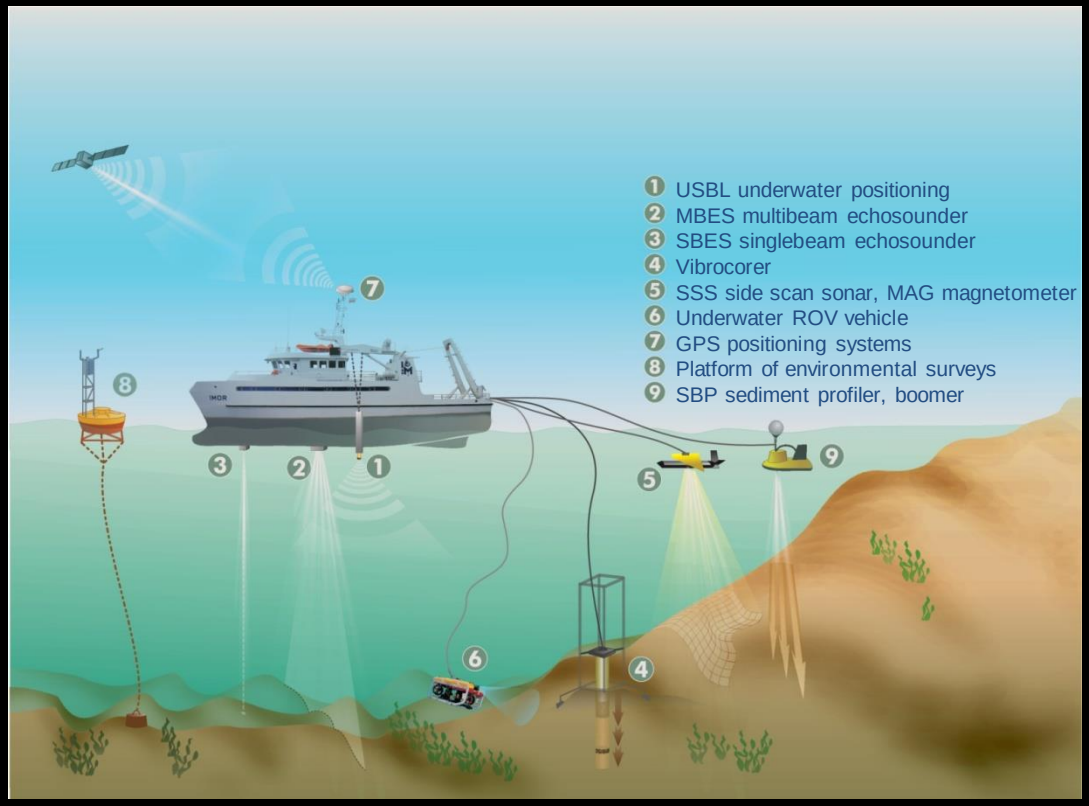
View of the s/s „Stuttgart” ship as Lazaretschiff „C”

s/s Stuttgart

An aerial photograph presenting a fragment of the Kriegsmarine base in the Gdynia harbour right after the american air raid. The photograph was taken by an allied airplane. The fiercely burning „Stuttgart” steam ship (hospital) is shown in the bottom right corner.

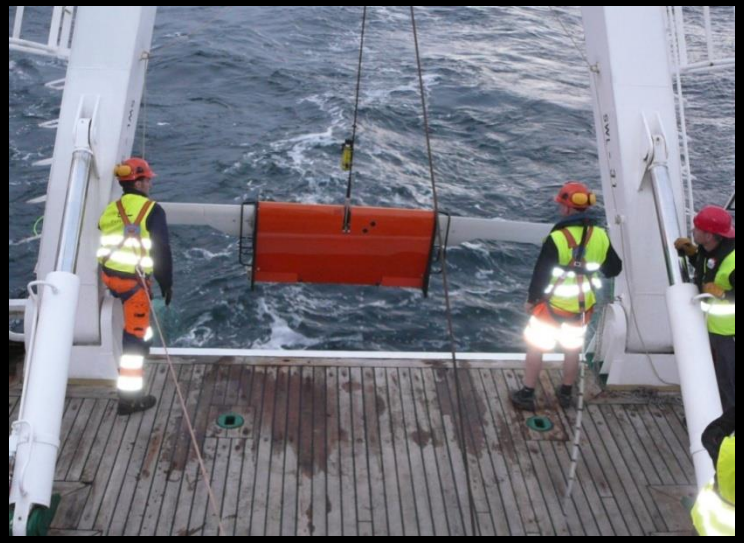
r/v IMOR
Research Vessel

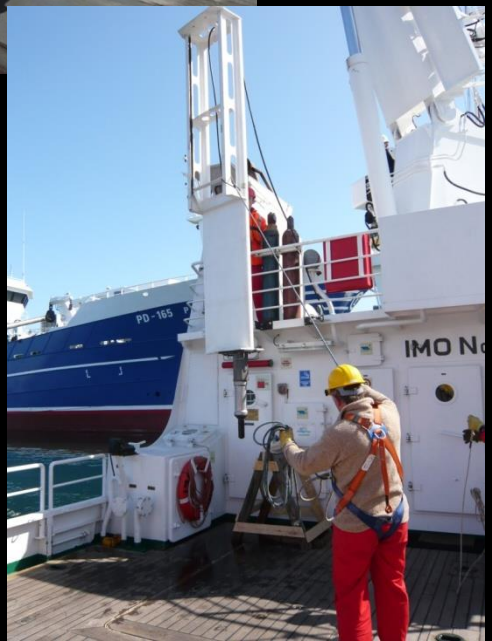
r/v IMOR
Research Vessel



Sureying equipment of r/v IMOR

r/v IMOR
Research Vesse under survey





The main purpose of the carried out research and surveys of the s/s „Stuttgart” ship wreck in 2015 was the assessment of hazard it poses for the marine ecosystem in the area of the ship’s settlement and its impact on the sea water environment of the Gdańsk Bay.

The purpose of the carried out work was also to answer the following questions:

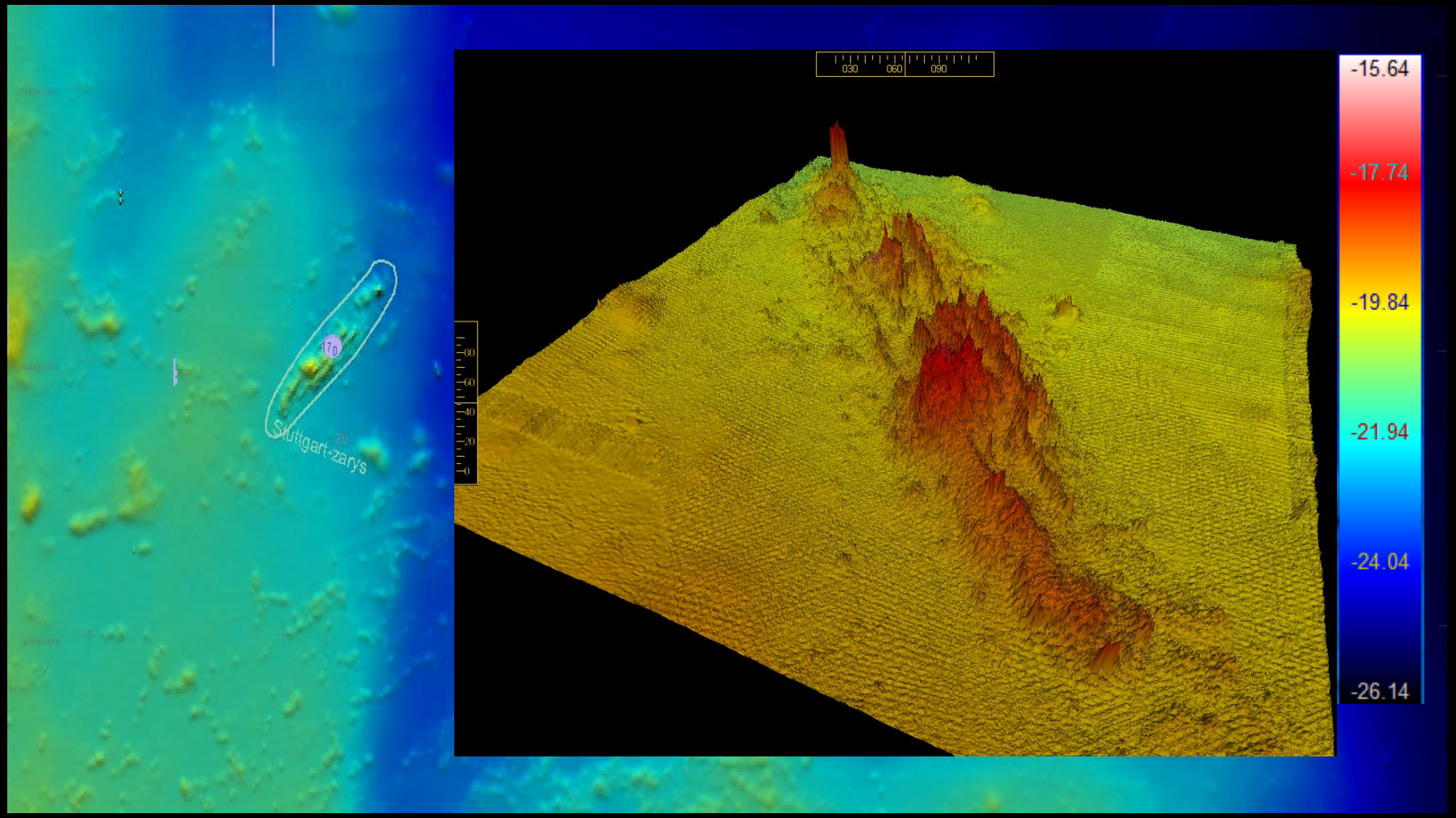
- Was the run-off of substances contaminating the seabed in the area of the wreck stopped in a natural way?
- Is the contaminated area still expanding?
- Have there been any signs of returning life in the area of contamination after 16 years from the first survey ?

Detailed scope of work:

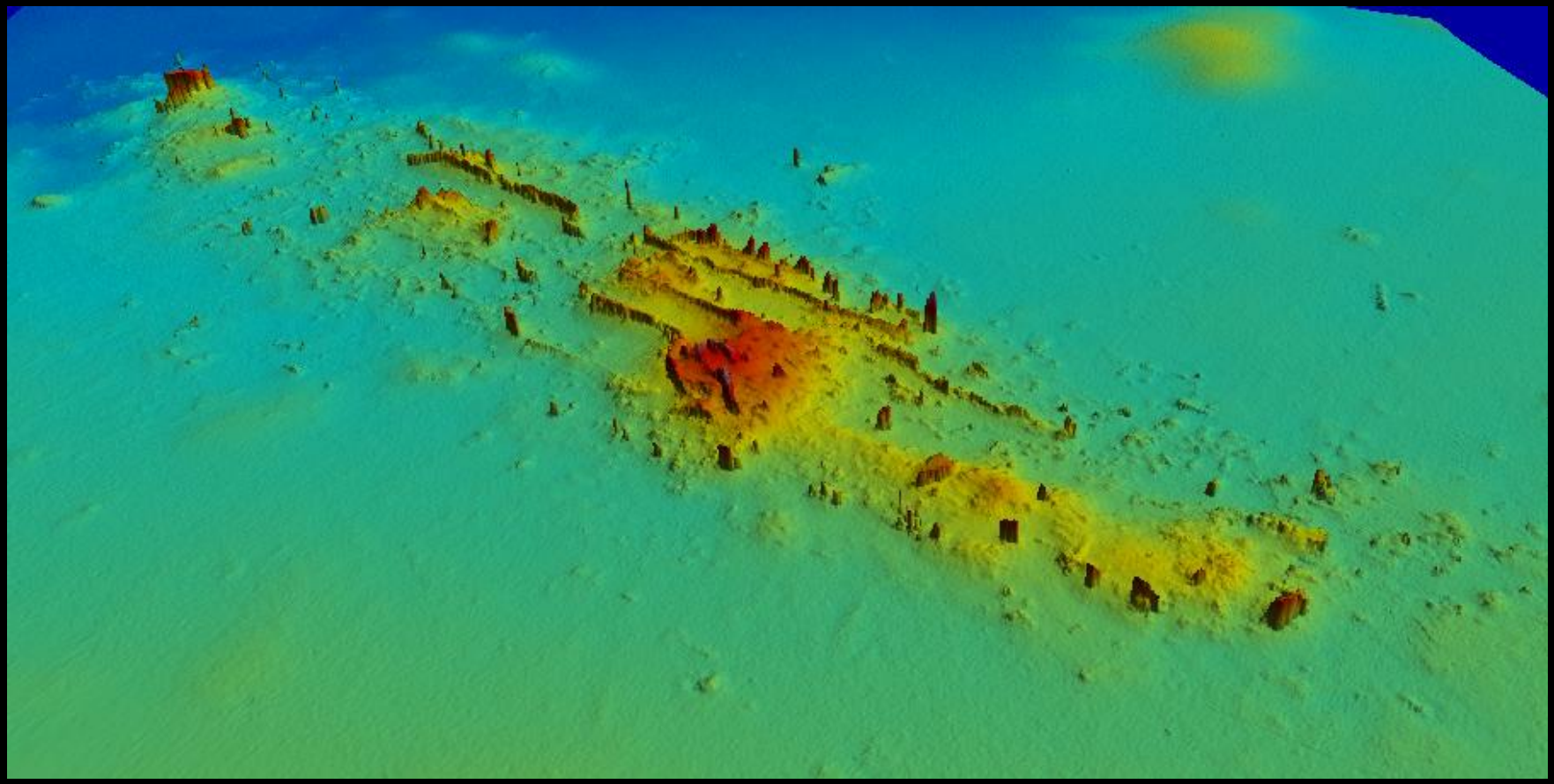
Collecting materials for the assessment of the environmental state in the area of the wreck involving:

- Collecting samples and performing geological analysis of the substratum in the area of the underwater fuel spill.
- Collecting samples and performing chemical analysis of water and bottom sediments.
- Assessing the state of zoobenthos as an indicator of the marine environment's condition.

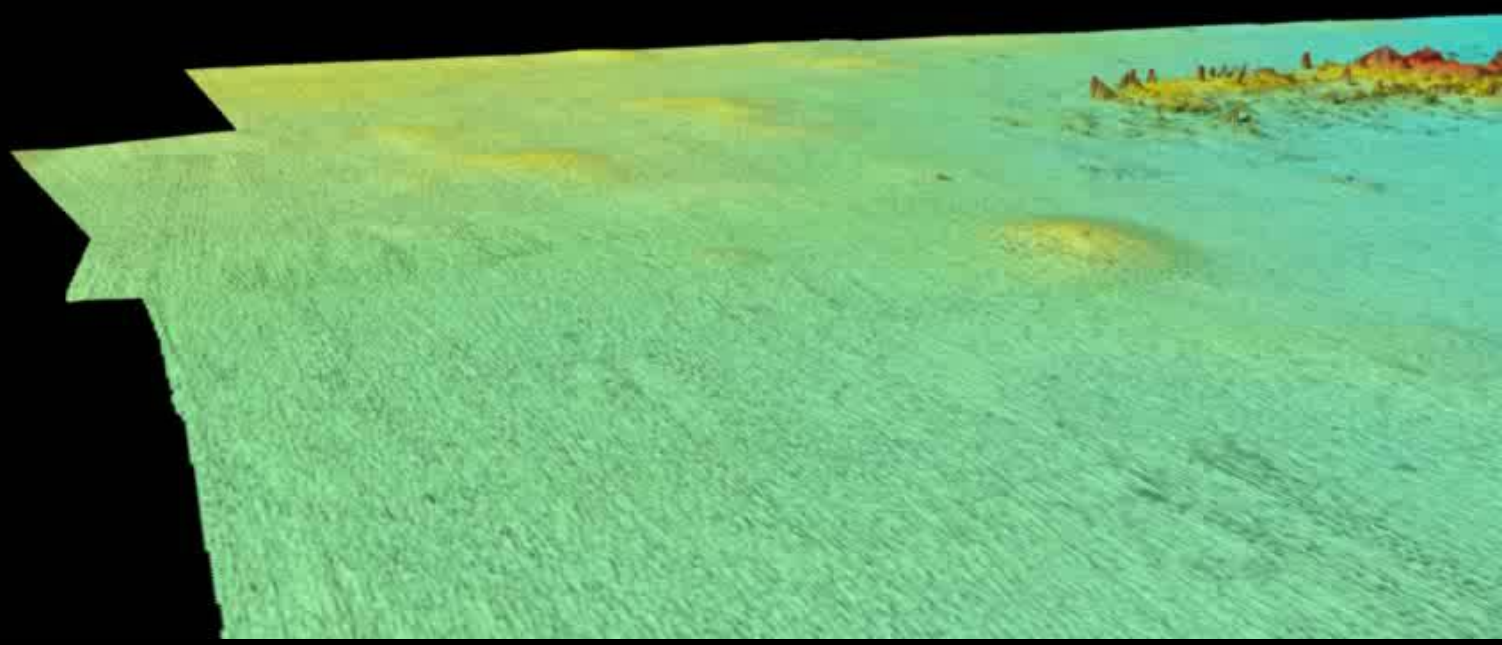
Bathymetric conditions of the seabed in the area where the s/s Stuttgart wreck is settled - 2009



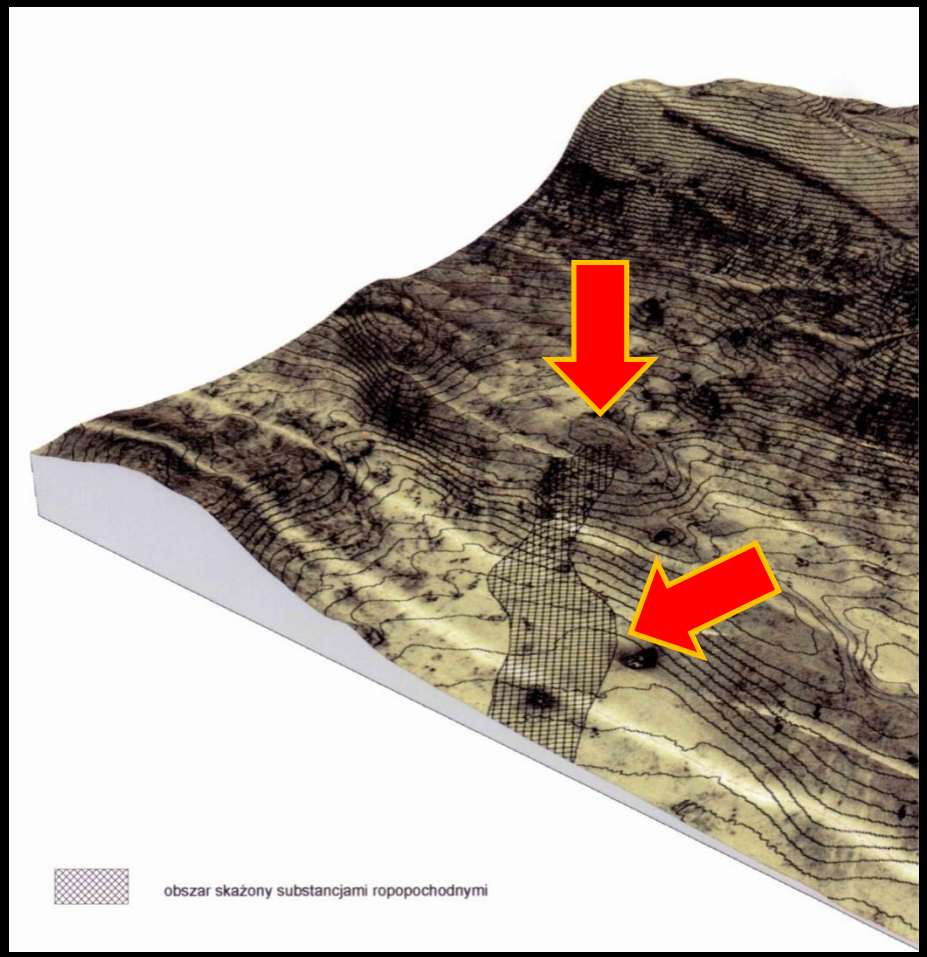
Bathymetric conditions of the seabed in the area where the s/s Stuttgart wreck is settled - 2015



Bathymetric conditions of the seabed in the area where the s/s Stuttgart wreck is settled - 2015

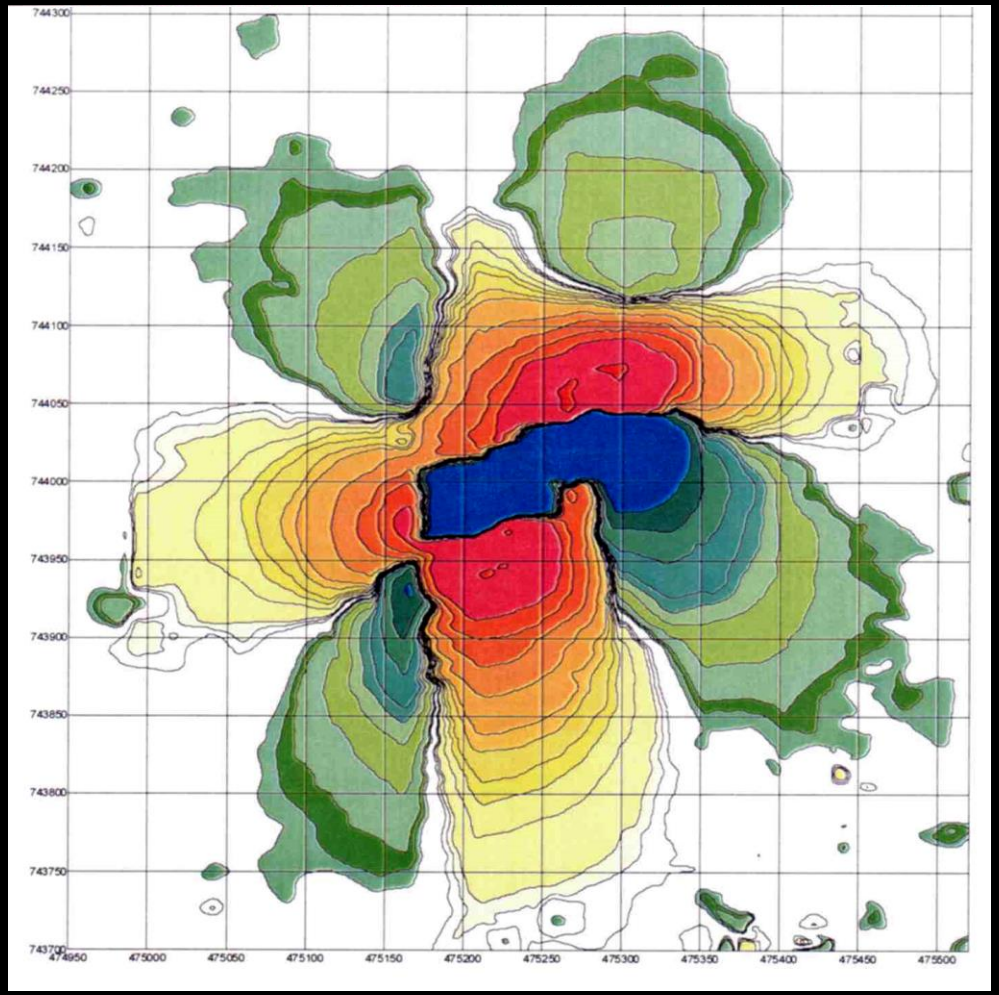


Bathymetric conditions of the seabed in the area where the s/s Stuttgart wreck is settled



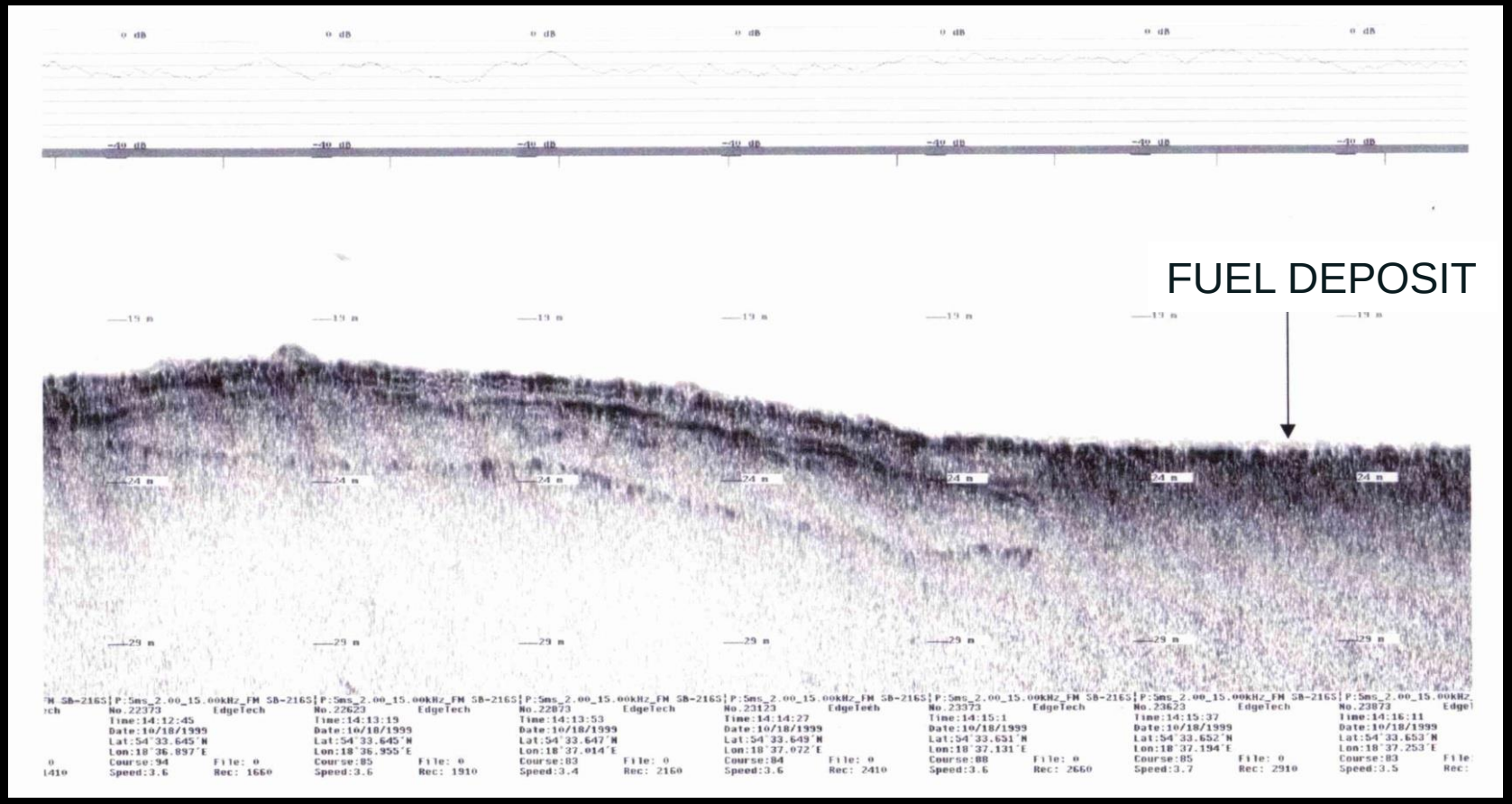
Run-off of heavy fuel in the direction of deeper water.

Anomalies of the natural field of magnetic induction in the vicinity of the wreck



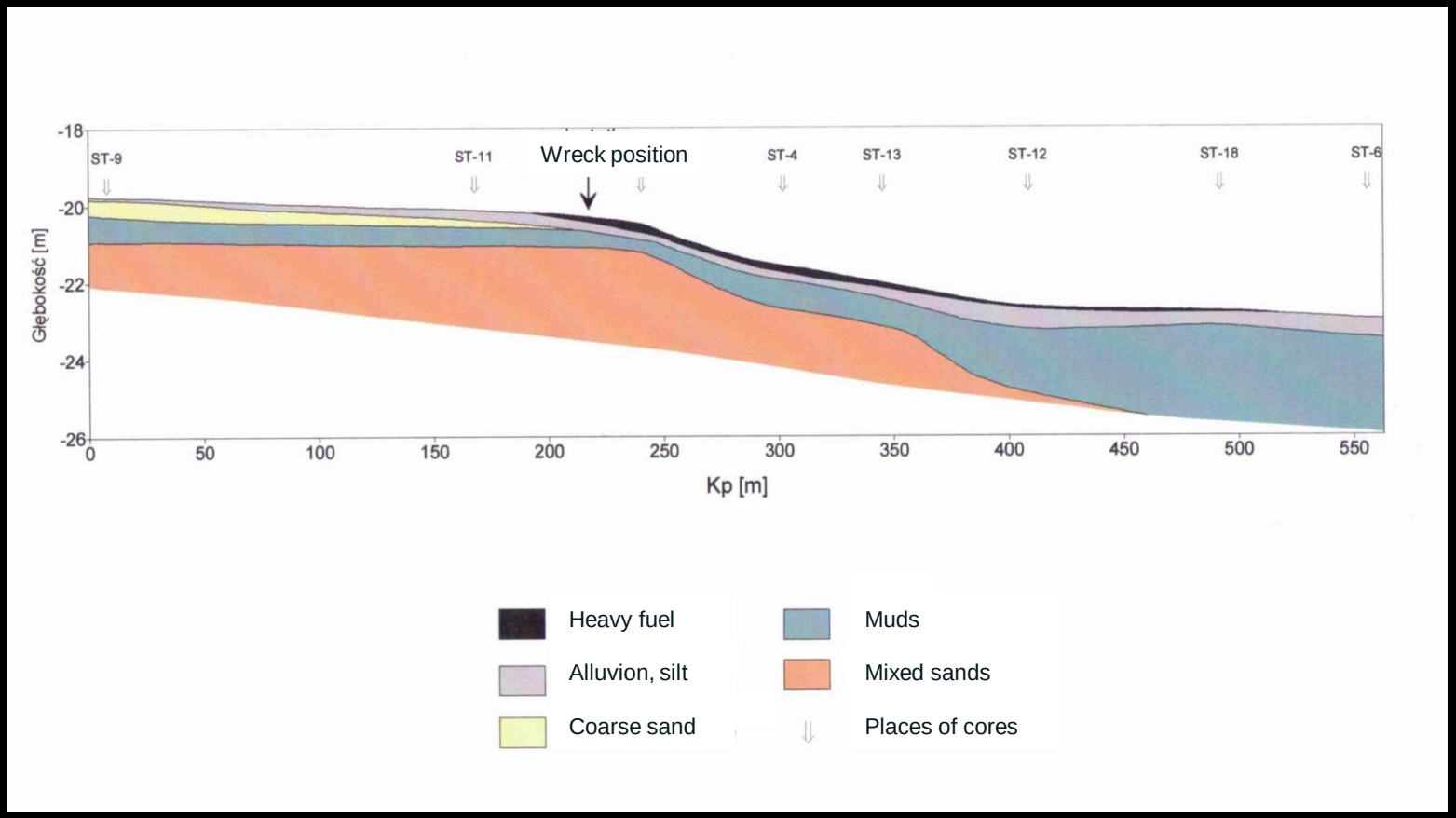
Anomaly isolines of the magnetic induction field caused by the magnetic mass of the s/s Stuttgart ship wreck and other magnetic masses in the area.

Geological conditions in the area where the wreck is settled – state in 1999



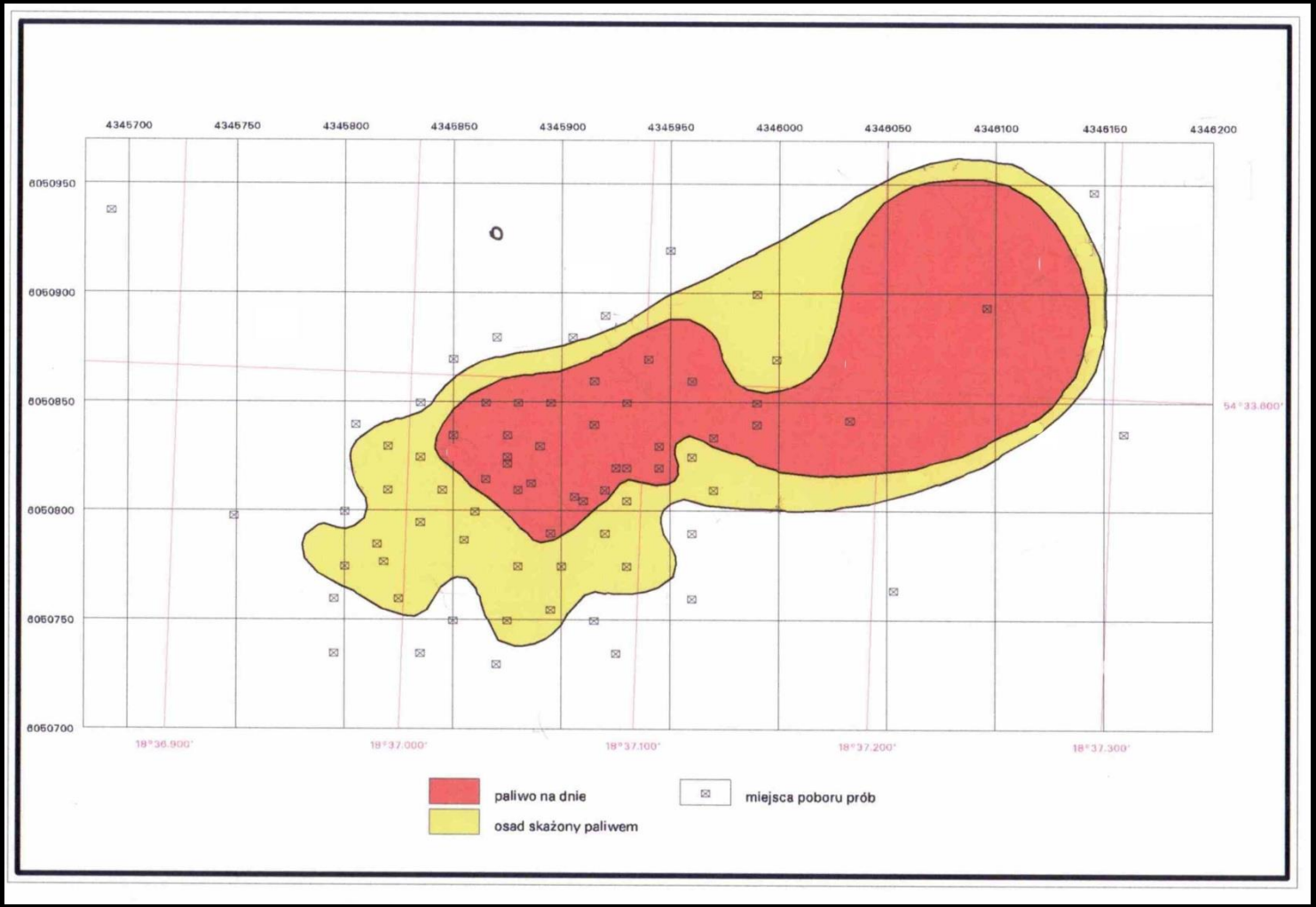
An example of a seismoacoustic profile with a layer of sand suffused with heavy fuel. (1999)

Geological conditions in the area where the wreck is settled – state in 1999



Geological situation and the distribution of contamination

Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 1999



Contaminated Area

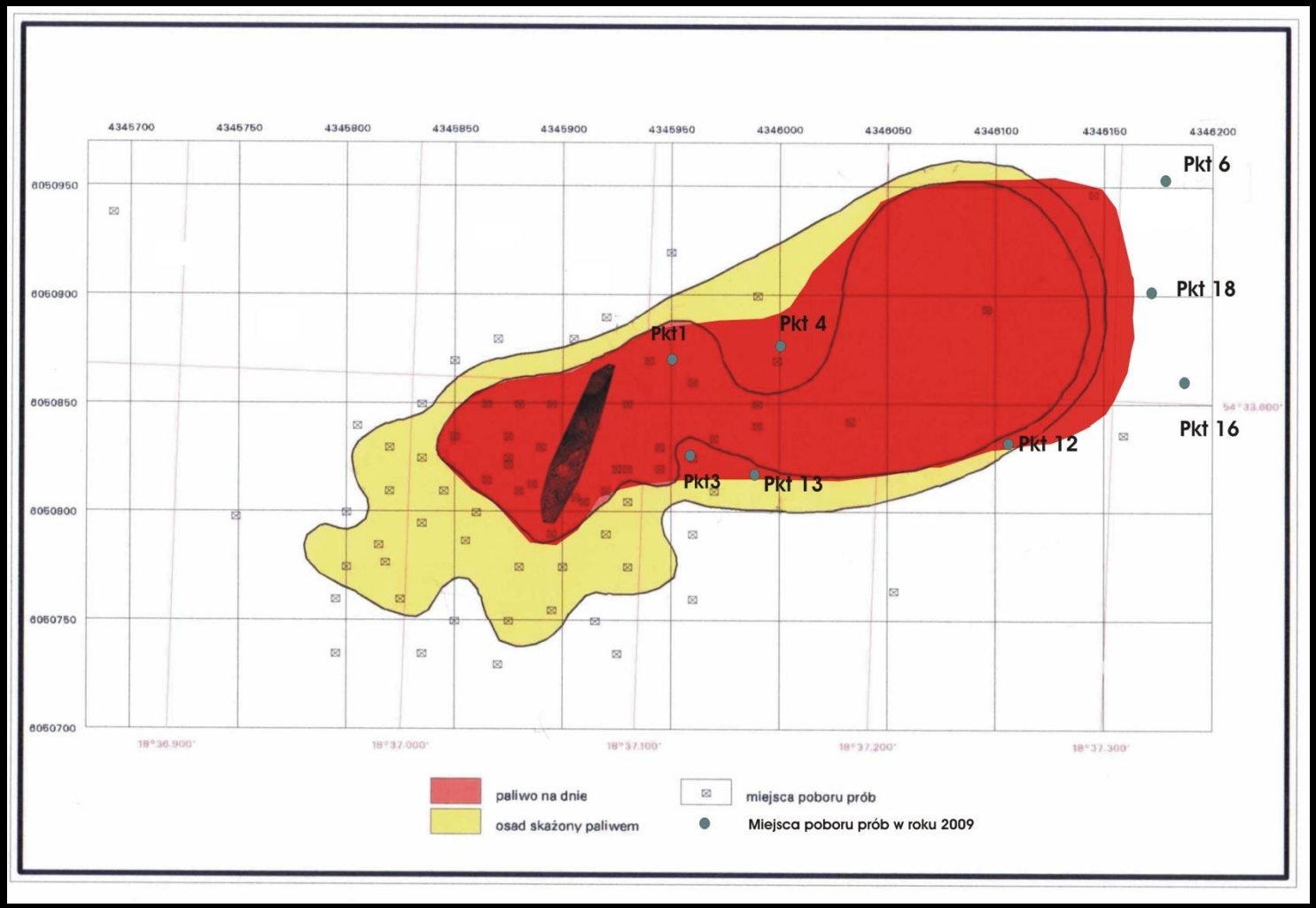
25 000 sq.m.

Estimated volume of contaminated ground

40 000 c.m.

(c.a. 70 000 ton)

Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2009



Contaminated Area

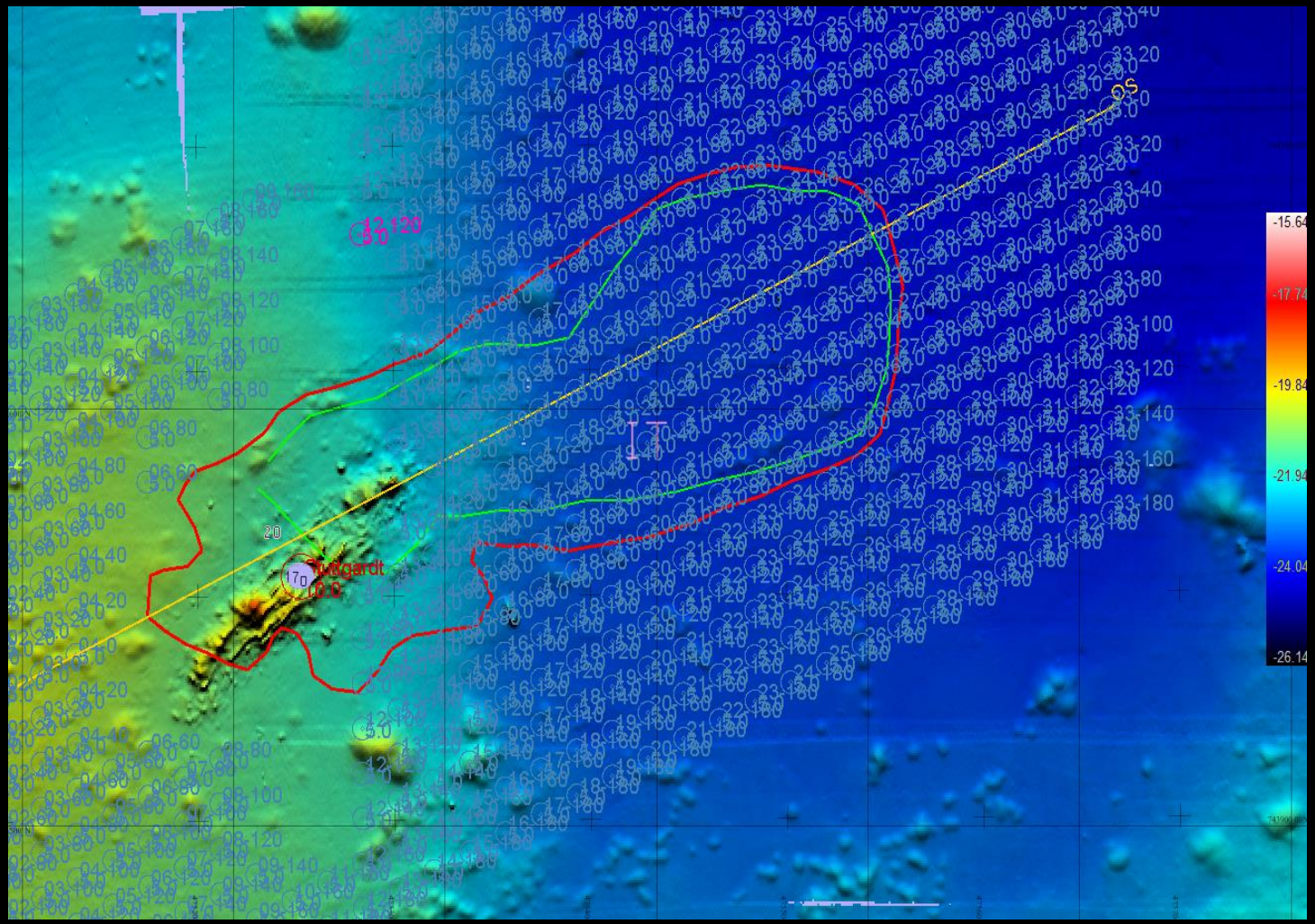
32 000 sq.m.

Estimated volume of contaminated ground

48 000 c.m.

(c.a.80 000 ton)

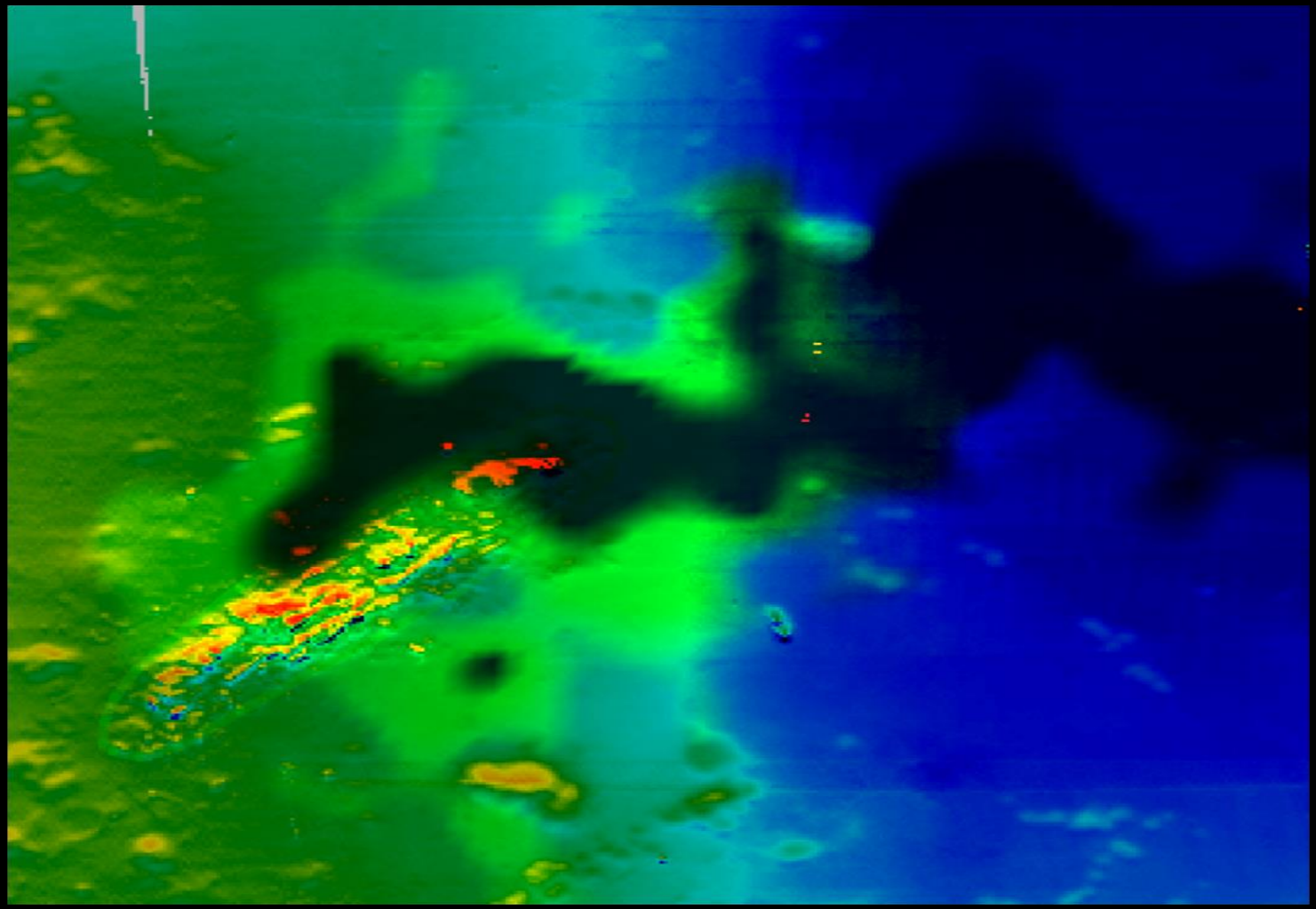
Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2012



Situation from 1999 and 2009

Plan of new survey at 2012 - nets of points where probes of ground were taken

Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2012



Contaminated Area

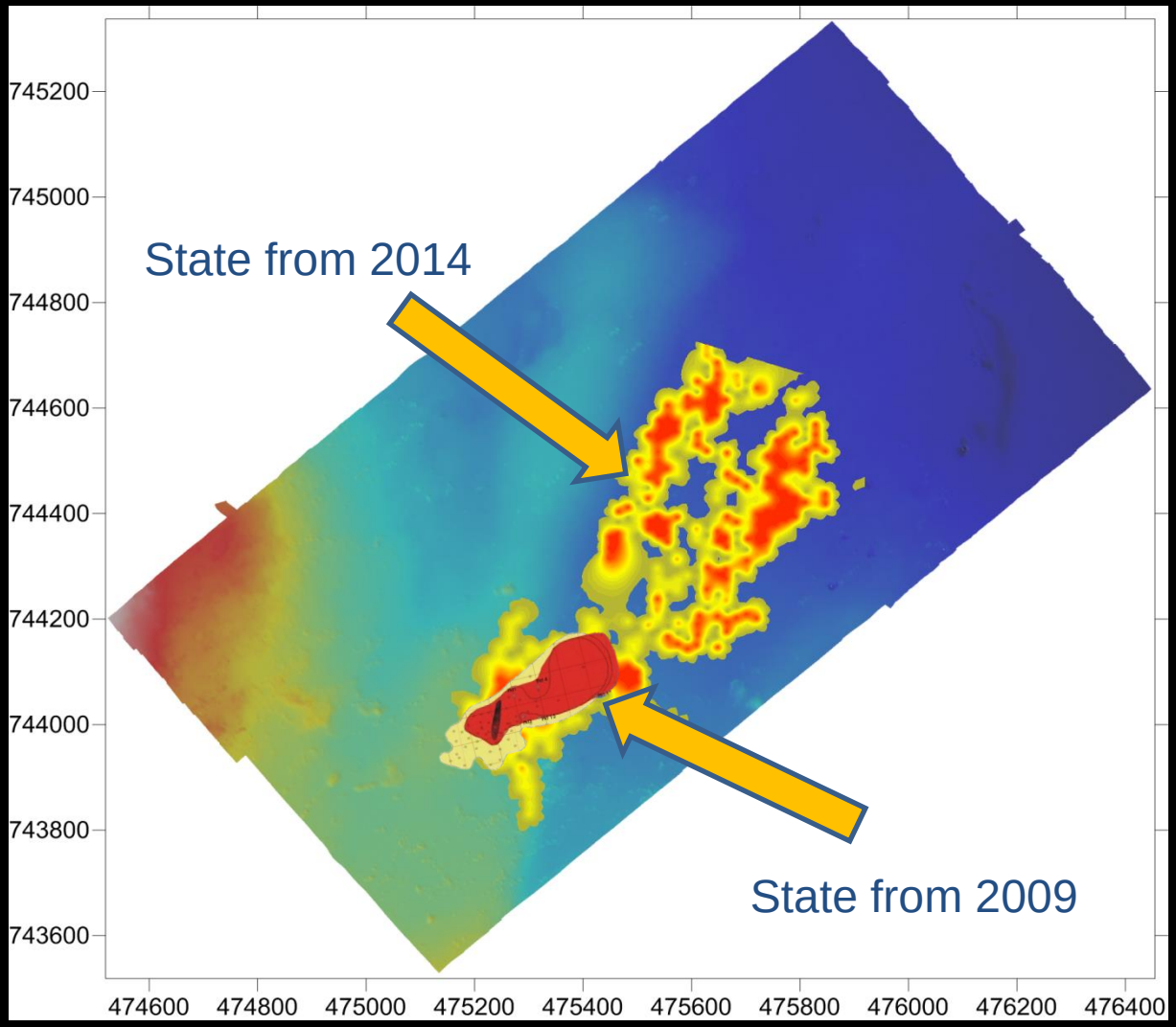
120 000 sq.m.

Estimated volume of contaminated ground

90 000 c.m.

(c.a.150 000 ton)

Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2014



Contaminated Area

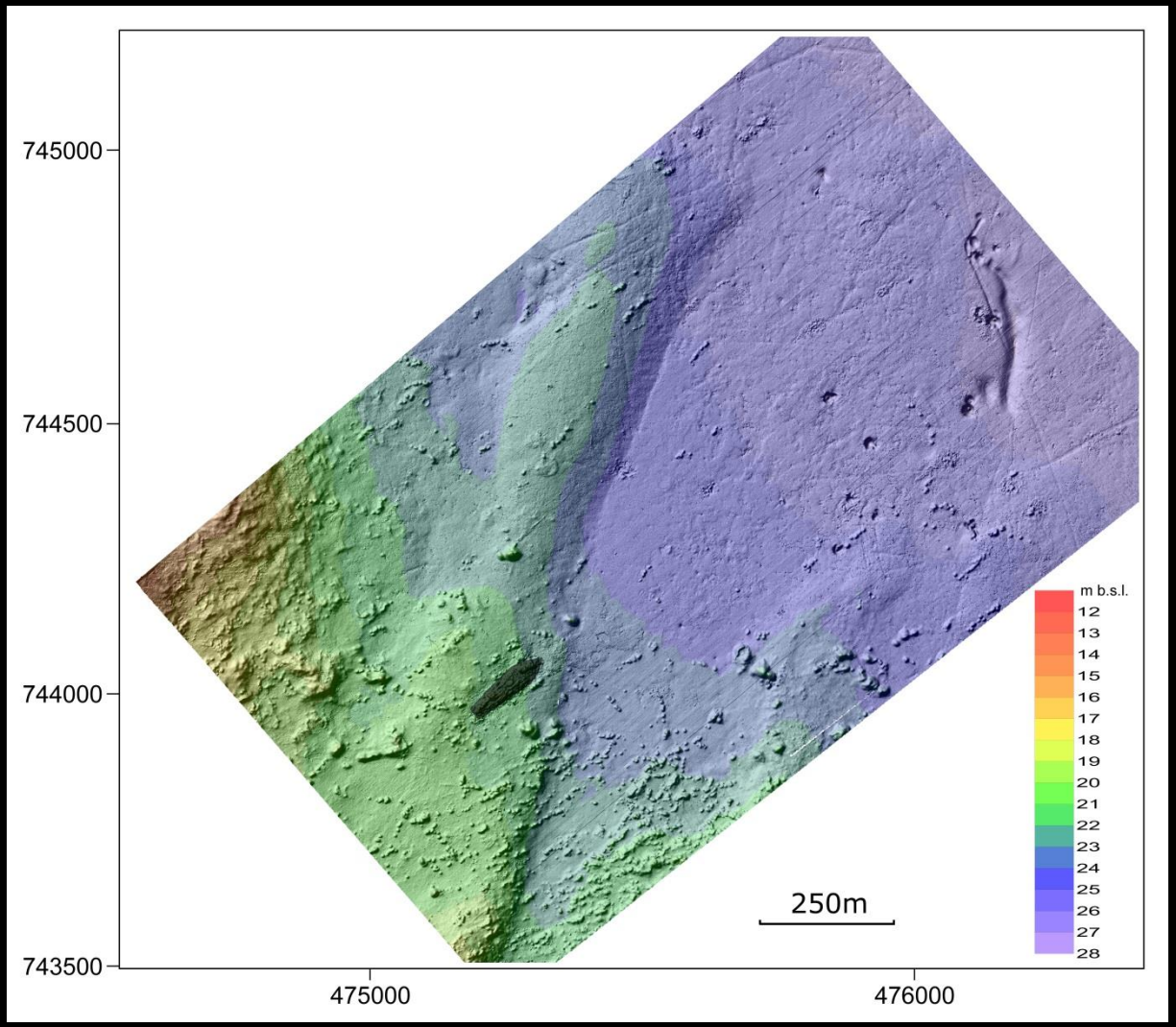
270 000 sq.m.

Estimated volume of contaminated ground

240 000 c.m.

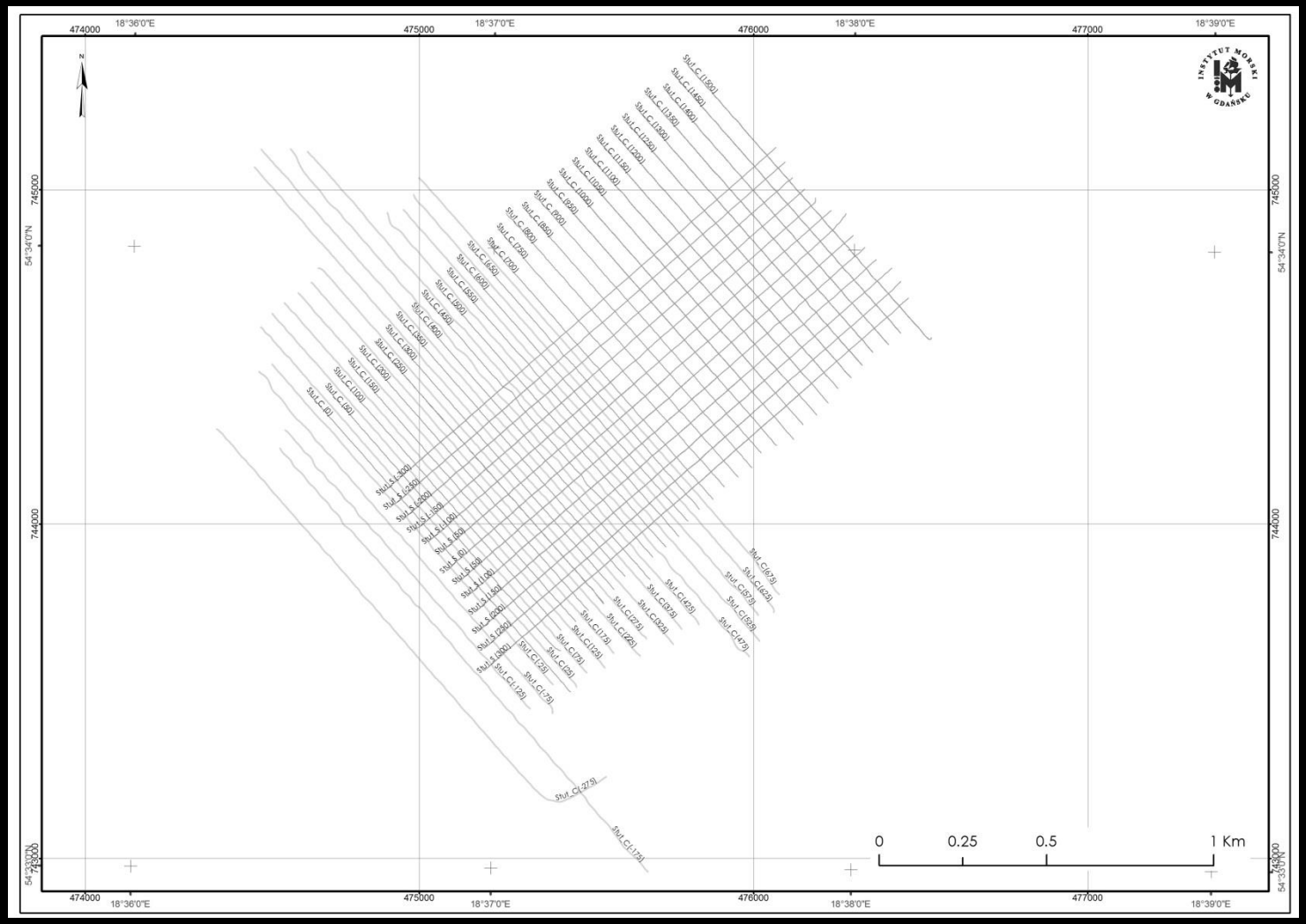
(c.a. 350 000 ton)

Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2015



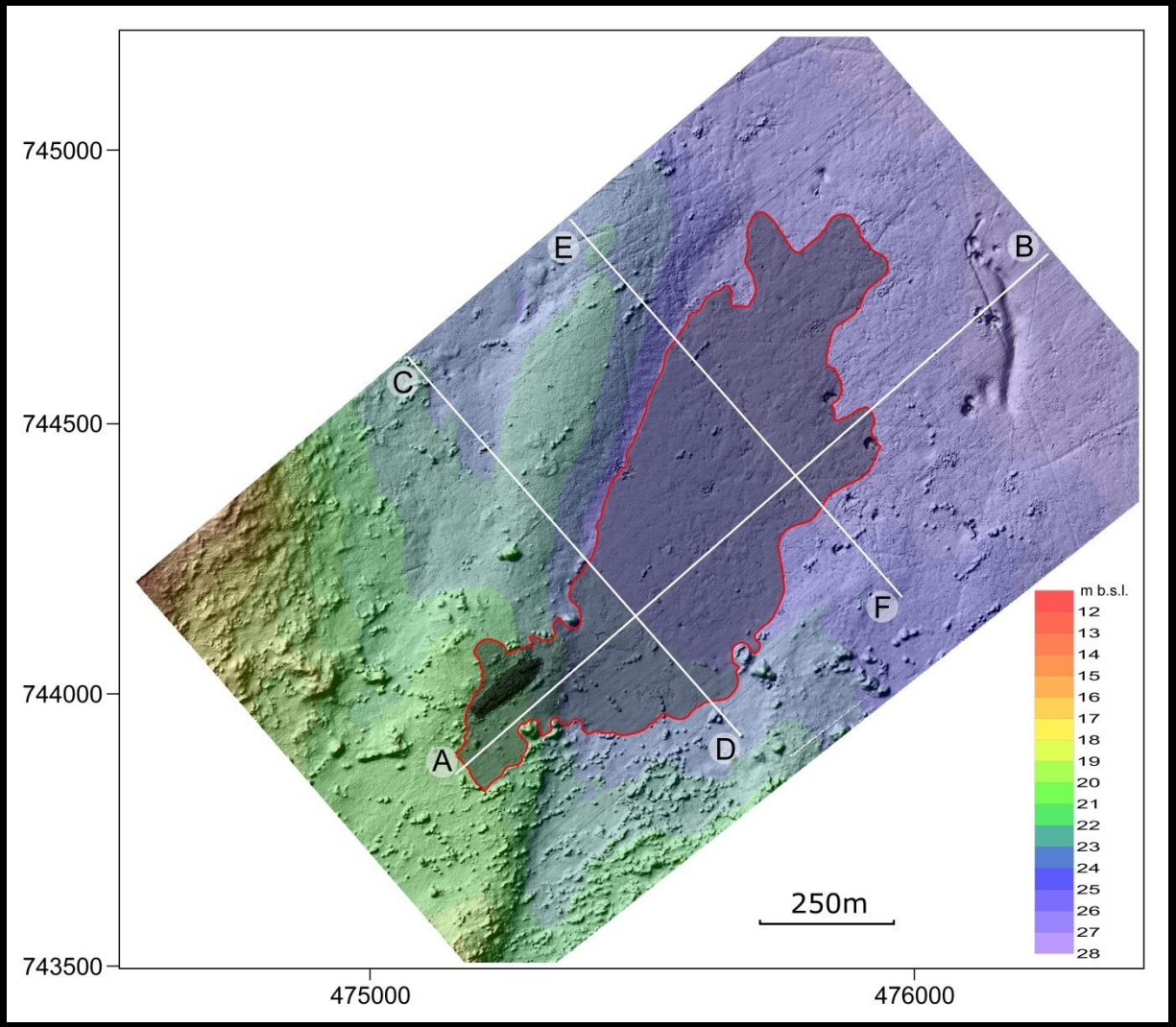
Extended limit
of bathymetric survey

Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2015



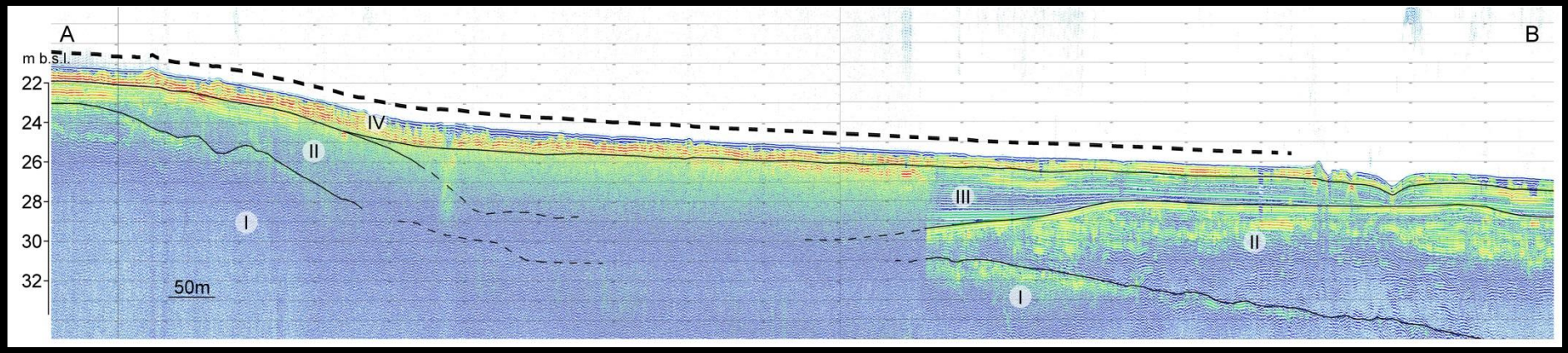
Nets of sejsmic profiles made using SES-2000

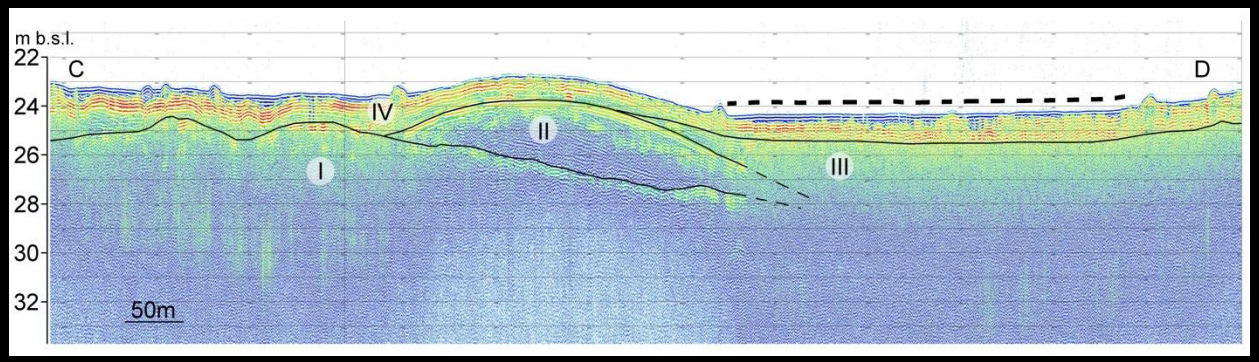
Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2015

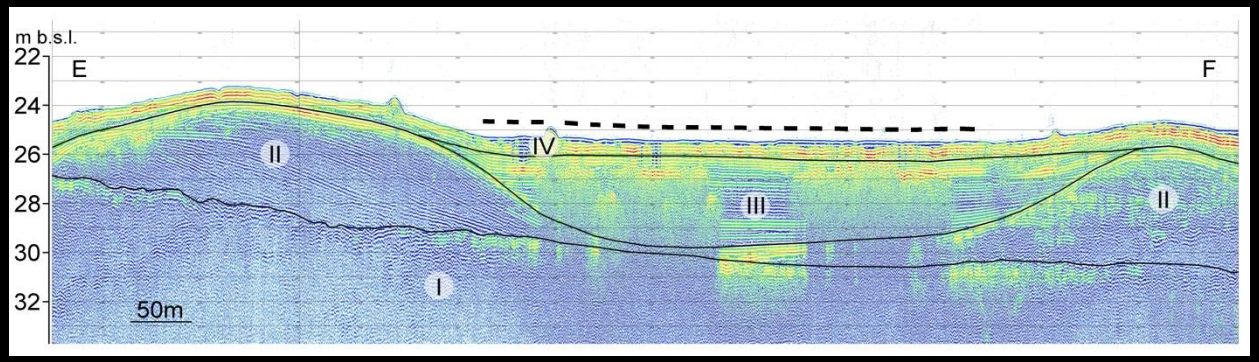


An example of a seismoacoustic profiles with a layer of sand suffused with heavy fuel.

Geological conditions in the area where the wreck is settled

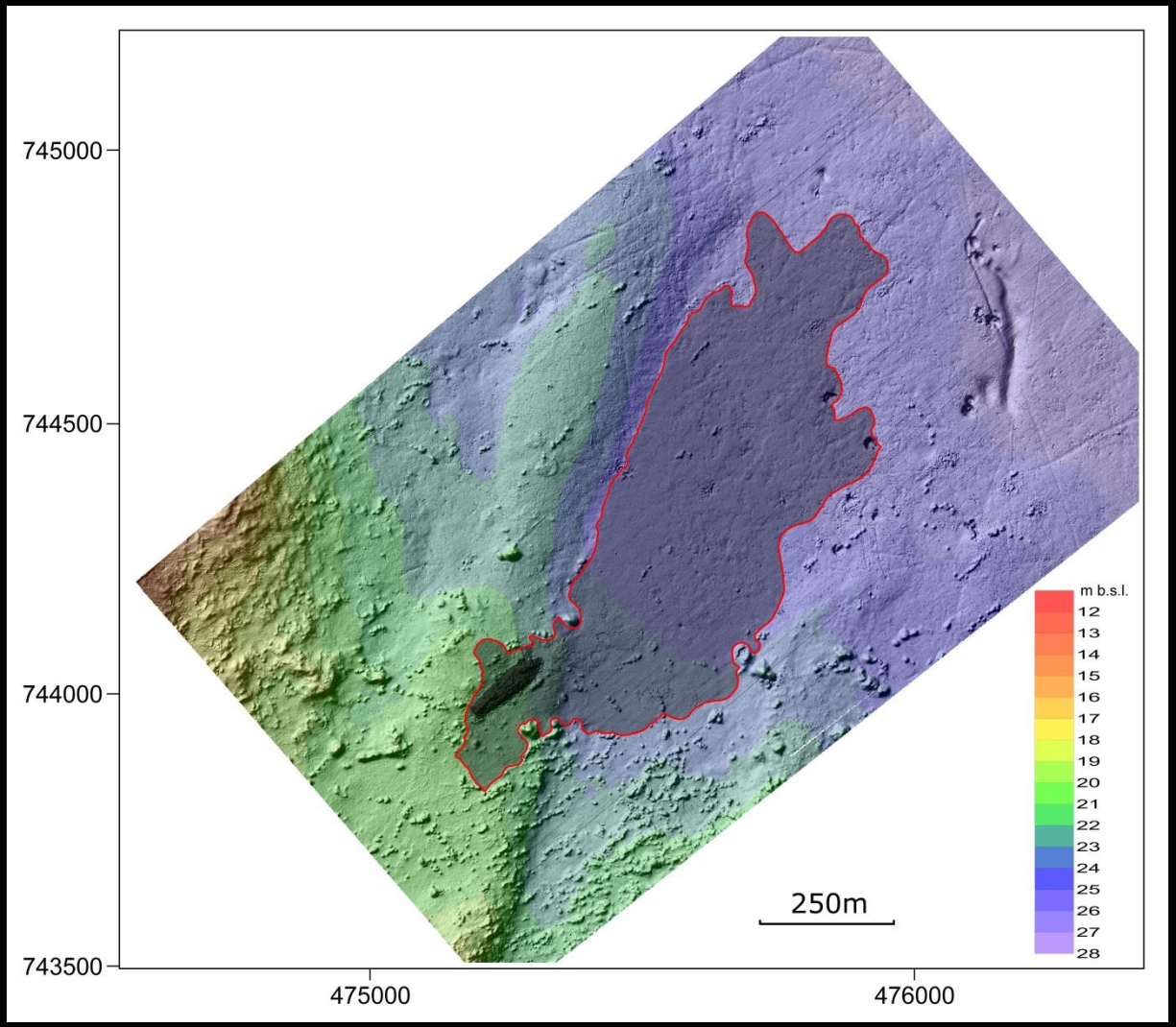






An example of a seismoacoustic profiles with a layer of sand suffused with heavy fuel.

Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2015



Effect of examination

Contaminated Area

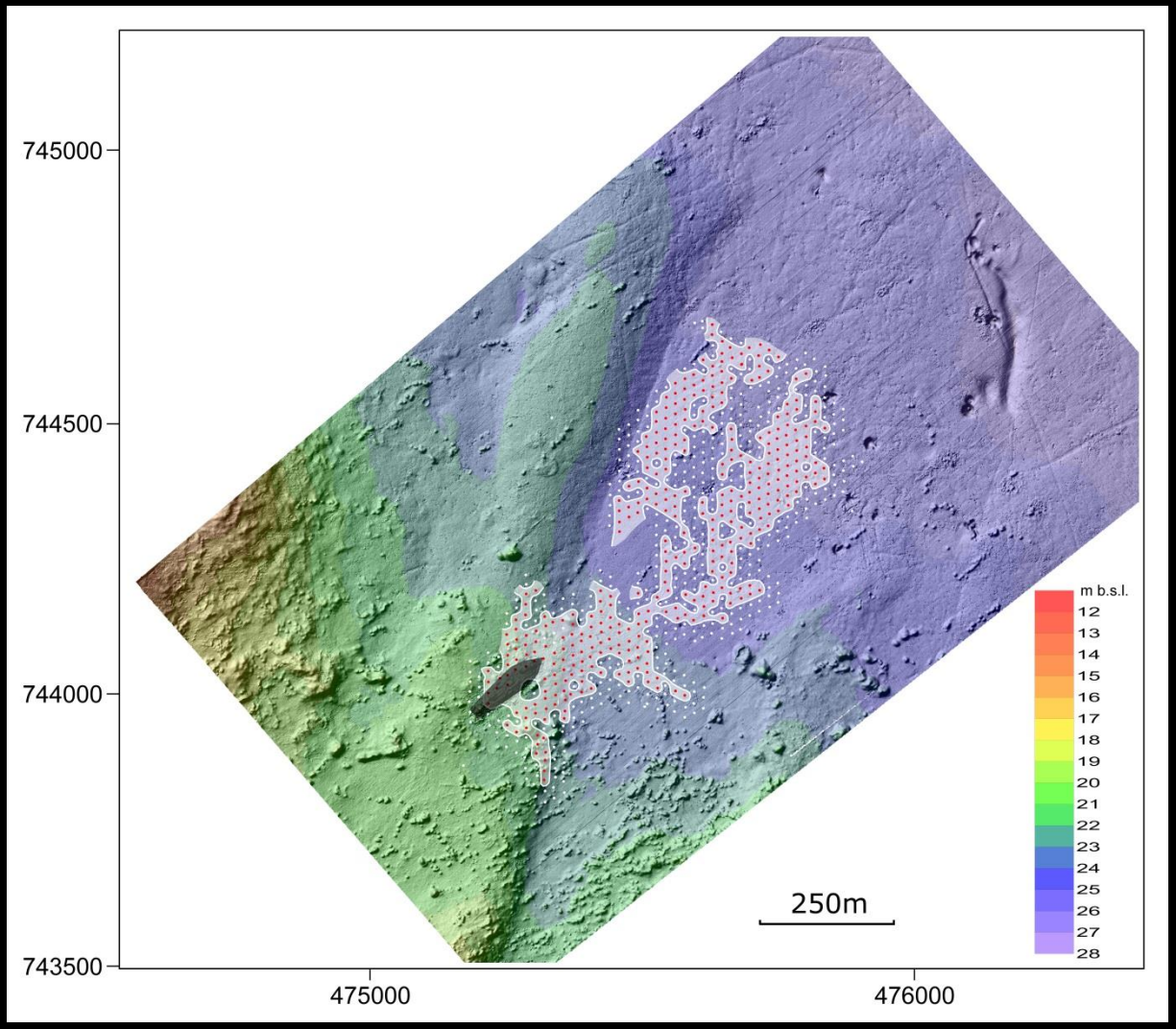
350 000 sq.m.

Estimated volume of contaminated ground

320 000 c.m.

(c.a. 400 000 ton)

Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2015



650 samples taken by Van Veen grab

- position of probe with oil
- position of probe without oil
- heavy contaminated area

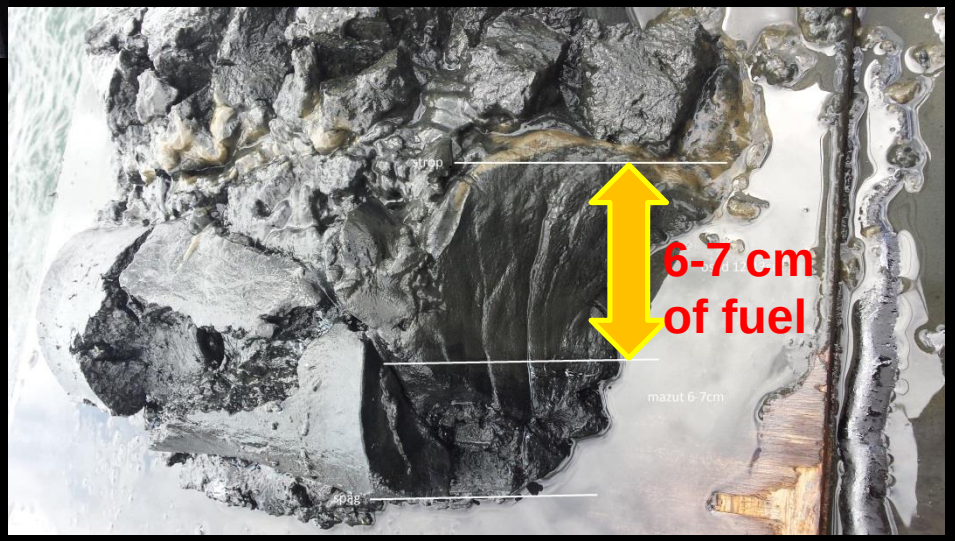
Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2015

One from 650 samples taken by Van Veen grab

– thin film of oil on deck

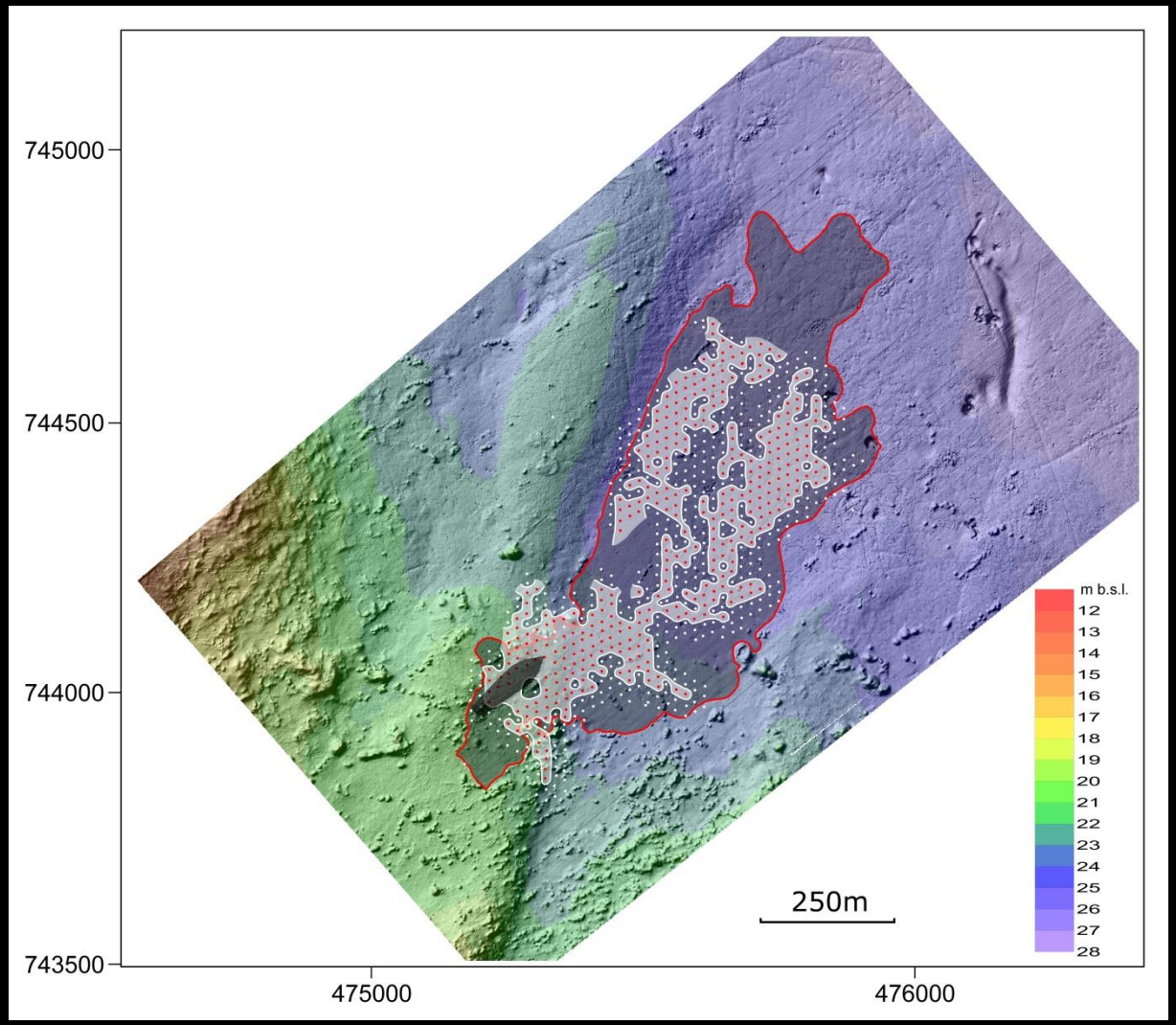
One from 650 samples taken by Van Veen grab:

- 6-7 cm of „life fuel” covered by
- 10-12 cm of fine sand and silk



Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2018

Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2015

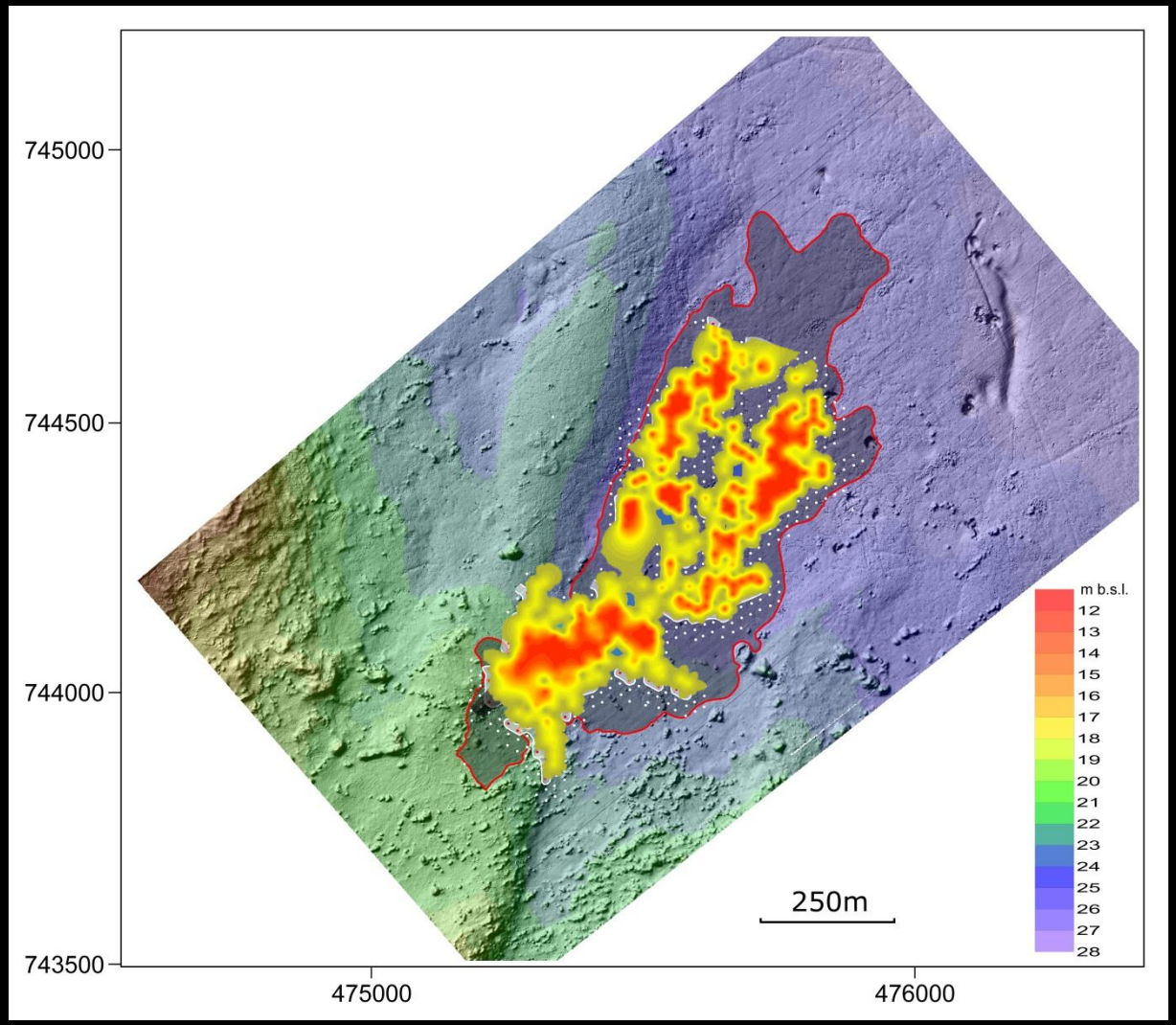


Contaminated Area

From seismic:
350 000 sq.m.

From grab probes:
270 000 sq.m.

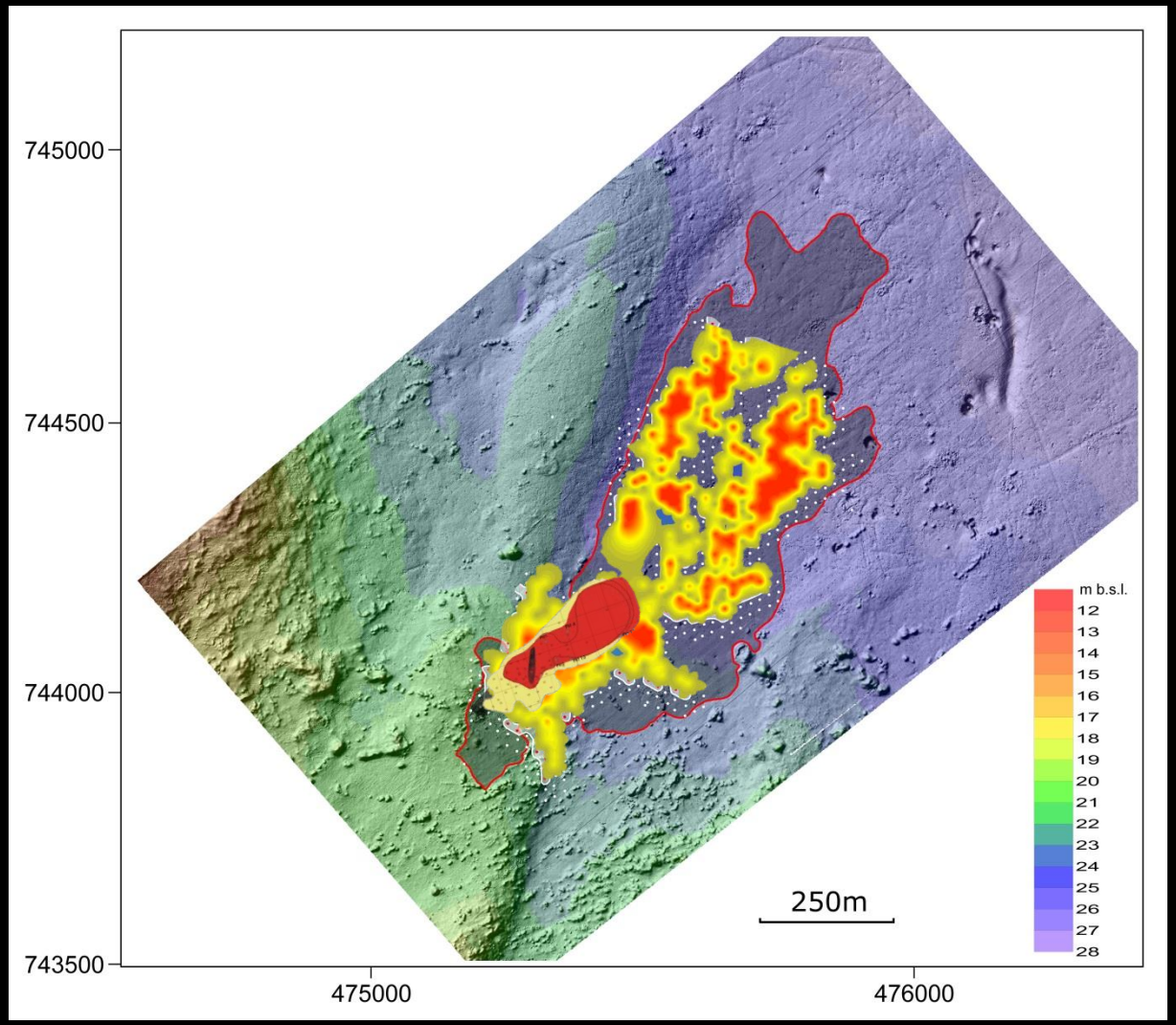
Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2015



Contaminated Area

- „life fuel” – yelly fish
- fuel mixed with sand
- sand with thin film of fuel
- clean top layer of sand/silk

Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 1999/2009/2012/2014 and 2015



Contaminated Area:

1999 Year
- **25 000 sq.m. – 2,5 ha.**

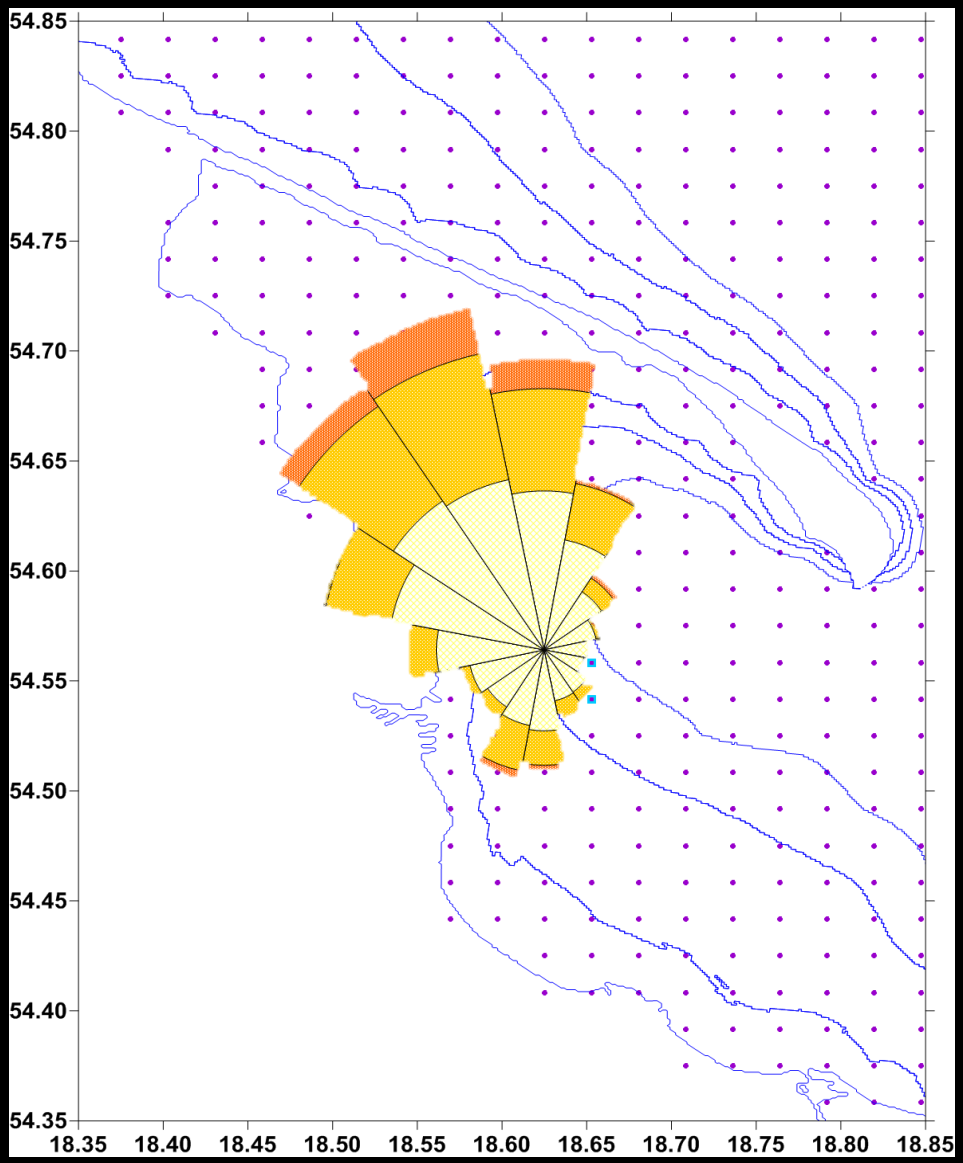
2009 Year
- **32 000 sq.m – 3,2 ha.**

2012 Year
- **90 000 sq.m – 9,0 ha.**

2014 Year
- **270 000 sq.m – 27 ha.**

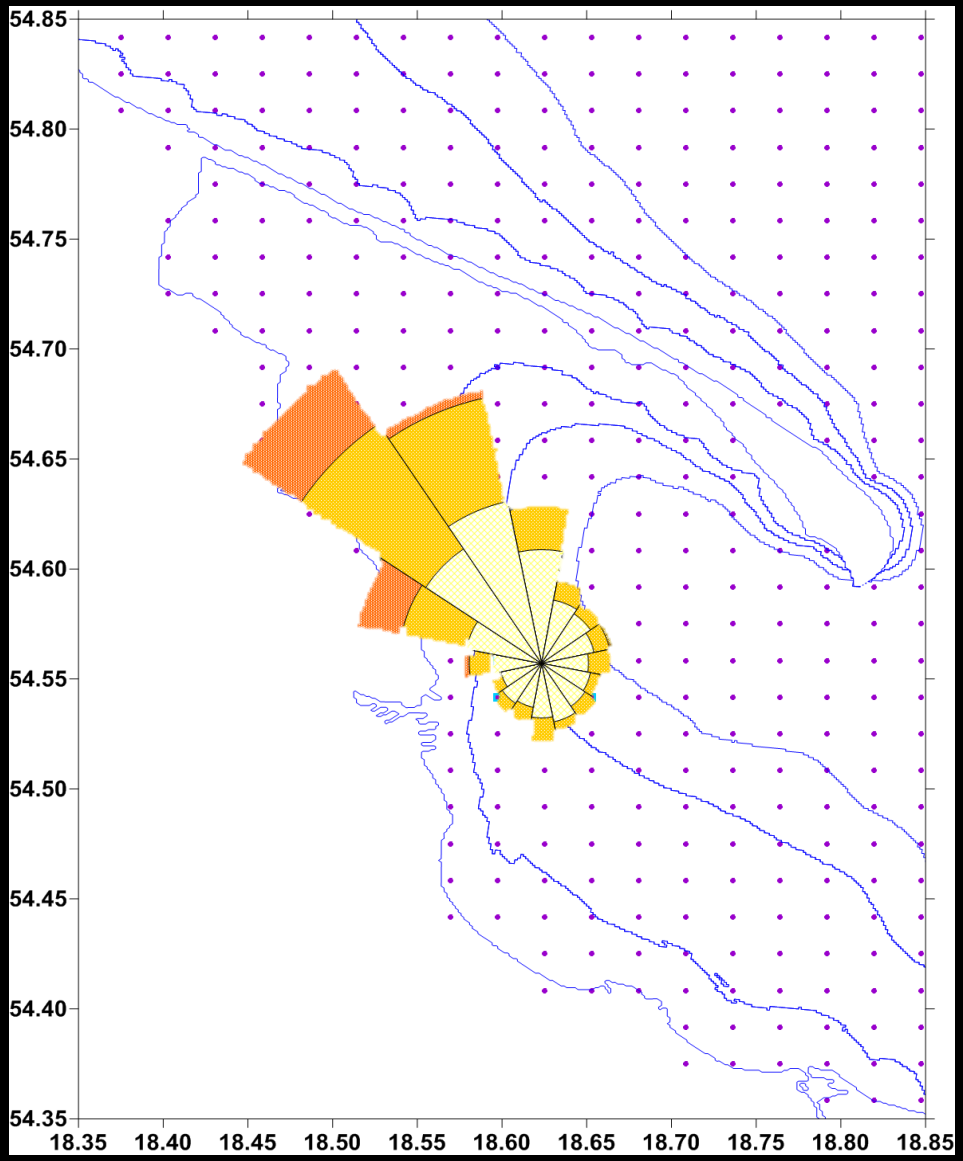
2015 Year
- **350 000 sq.m – 35 ha.**

Survey of currents in the vicinity of the s/s Stuttgart wreck



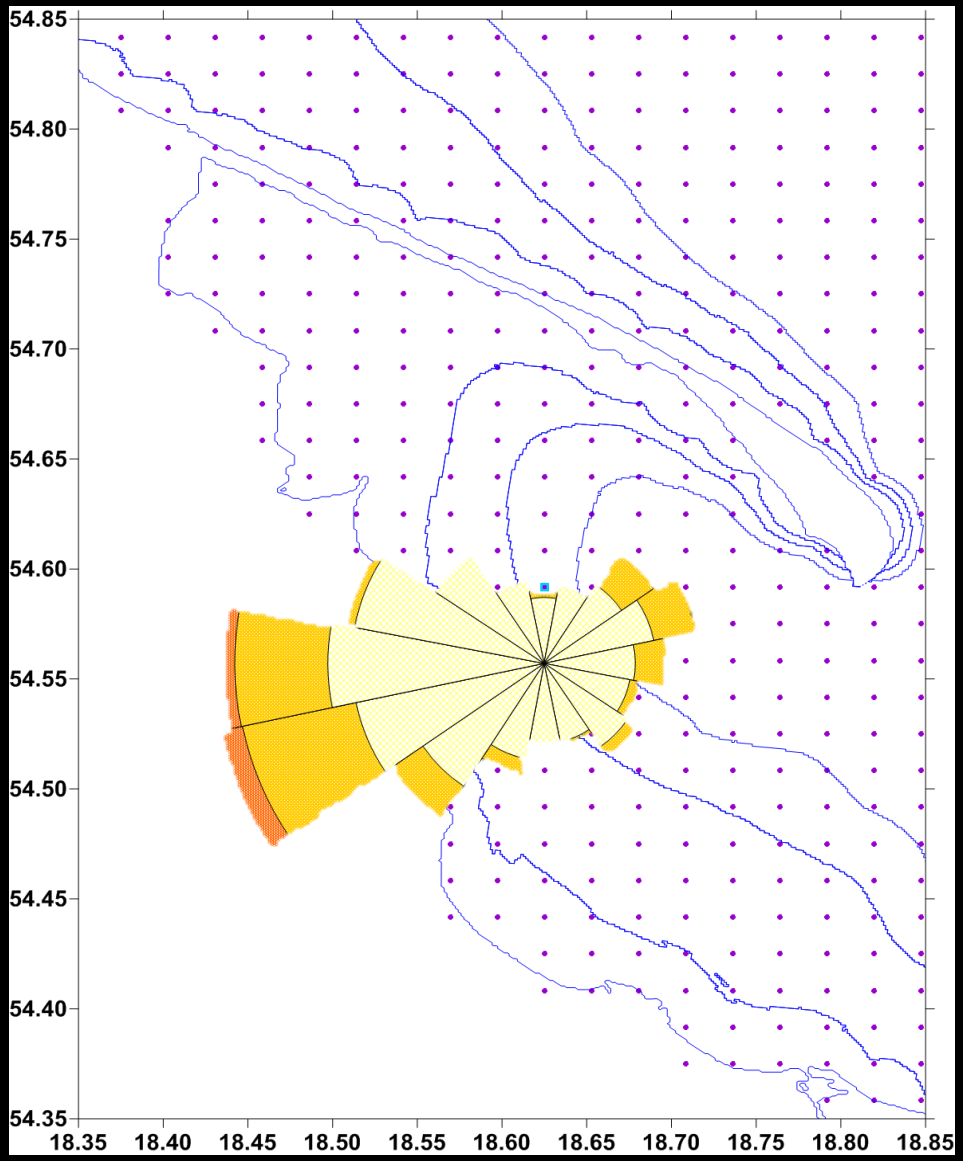
Distribution of currents in the depths of the water at the level of 4 meters
(near surface layer).

Survey of currents in the vicinity of the s/s Stuttgart wreck



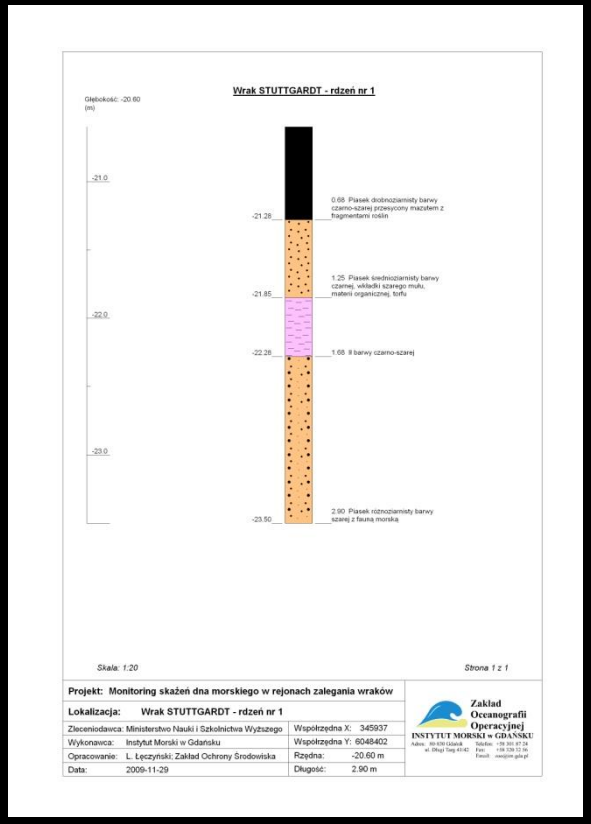
Distribution of currents in the depths of the water at the level of 16 meters

Survey of currents in the vicinity of the s/s Stuttgart wreck

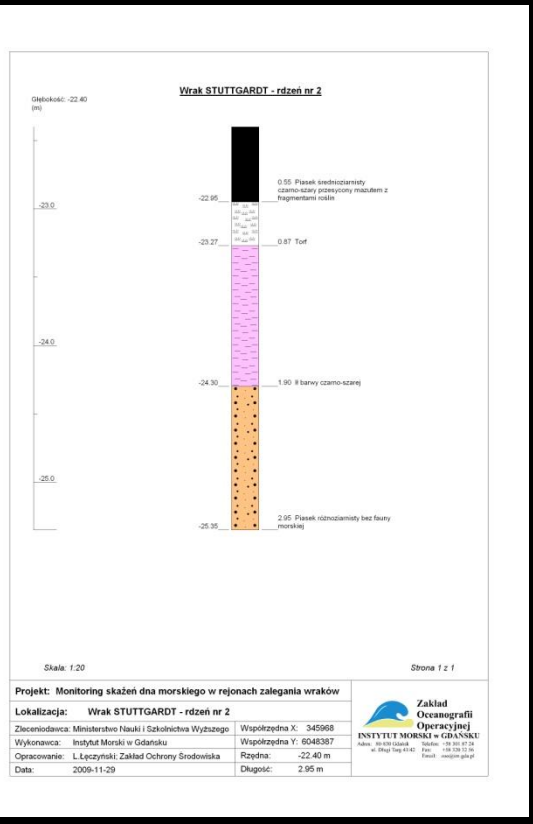


Distribution of currents in the depths of the water at the level of 24 meters (nearbottom layer).

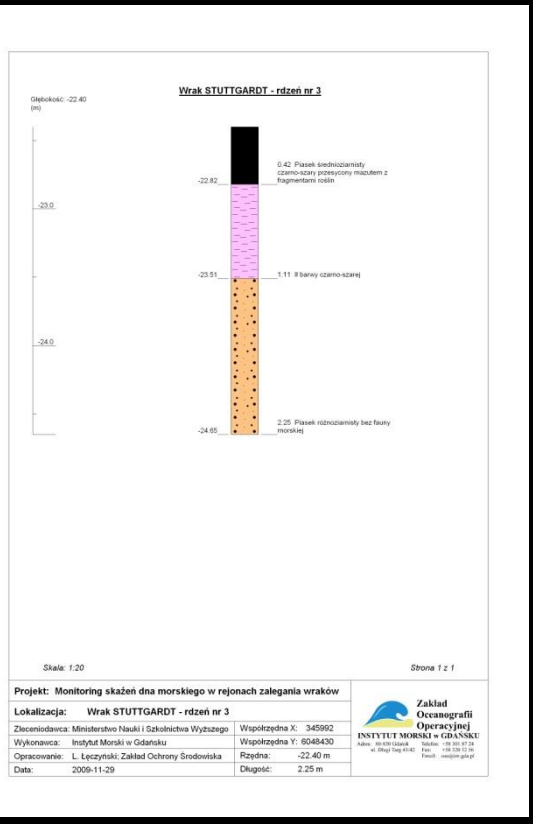
Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2009



Core no. 1 collected in control point no. 1.

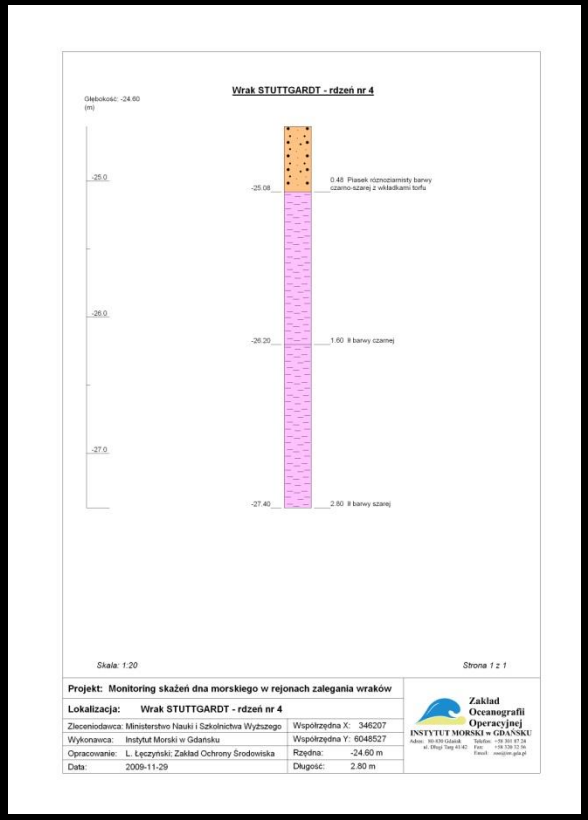


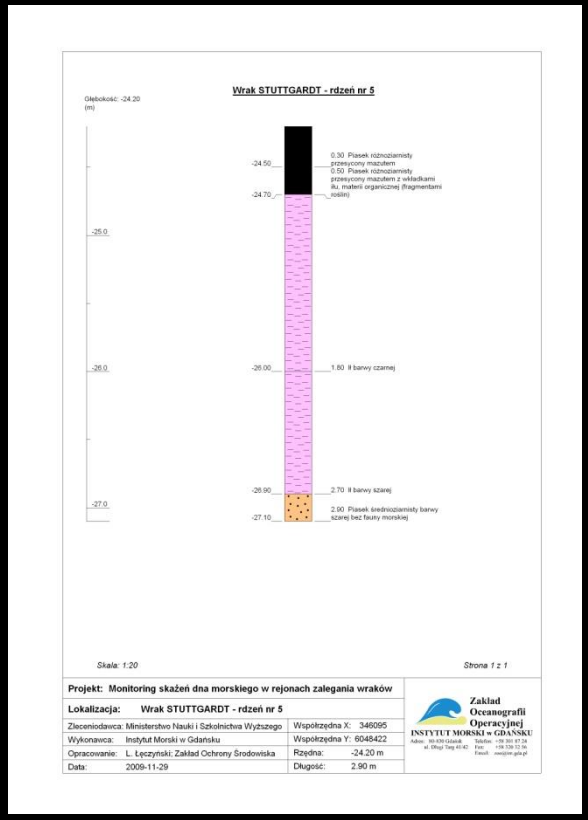
Core no. 2 collected in control point no. 3.

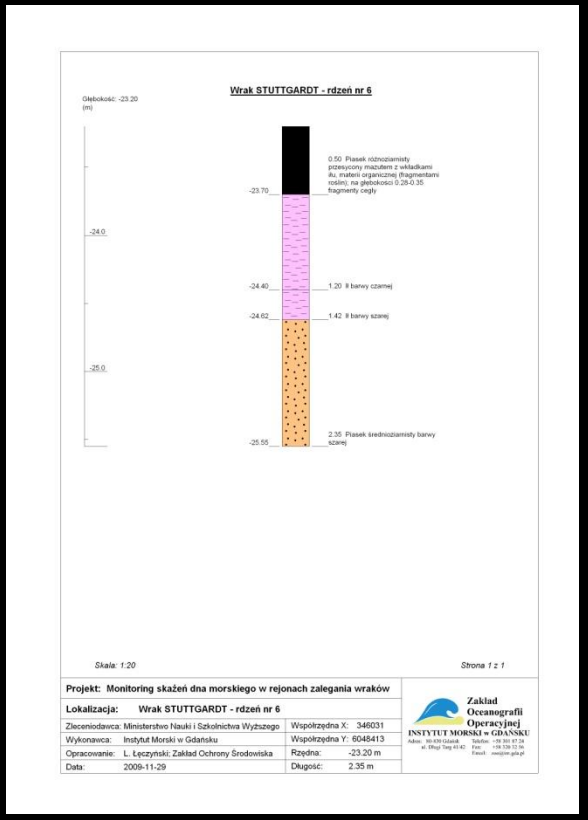


Core no. 3 collected in control point no. 4.

Range of occurrence of contamination with the heavy fuel flowing out of the s/s „Stuttgart” wreck – state for 2009







Core no. 4 collected in control point no. 6.

Core no. 5 collected in control point no. 12.

Core no. 6 collected in control point no. 13.

Assessment of the chemical state of sediments and waters in the vicinity of the monitored wrecks

- Sediments were collected in close vicinity of the wrecks, in such a way as to include potential contamination of sediments with fuel leaking from the wreck, in order to assess the level of contamination of bottom sediments in the vicinity of the monitored wreck.

- Samples were collected with a standard van Veen type grab.

- Water samples for the assessment of water quality were collected with a plastic batometer in the location of core sample collection, at the height of about 1 meter above the seabed.

Assessment of the chemical state of sediments and waters in the vicinity of the monitored wreck

Survey results

*The survey report includes survey results covered with the scope of accreditation as well as unaccredited surveys. Results from beyond the scope of accreditation were indicated with the following mark: **)*

Samples were averaged from the whole core including the surface layer of mazout.

No.	Survey type	Unit	Sample number			
			469/09/1938	469/09/1939	469/09/1940	469/09/1941
			Client Code			
			PKT-1	PKT-3	PKT-4	PKT-6
I. Basic indicators						
1	Humidity in 105^0C	%	26.8	39.5	27.9	61.3
2	Loss on ignition*)	% d.m.	4.89	5.63	2.97	7.94
3	Phenols *)	mg/kg	45.5	5.37	10.9	44.7
4	Ether extract *)	mg/kg	1521	548	609	283

Assessment of the chemical state of sediments and waters in the vicinity of the monitored wreck

No.	Survey type	Unit	Sample number			
			469/09/1938	469/09/1939	469/09/1940	469/09/1941
			Client code			
			PKT-1	PKT-3	PKT-4	PKT-6
II.	Metals					
1	Arsenic	mg As/kg	5.77	5.95	2.61	5.66
2	Chromium	mg Cr/kg	15.14	14.08	12.83	41.24
3	Zinc	mg Zn/kg	333.2	430.4	37.75	85.53
4	Cadmium	mg Cd/kg	0.69	0.62	0.09	b. 0.05
5	Copper	mg Cu/kg.	56.28	26.34	5.51	23.60
6	Nickel	mg Ni/kg	12.03	10.46	8.67	33.53
7	Lead	mg Pb/kg.	419.5	200.6	16.36	22.60
8	Vanadium *)	mg V/kg	15.59	13.72	14.18	45.89
9	Molybdenum *)	mg Mo/kg	b.0.25	0.41	b. 0.25	0.51
10	Mercury *)	mg Hg/kg	1.03	0.19	0.06	0.09
III.	Nonpolar aliphatic hydrocarbons					
1	Mineral oil ($C_{12} - C_{35}$) *)	mg/kg d. m.	**2972.96**	**1659.27**	**1126.16**	**37.64**
IV.	Polycyclic aromatic hydrocarbons (PAHs)					
1	Naphthalene	mg/kg d. m.	9.199	5.136	7.118	0.070
2	Acenaphthylene	mg/kg d. m.	0.838	0.525	0.425	0.004
3	Acenaphthen	mg/kg d. m.	35.846	23.460	22.524	0.106
4	Fluorene	mg/kg d. m.	38.801	20.819	19.545	0.094
5	Phenanthrene	mg/kg d. m.	3.016	36.445	3.393	0.187
6	Anthracene	mg/kg d. m.	13.300	9.422	8.132	0.039
7	Fluoranthene	mg/kg d. m.	27.533	17.823	16.129	0.078
8	Pyrene	mg/kg d. m.	18.205	11.727	10.777	0.048
9	Benzo(a)anthracene	mg/kg d. m.	10.450	6.401	5.263	0.012
10	Chrysene	mg/kg d. m.	9.686	5.299	4.161	0.012
11	Benzo(b)fluoranthene	mg/kg d. m.	5.880	4.151	2.544	0.005
12	Benzo(k)fluoranthene	mg/kg d. m.	3.425	1.828	1.454	0.006
13	Benzo(a)pirene	mg/kg d. m.	6.989	4.013	2.873	0.006
14	Indeno(1,2,3-cd)pirene	mg/kg d. m.	6.606	3.821	0.240	0.001
15	Dibenzo(a,h)anthracene	mg/kg d. m.	0.944	0.455	0.127	b.0.001
16	Benzo(g,h,i)perylene	mg/kg d. m.	3.516	2.092	1.411	0.001

Assessment of the chemical state of sediments and waters in the vicinity of the monitored wreck

- In the area of the s/s STUTTGART wreck sediments **do not comply** with the cleanliness standards for dredged material determined in the Regulation of the Minister of Environment dated 9th September 2002 (Journal of Laws No. 165, item 1359 **– samples indicate great contamination of the seabed with heavy fuel – some indicators were exceeded by a 1000 or more times.**

- In the area of the s/s STUTTGART wreck samples of water comply with the cleanliness standards

State of macrozoobenthos in the area of the wreck as an indicator of marine seabed contamination

Macrozoobenthos samples collected in the area of the Stuttgart wreck in November 2009.

State of macrozoobenthos in the area of the wreck as an indicator of marine seabed contamination

- The environment's state in the region of the Stuttgart wreck identified in November 2009 is equal to the status of a local ecological catastrophy.

- The layer of heavy oil occurring at the point of contact of bottom sediment and the depths of the water created an azoic zone – devoid of macroscopic life.

- However the limited number of stations where the samples were collected prevents the determination of the range of this zone.

CONCLUSIONS

- **On the basis of analysis of sediments collected in the settlement area of the STUTTGART - wreck can be qualified as a wreck being a huge threat for the marine environment (category A) – it is the only (known) such dangerous wreck in the area of the Gdańsk Bay**

- **A direct negative impact of the wreck on communities of benthic fauna was identified – present state of the environment in the area of the Stuttgart wreck corresponds to the status of a local ecological catastrophy.**

CONCLUSIONS

- **Surveys – repeated after 10 years – indicate a significant deterioration of the environment's state.**
- **Surveys performed in 2012 (after 13 years) indicate that the contaminated area may be even 2-3 times larger than it was previously considered to be contaminated with heavy fuels**
- **After initiating new technology - In 2014 – polluted area was determinated as 10 times bigger than initialy**
- **At 2015 we get proof – it is not end - polluted area is not less than 15 times bigger than initialy**

CONCLUSIONS

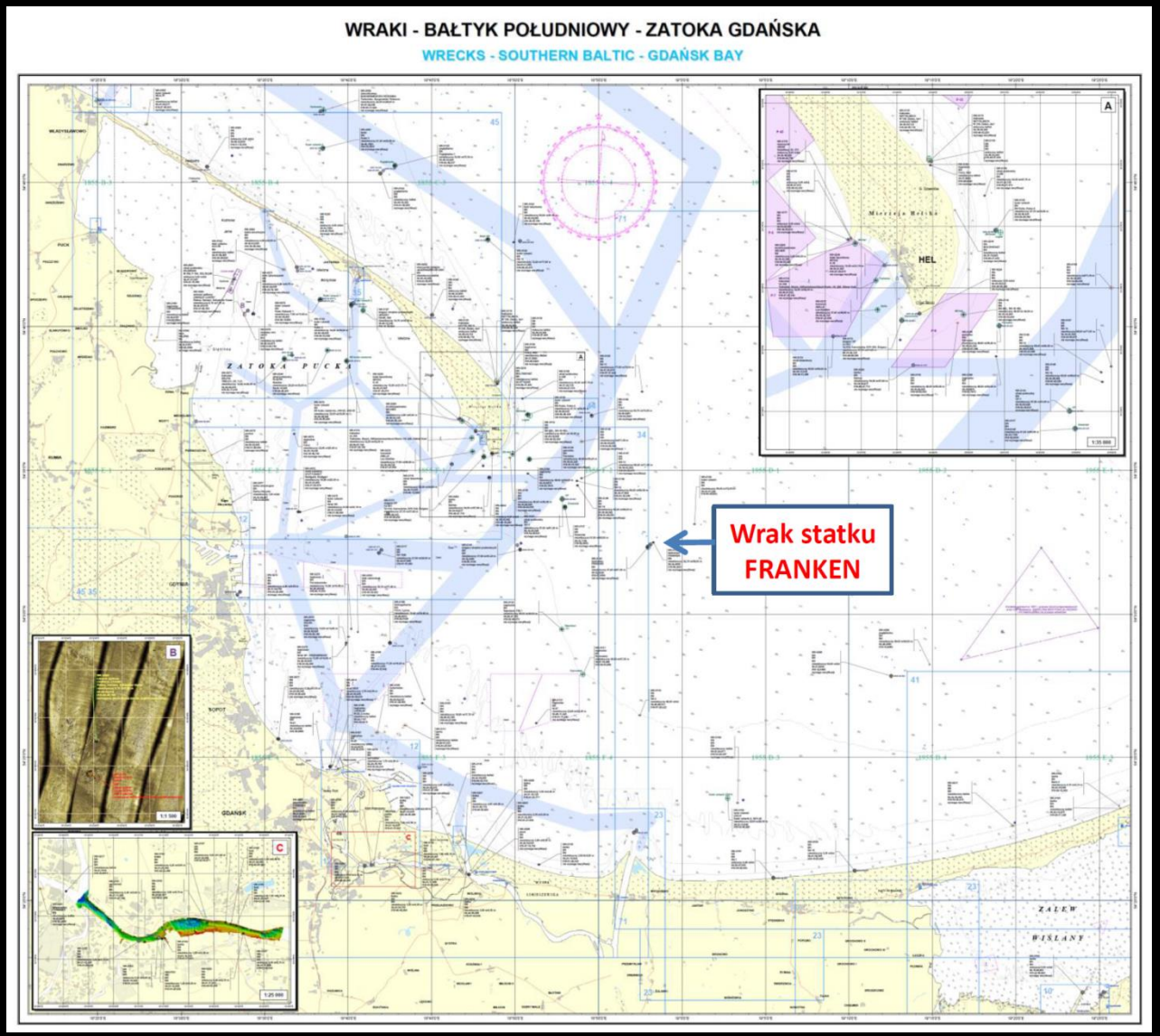
- **In places of sample collection for surveys there was an uncovering of contaminated substratum and a complete atrophy of living forms.**
- **It is necessary to start immediate work aimed at developing a method of cleaning and recultivating the seabed in the area s/s Stuttgart wreck.**

Dangerous shipwrecks of the Gdańsk Bay

T/S FRANKEN

Benedykt Hac

T/S FRANKEN

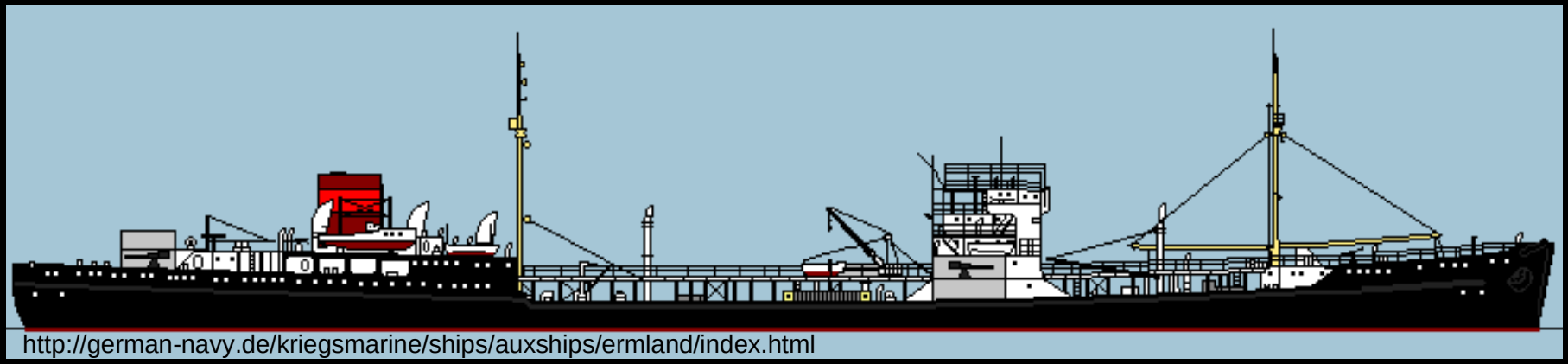


T/S Franken is the biggest

(179 m/126 m) known wreck of the Gdańsk Bay

Source: BHMW

T/S FRANKEN



http://german-navy.de/kriegsmarine/ships/auxships/ermland/index.html

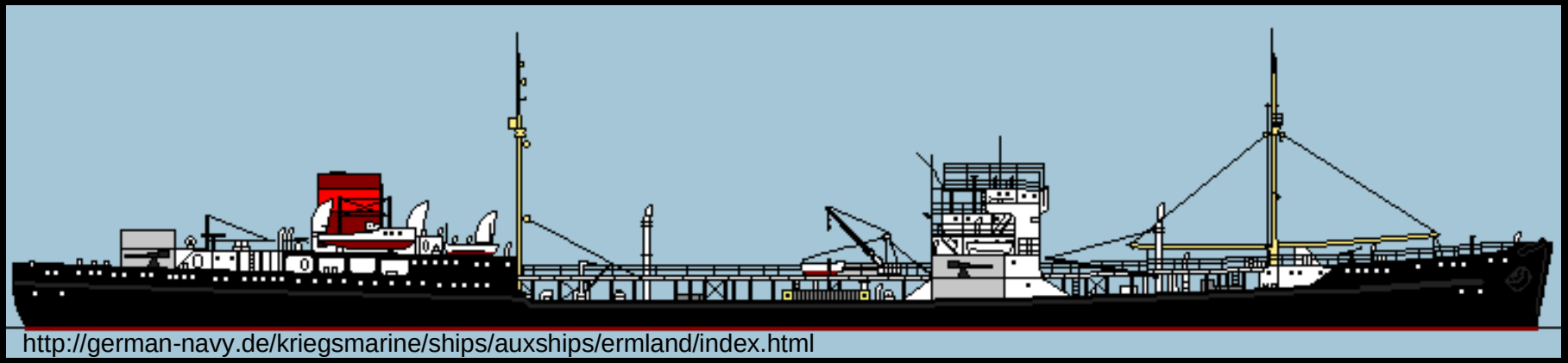
Support vessel (Troßschiffe - tanker/supply ship)

of Kriegsmarine, „Dithmarschen” type

Main dimensions of the vessel :

- Total length Lc 179.00 m
- Breadth in the midship section 22 m
- Draft 10.2 m
- Displacement 22850 t
- Crew 94 - 208 people, depending on the mission

T/S FRANKEN



http://german-navy.de/kriegsmarine/ships/auxships/ermland/index.html

The ship was able to supply:

- **9 500 tons of fuels (heavy fuel, light fuel, aviation gasoline),**
- **306 tons of lubricating oils of various types,**
- **973 tons of ammunition (of calibers from 20mm to 280 mm)**
- 822 m3 (790 tons) of spare parts, technical supplies for ships,
- 119 m3 of packed food supplies
- 1472 m3 of food supplies in coolers (295 m3 in 8 degrees Celsius, 161 m3 of frozen foods, 991 m3 of cooled food supplies)

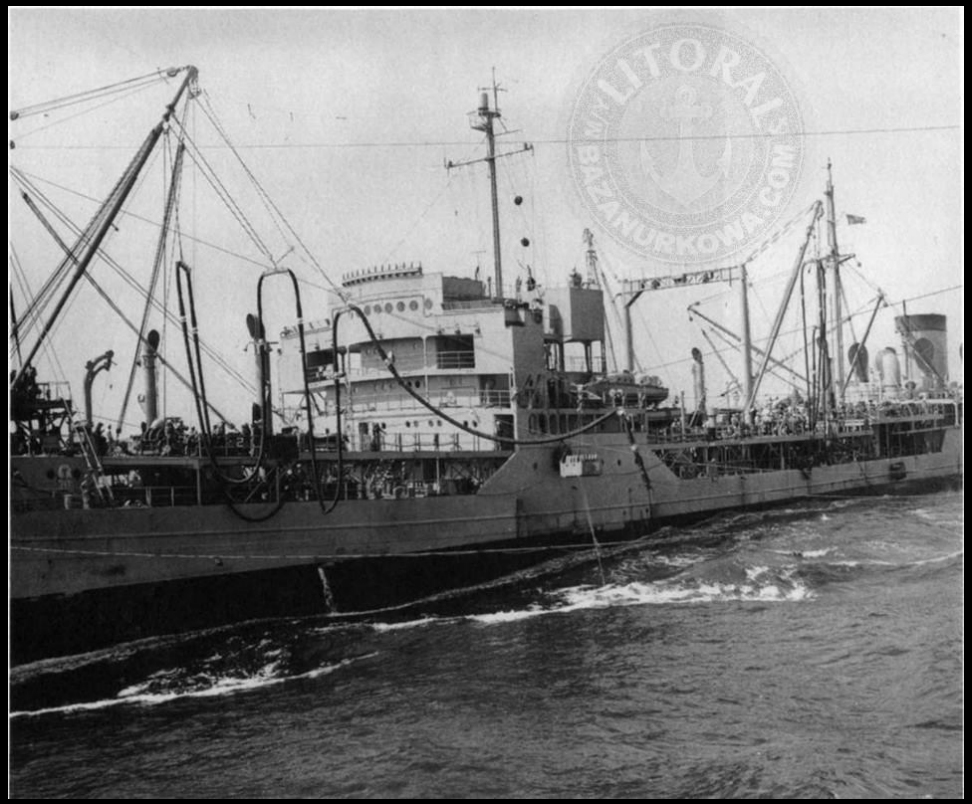
T/S FRANKEN

T/S FRANKEN

On the rigth:

Altmark (Franken's twin ship)

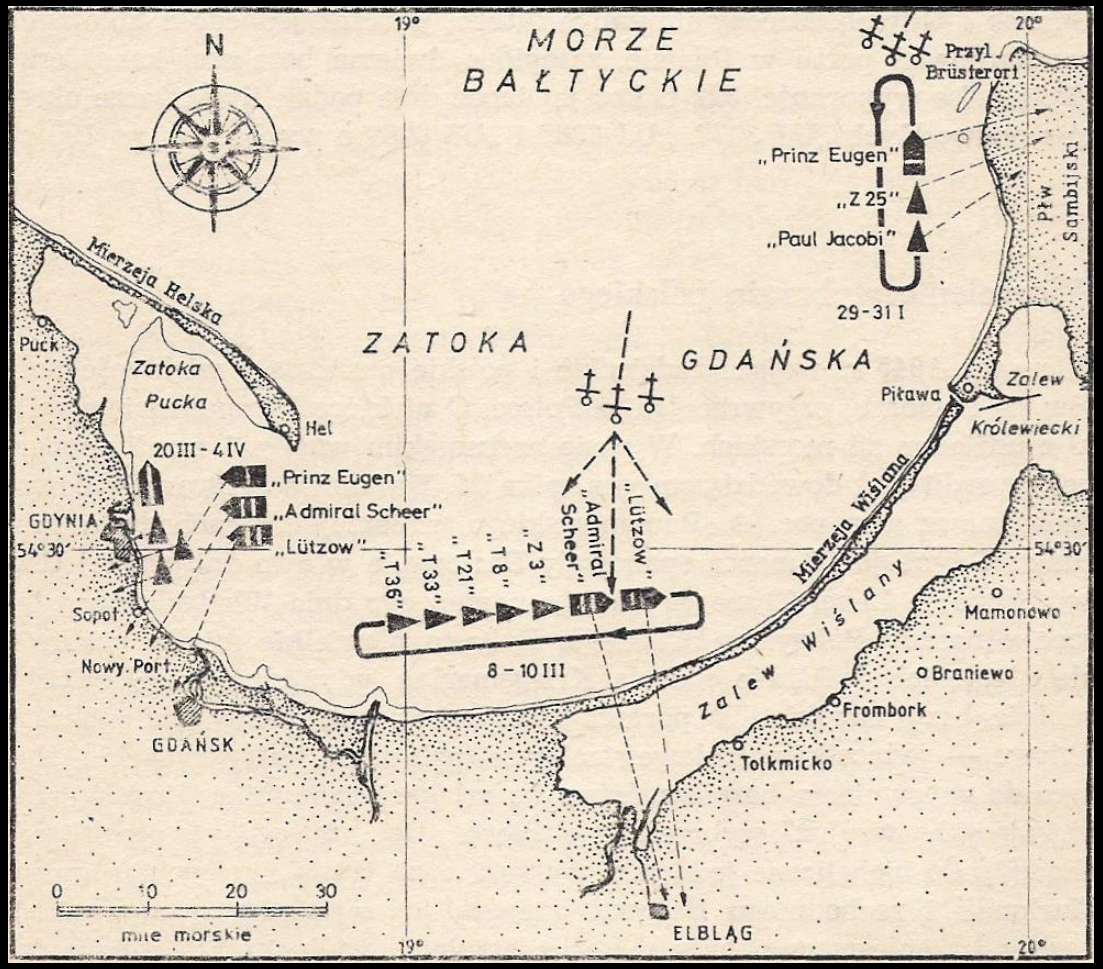
During handing over of fuel to a Kriegsmarine vessel



T/S FRANKEN

T/S FRANKEN accompanied by the heavy cruiser Prinz Eugen

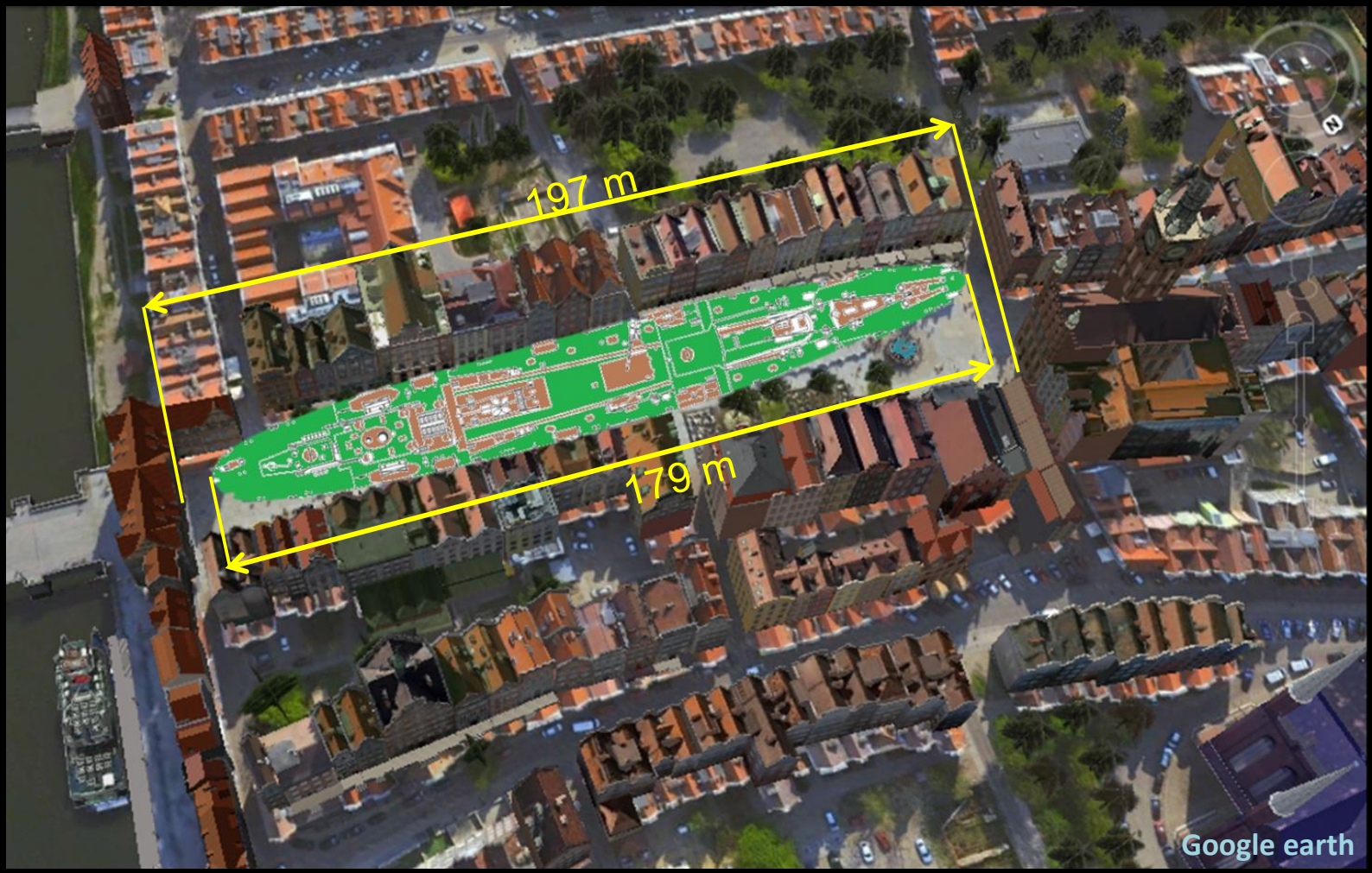
T/S FRANKEN



Due to intense battles and partial occupation of harbors in Gdynia and Gdansk the supplying of battleship Lutzow and Admiral Scheer and the cruiser Prinz Eugen was prevented
Therefore, the role of the supply ship Franken has grown to such an extent that after its sinking on 04/08/1945 all battleships and the cruiser were sent away from the Bay of Gdansk to the Western Baltic.

T/S FRANKEN accompanied by the heavy cruiser Prinz Eugen

T/S FRANKEN



T / S FRANKEN - projection of decks entered in scale into the Długi Targ square in Gdansk

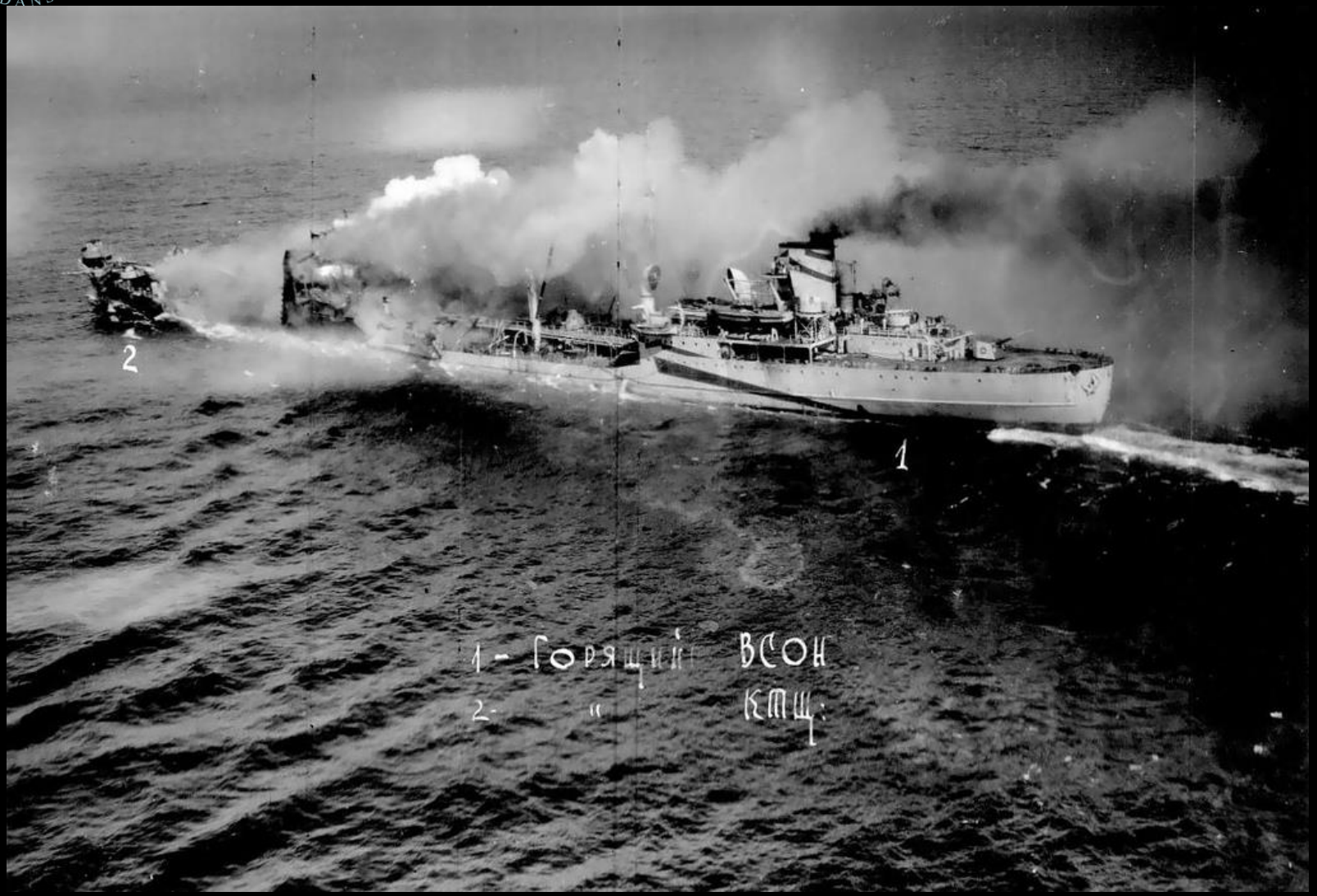
T/S FRANKEN

T/S FRANKEN – ship silhouette entered in scale into the Długi Targ square in Gdansk

T/S FRANKEN

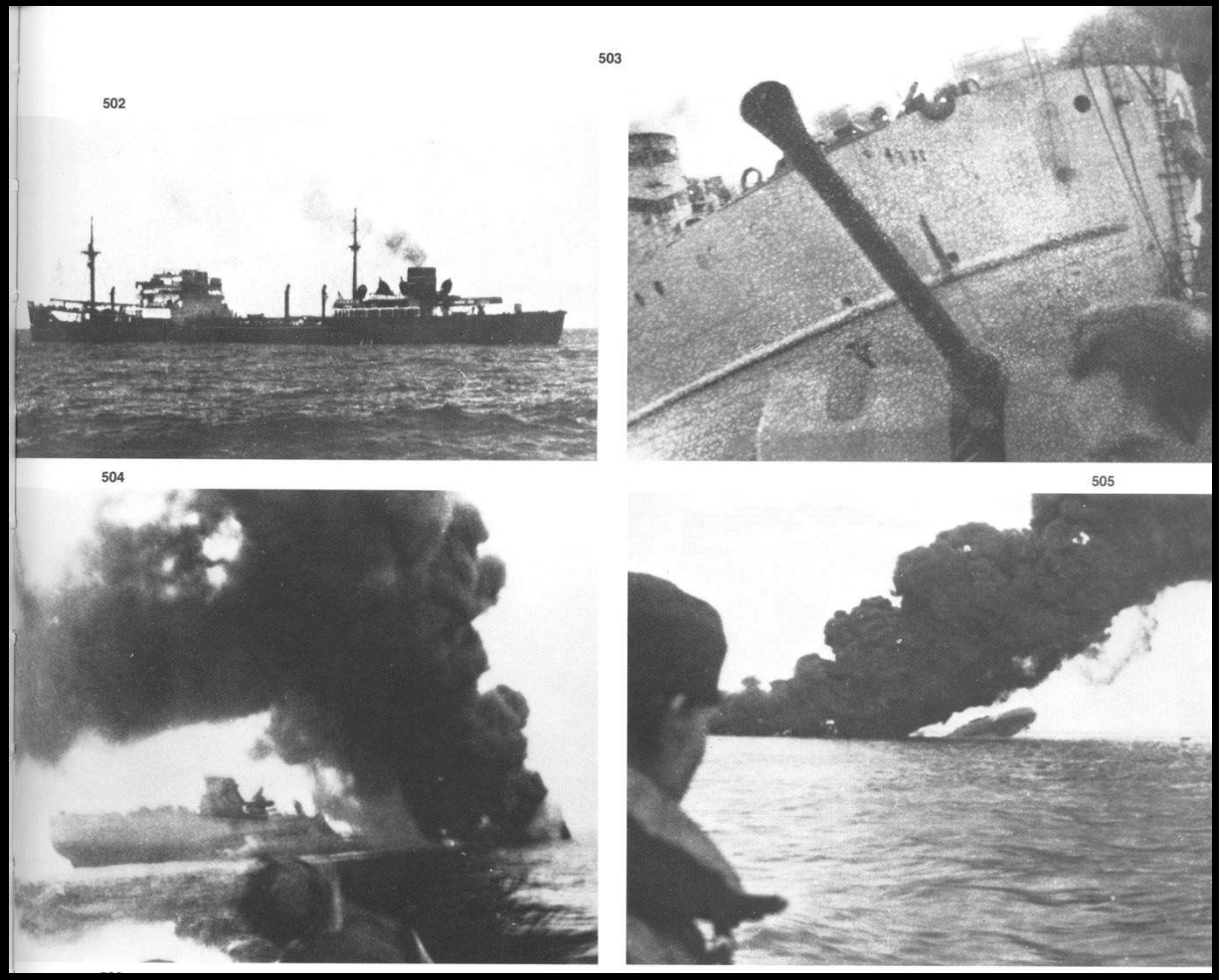
T/S FRANKEN during a bomb attack of IŁ aircrafts – 04/08/45 time: 1130

T/S FRANKEN



T/S FRANKEN during a bomb attack of IŁ aircrafts – 04/08/45 time: 1130

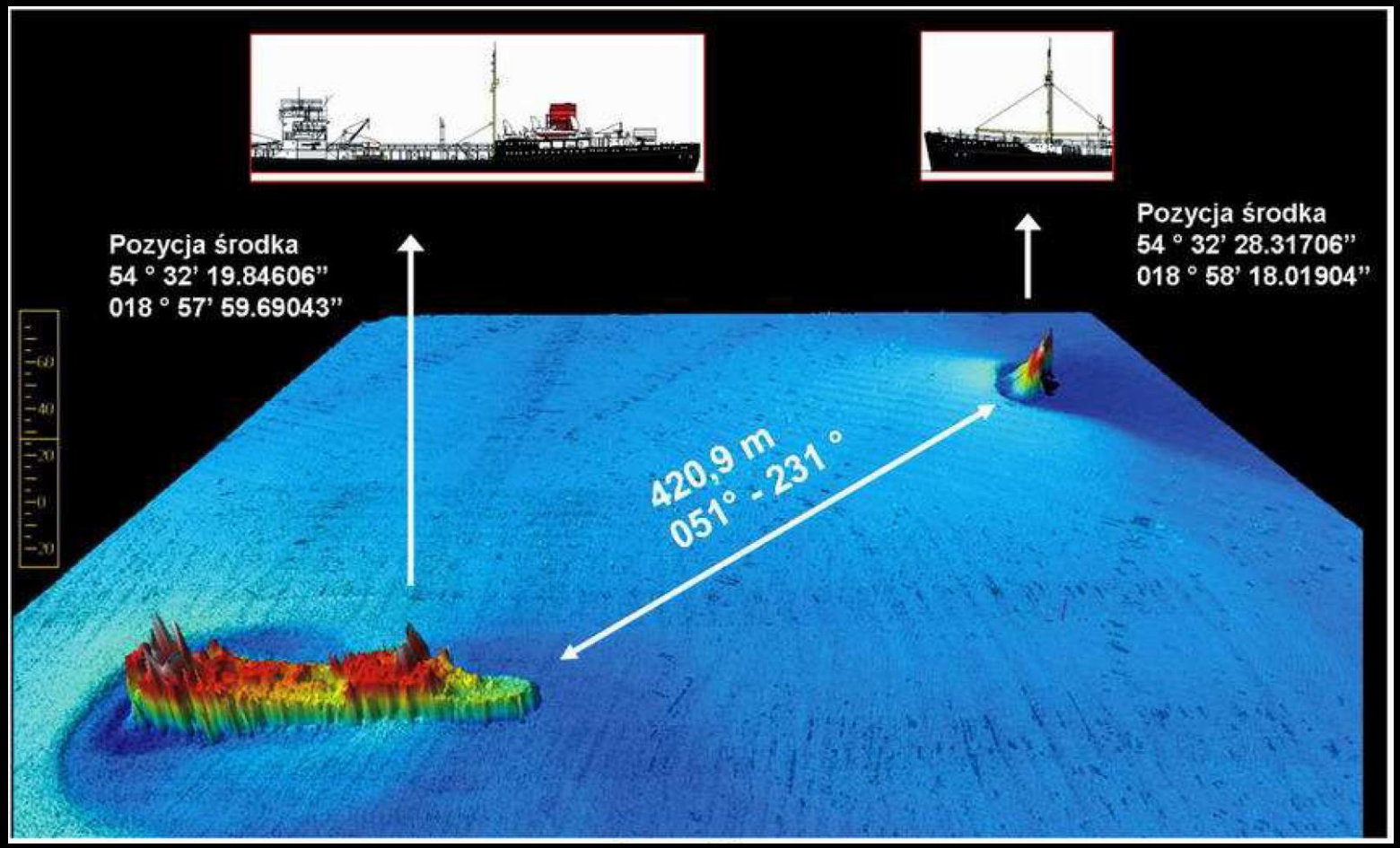
T/S FRANKEN



T/S FRANKEN during a bomb attack of Ił aircrafts – 04/08/45 time: 1200

"Die Tragödie der Flüchtlingsschiffe: Gesunken in der Ostsee 1944/45" (author Heinz Schön) -"Lufttorpedos versenken TMS Franken".

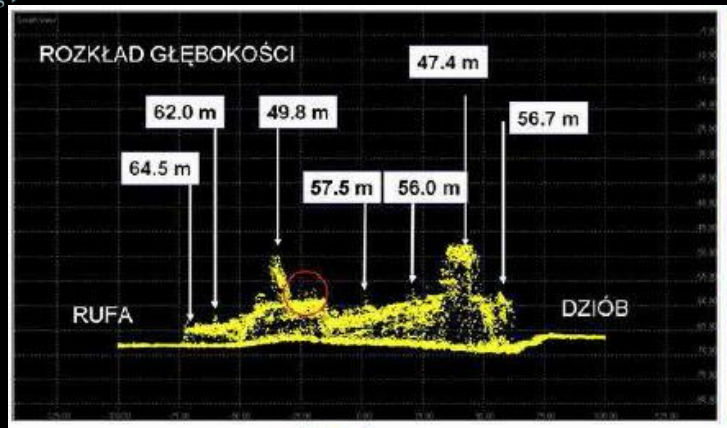
T/S FRANKEN



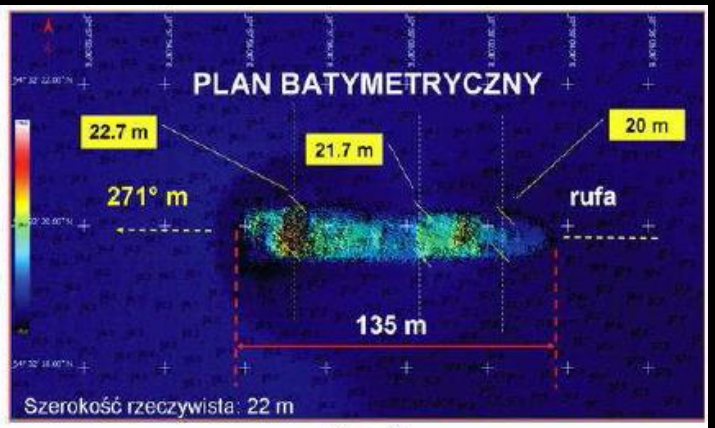
T/S FRANKEN - current state – hydrographic surveys

„Badania hydrograficzne wraku Franken" - Artur Grządziel, *www.dzh.mw.mil.pl/zasoby/archiwum/upload/badania.pdf*

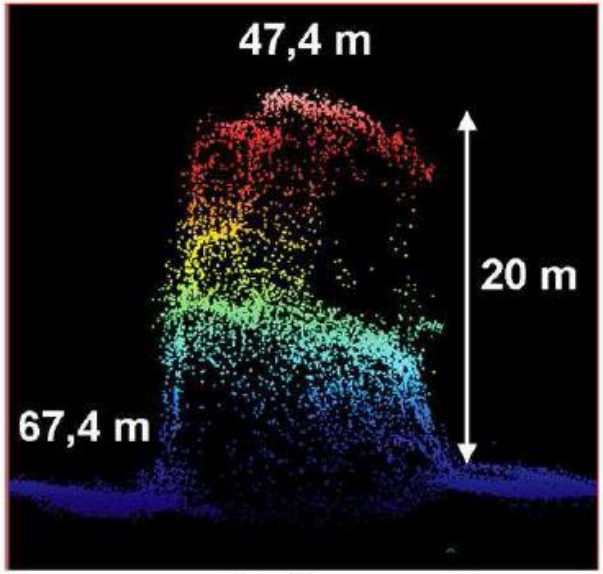
T/S FRANKEN

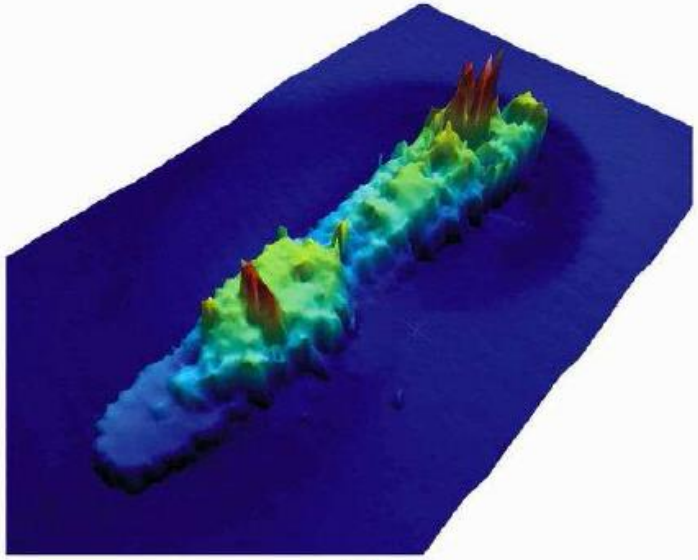


Rys. 8.



Rys. 9.





T/S FRANKEN - current state – hydrographic surveys

„Badania hydrograficzne wraku Franken" - Artur Grządziel, *www.dzh.mw.mil.pl/zasoby/archiwum/upload/badania.pdf*

T/S FRANKEN

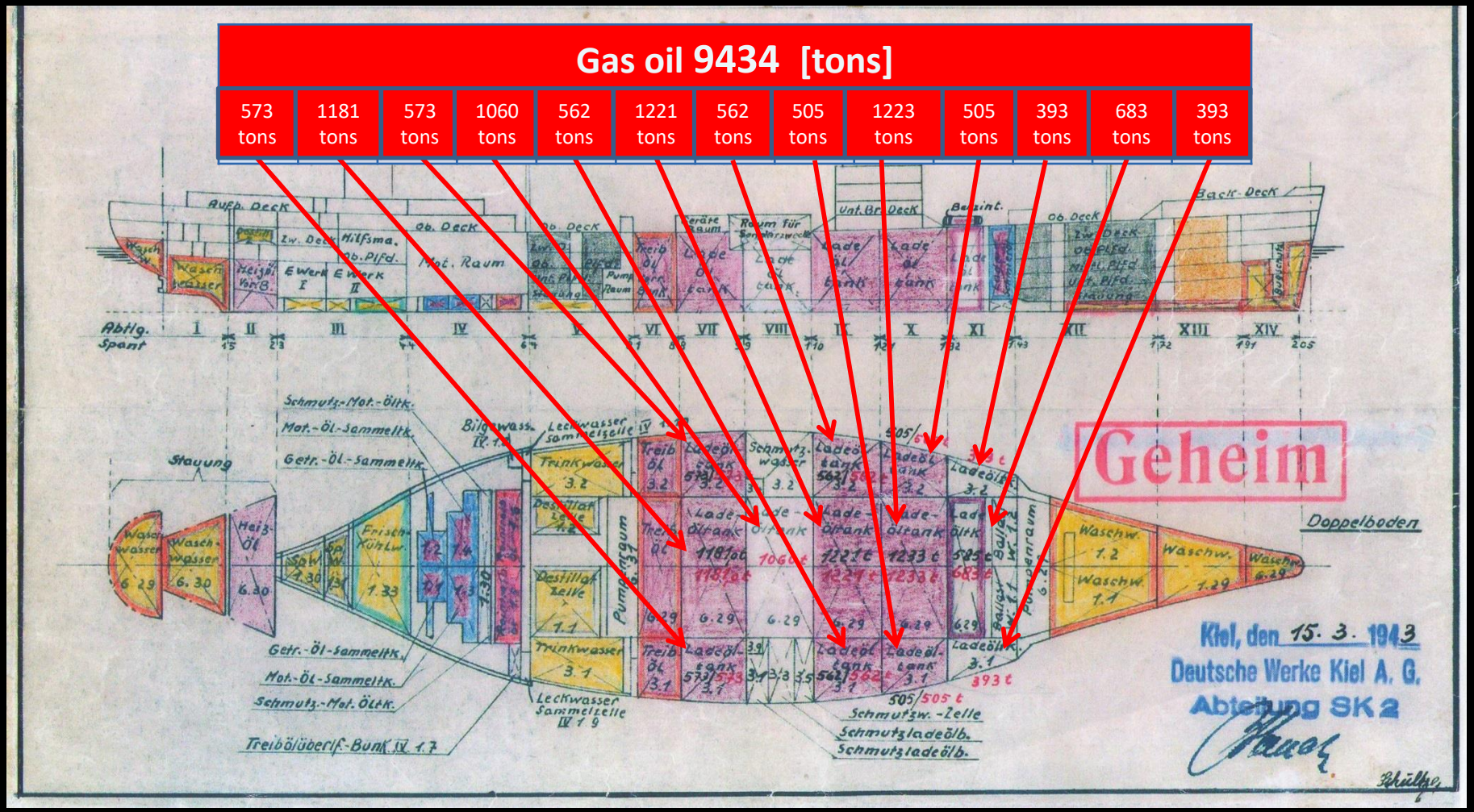
T/S FRANKEN - current state – artist’s vision

http://divingbaltic.pl/pl/wraki-baltyku/franken.html

https://wrakibaltyku.pl/pl/wraki/19,franken-19.html

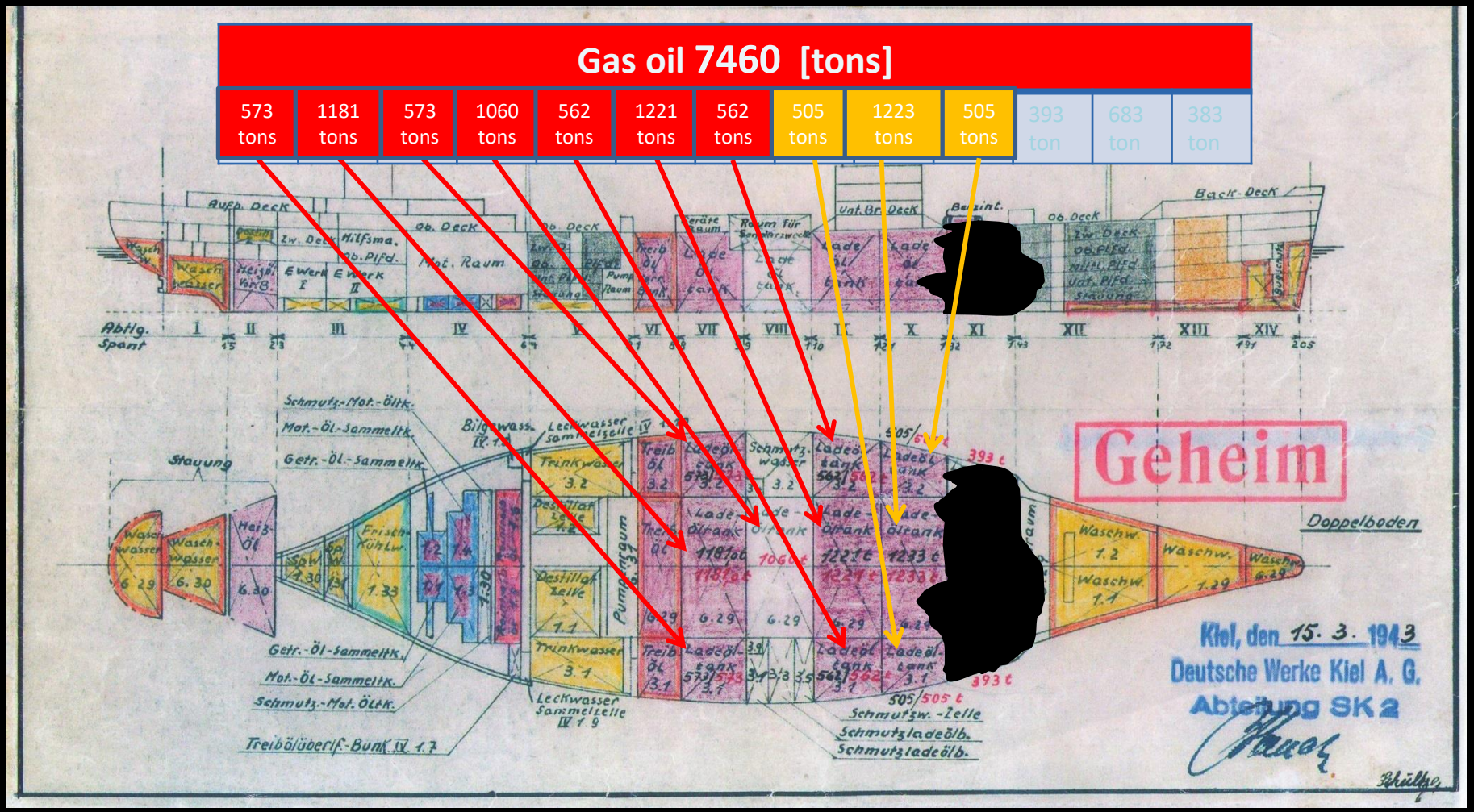
Why could the T/S Franken wreck be so dangerous?

T/S FRANKEN



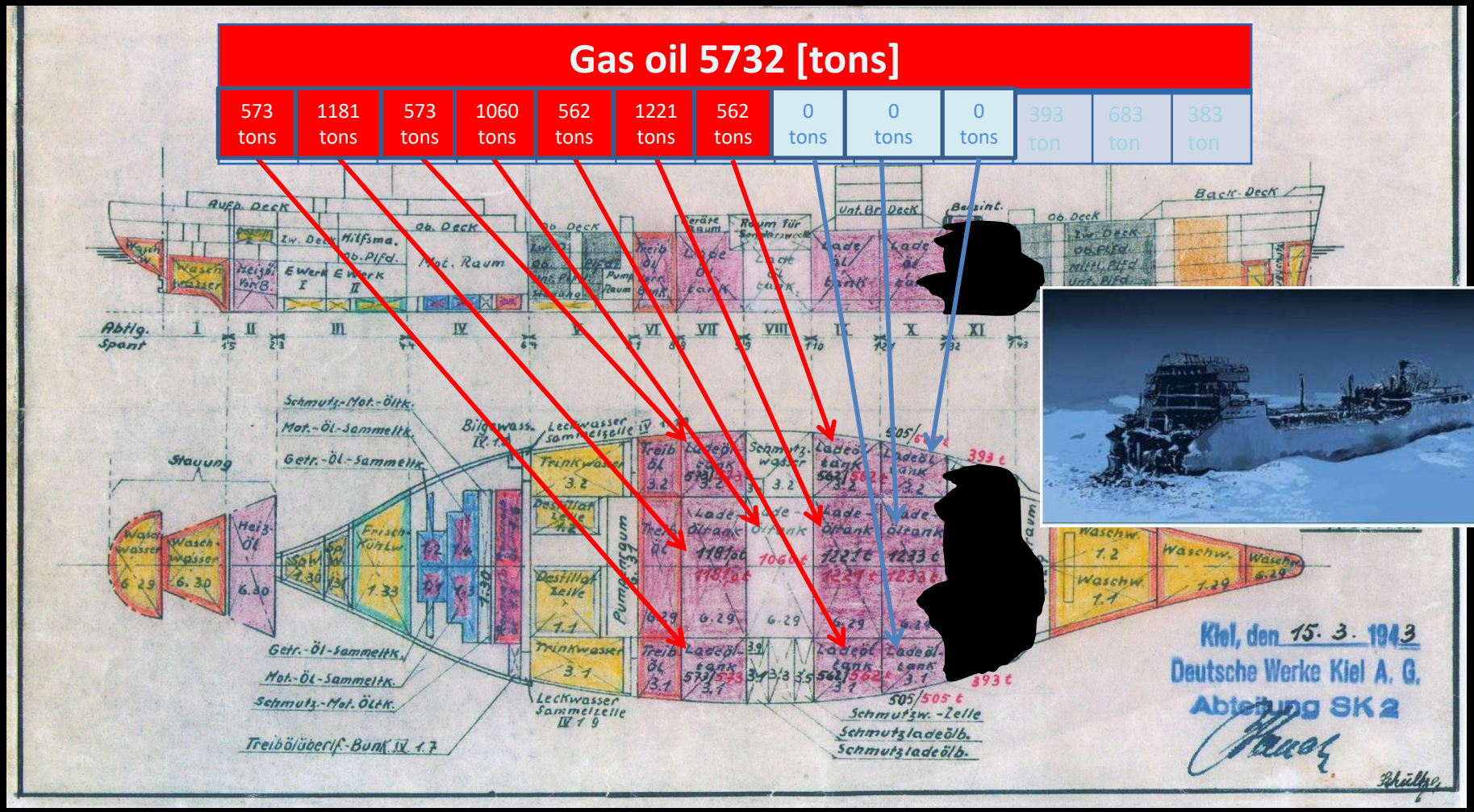
T/S FRANKEN - could have had 9500 tons of fuel in its tanks

T/S FRANKEN



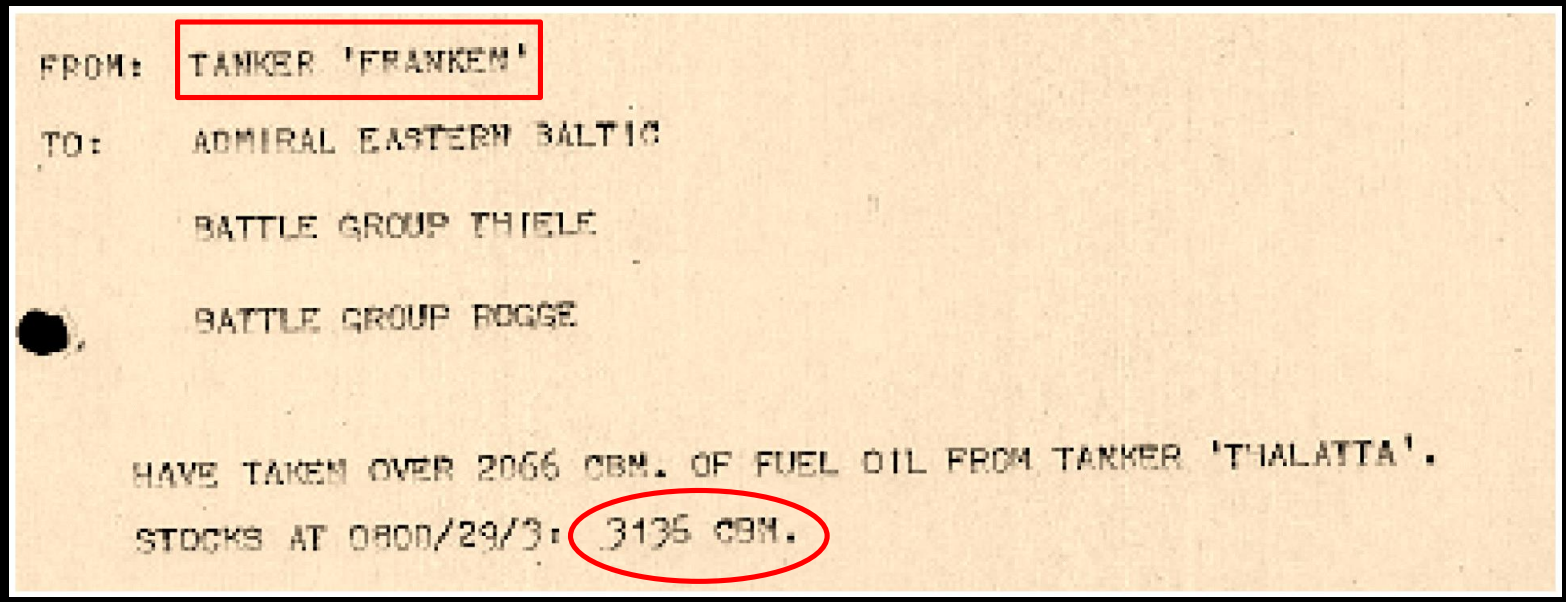
T/S FRANKEN - after losing the bow it was still able to hold a few thousand tons of fuel in its tanks

T/S FRANKEN



T/S FRANKEN - could still have about 6 thousand tons of fuel in its tanks

Current state of knowledge



FROM: TANKER 'FRANKEN'

TO: ADMIRAL EASTERN BALTIC

BATTLE GROUP THIELE

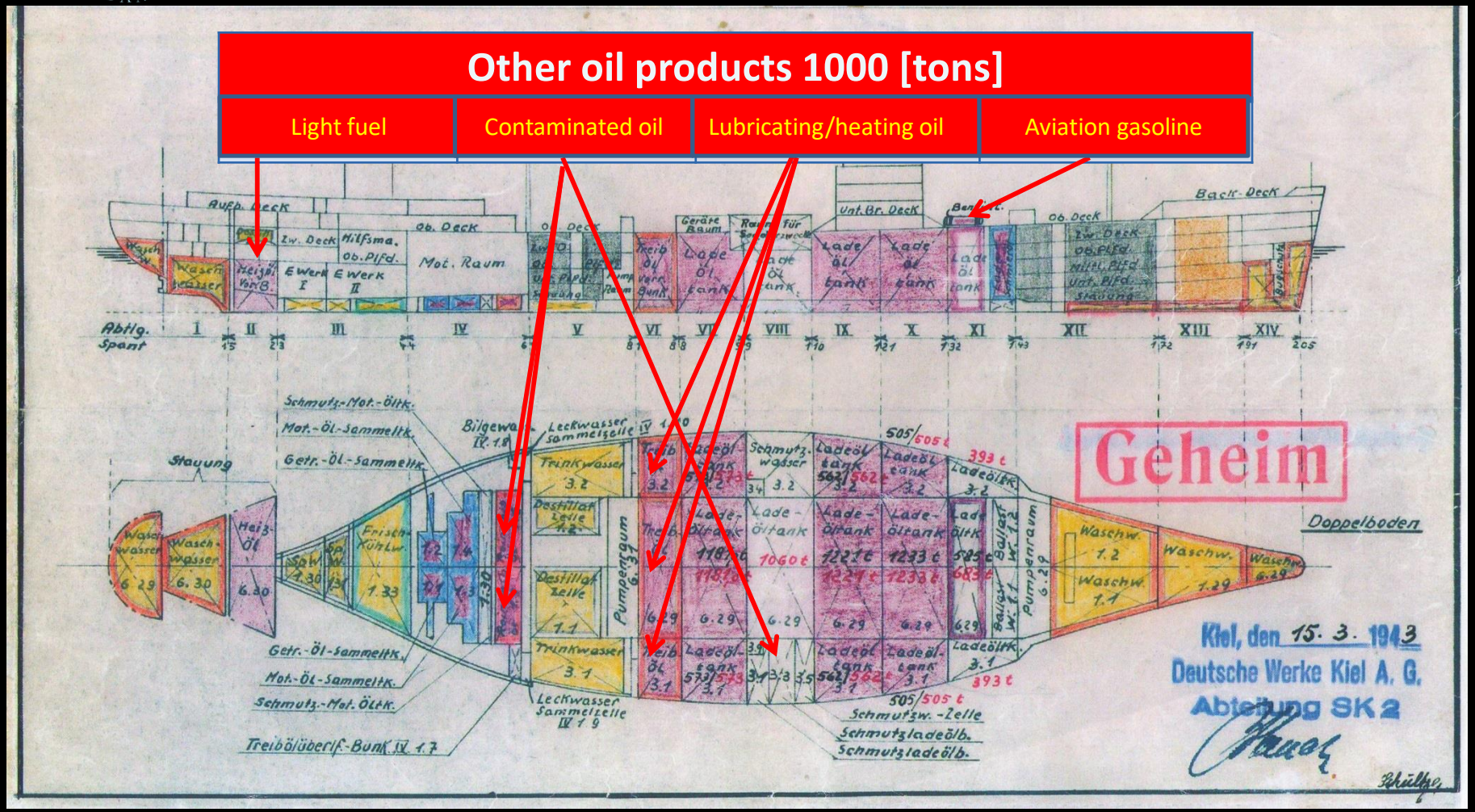
BATTLE GROUP ROGGE

HAVE TAKEN OVER 2066 CBM. OF FUEL OIL FROM TANKER 'THALATTA'.

STOCKS AT 0800/29/3: 3135 CBM.

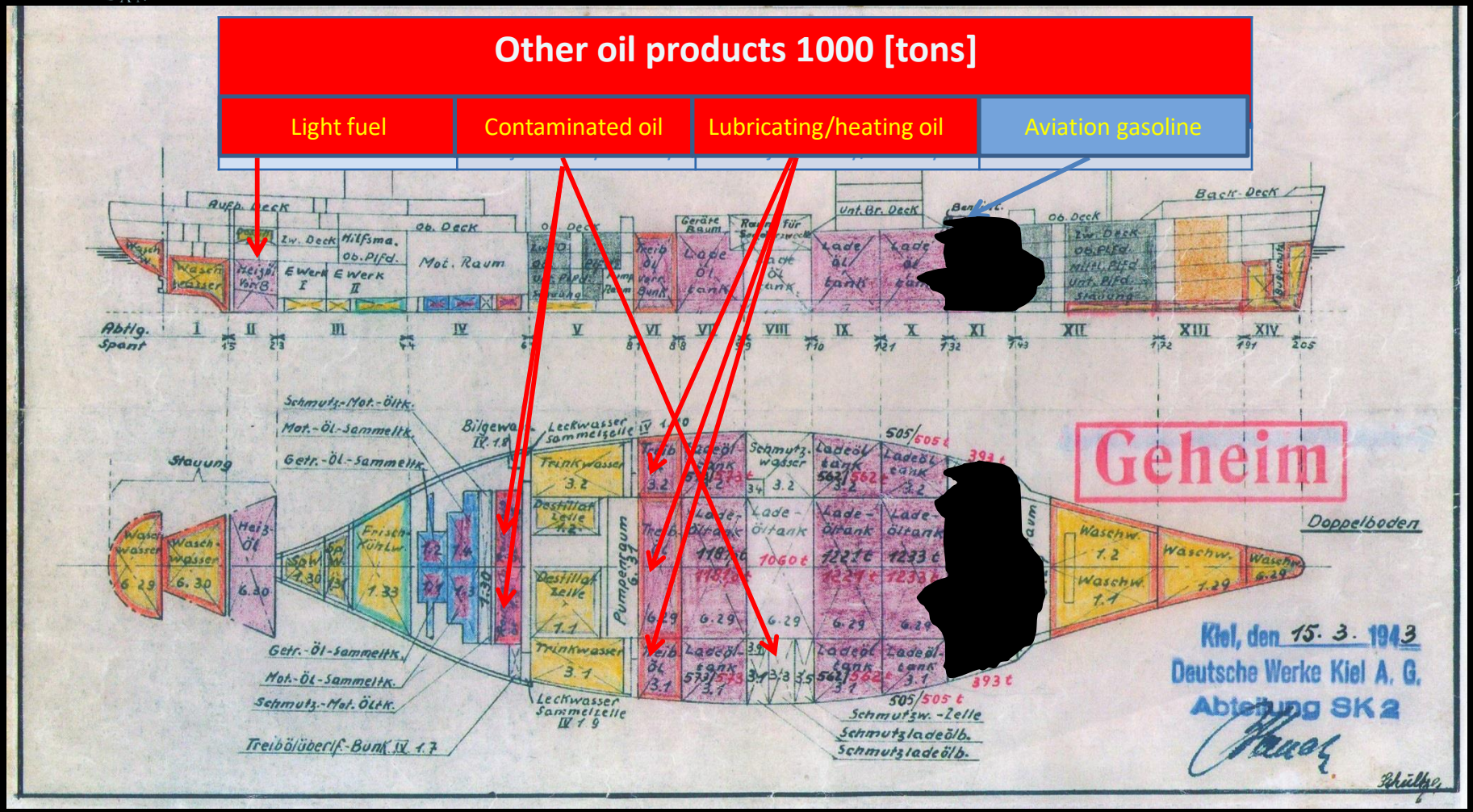
A telegram intercepted by an English radio inteligence department

T/S FRANKEN



T/S FRANKEN - could have had about a thousand tons of other oil products in its tanks

T/S FRANKEN



T/S FRANKEN - could have had about a thousand tons of other oil products in its tanks

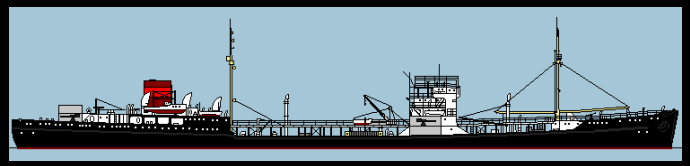
Specification of dangerous substances, which could be present aboard the wreck

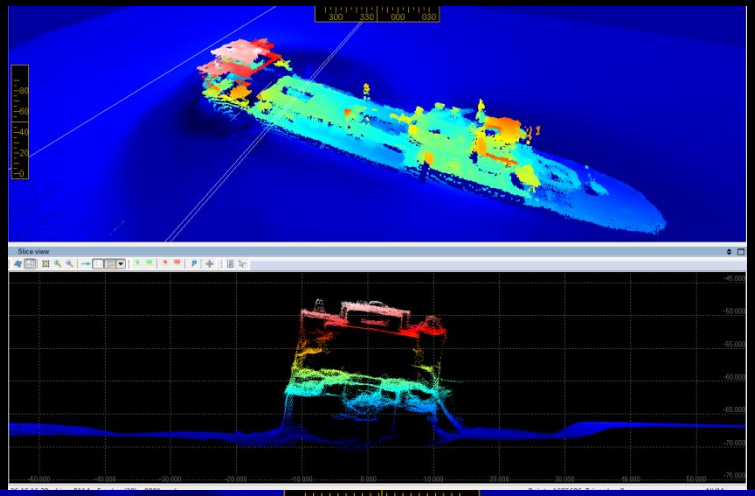
Gas oil 5732 [tons]												
573 tons	1181 tons	573 tons	1060 tons	562 tons	1221 tons	562 tons	0 tons	0 tons	0 tons	393 ton	683 ton	383 ton

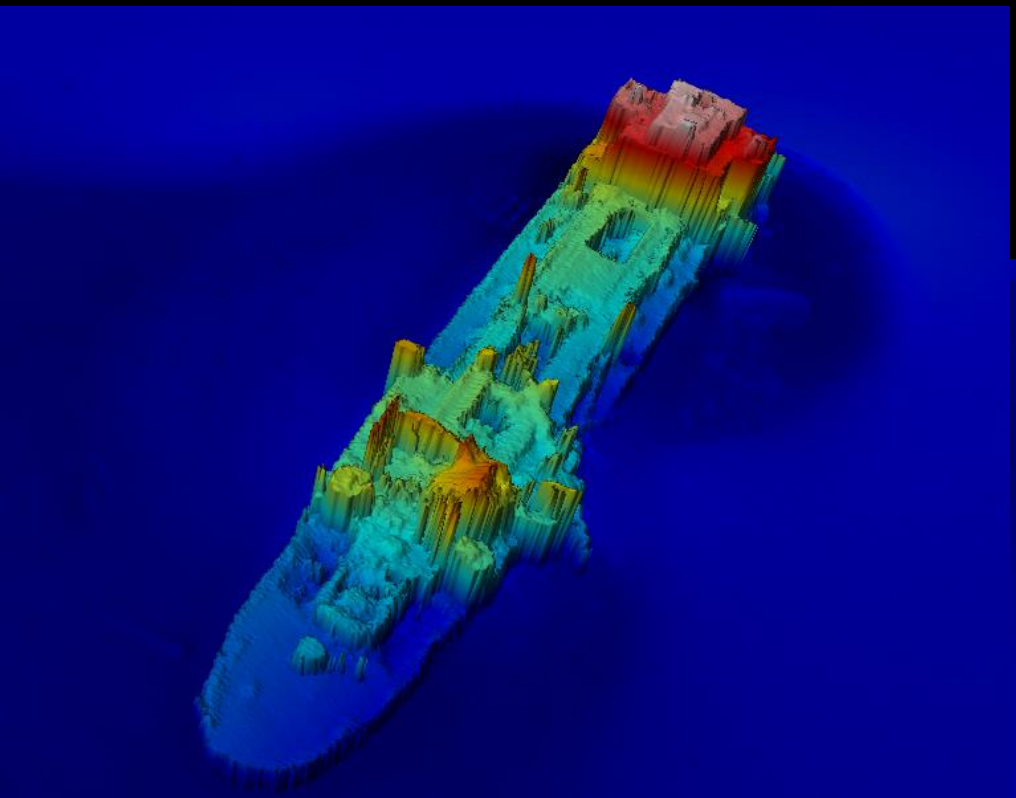
Other oil products 1000 [tons]			
Light fuel	Contaminated oil	Lubricating/heating oil	Aviation gasoline

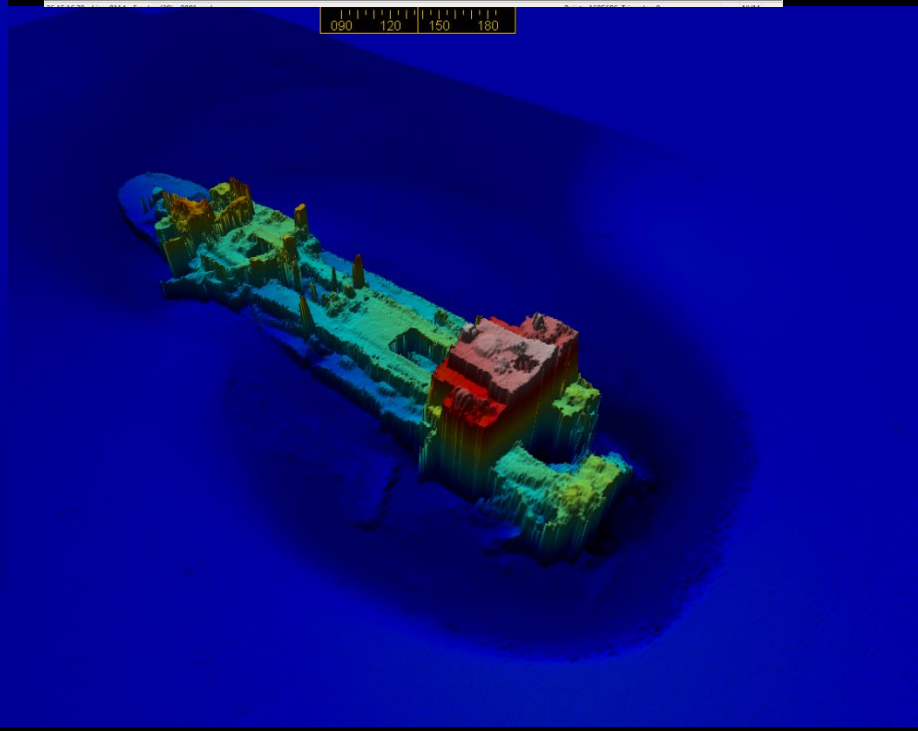
Other products ? [tons]			
Food supplies	Frozen food supplies	Ammunition / propelling charges	Chemical substances

Current state of knowledge



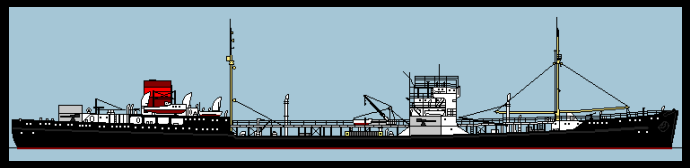


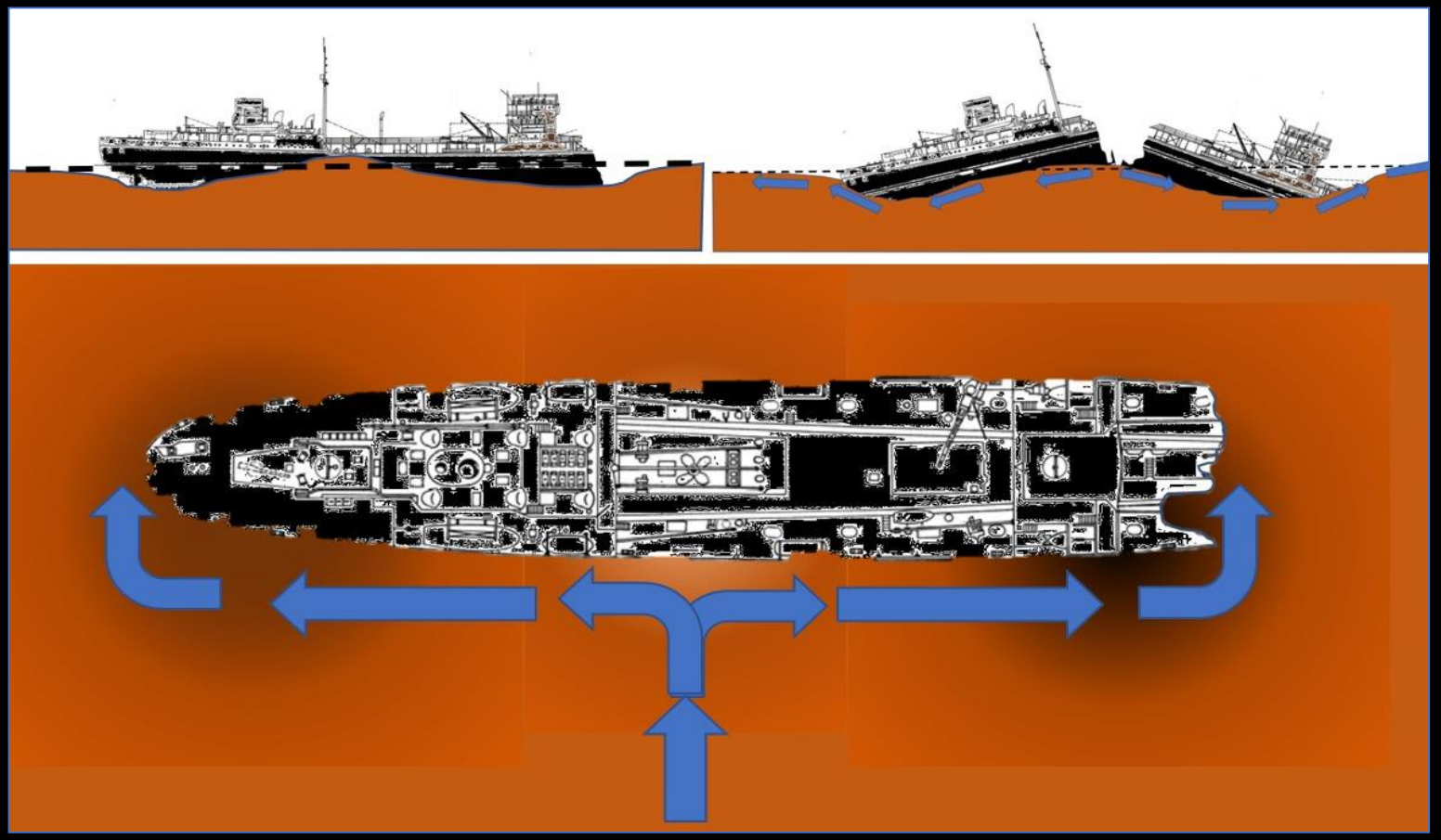




J. Koszałka
(Maritime Institute in Gdansk)

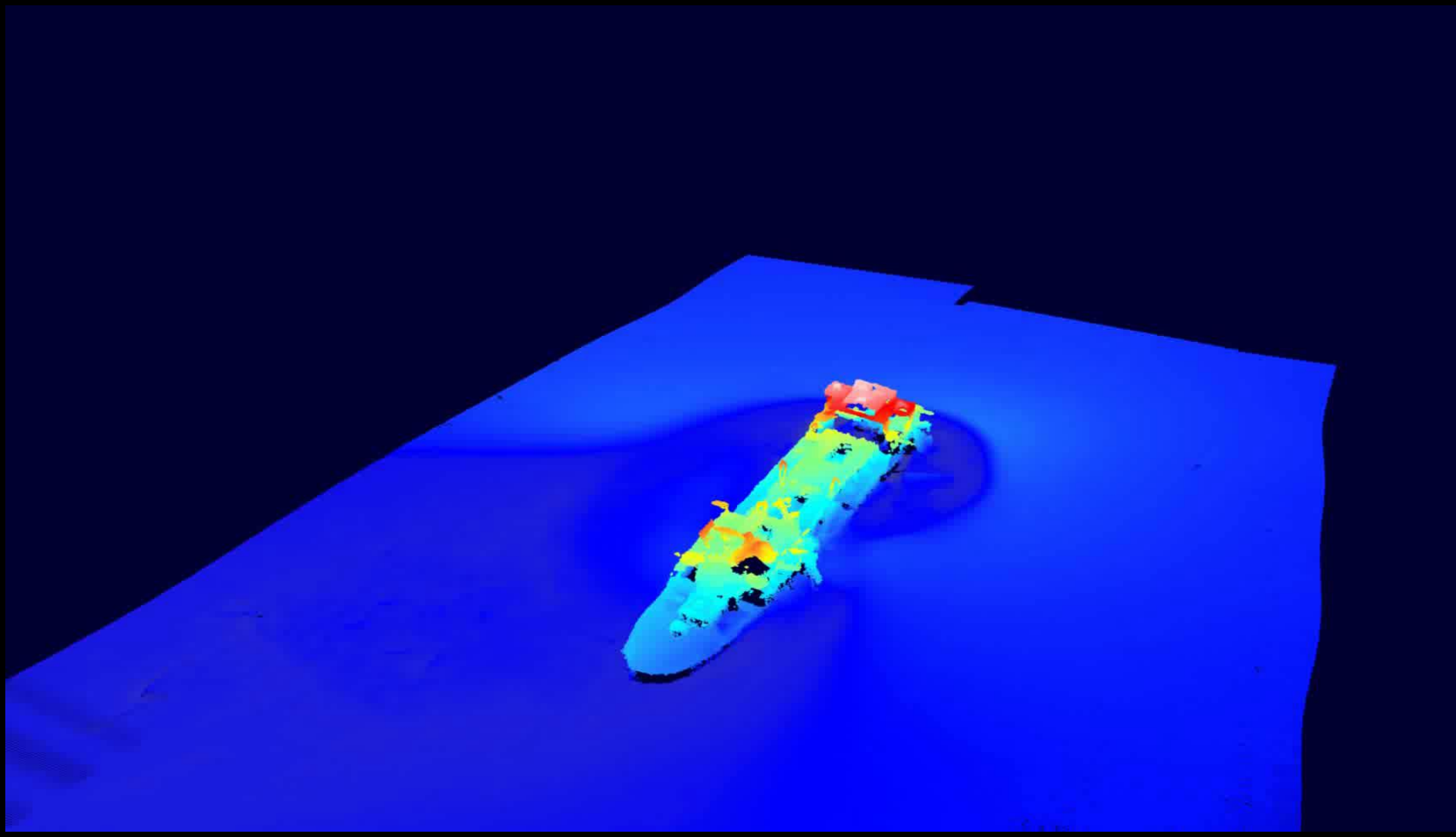
Current state of knowledge





B.Hac
(Maritime Institute in Gdansk)

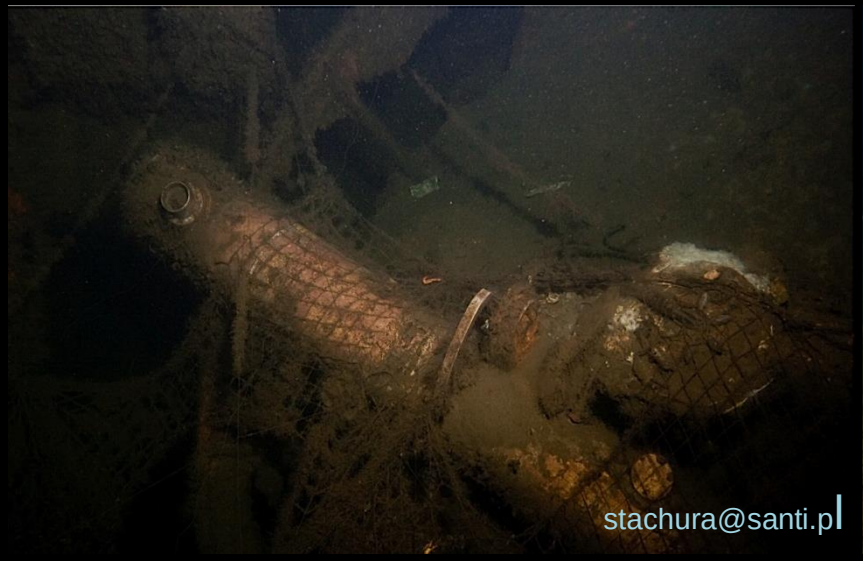
Current state of knowledge

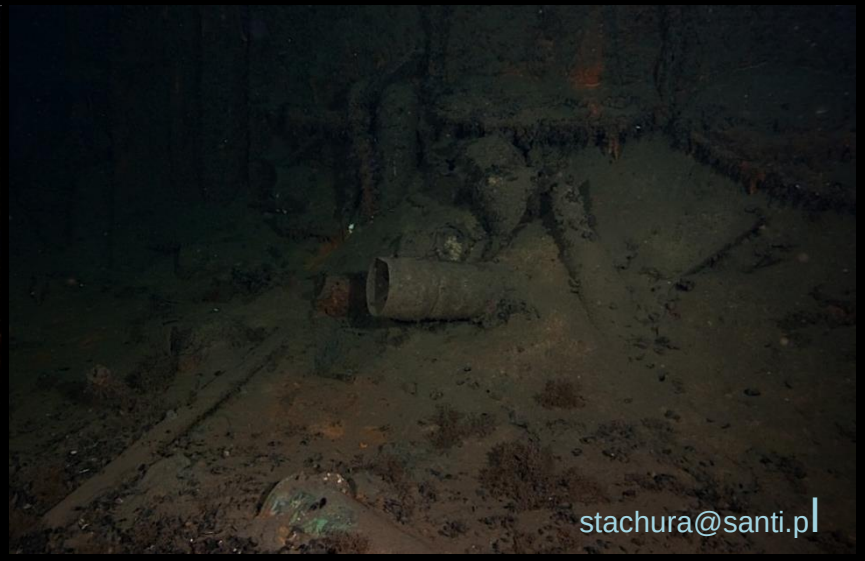


Current state of knowledge

Taken from a presentation by Daniel Pastwa - Known and unknown wrecks around Hel

Current state of knowledge





Taken from a presentation by Daniel Pastwa - Known and unknown wrecks around Hel

Current state of knowledge

1. The load condition of the wreck is unknown - photos and known circumstances (e.g. the Kriegsmarine HQ reports from April 1945) indicate that at the time of the sinking, there were a lot of supplies aboard the ship - which we estimate for 8 - 10 thousand tons.

2. It is impossible to define the current state of „supplies" and the load without thorough surveys of the wreck – even if only 10% of the load and supplies remained – we can still expect about 1 thousand tons of substances, which can contaminate the water and seabed in the area. The lack of information about previous contaminations suggests, that in reality the amount of fuel can be much greater than the assumed 1 thousand tons.

3. Annually– due to corrosion of steel – from 0.06 to 0.14 mm of steel wanes from the hull (side, frame etc) of the wreck. Assuming that in the case of FRANKEN it is 0.1 mm, after 70 years of being settled on the bottom about 7 mm of steel has waned, which means that the wreck is on the verge of collapsing under its own weight (the photographs show serious gaps in the strucutre of the ship).

Current state of knowledge

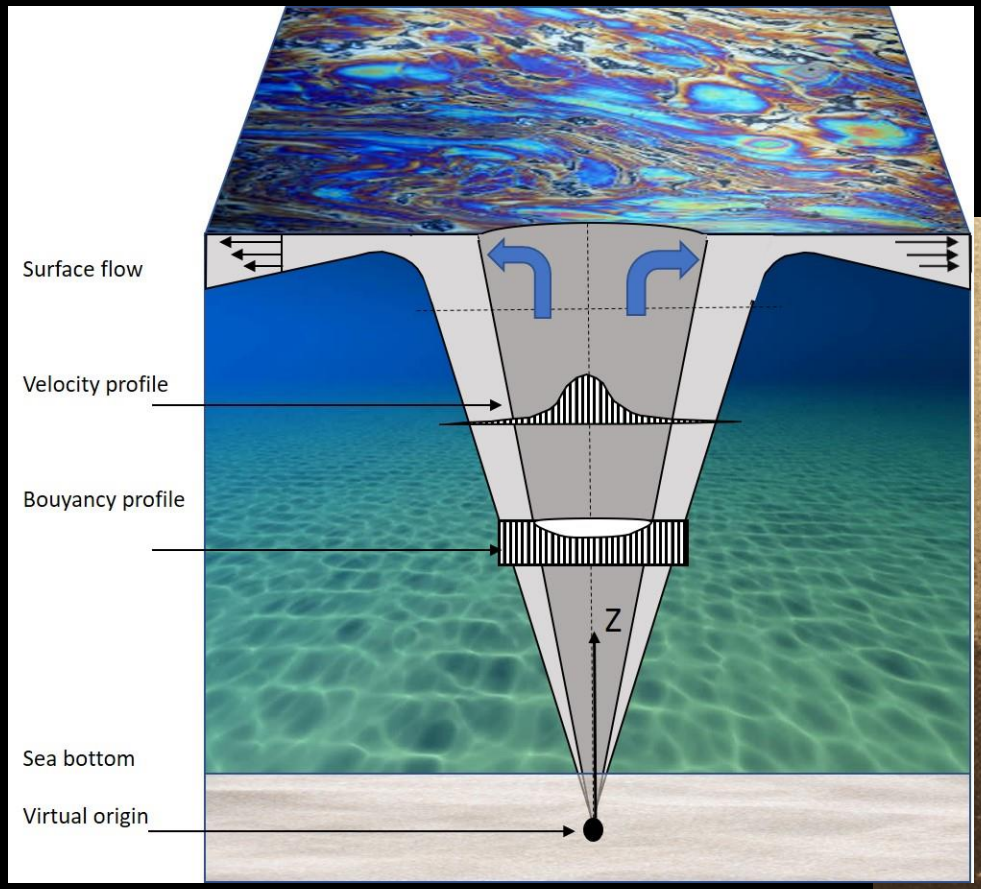
4. A SUDDEN COLLAPSING OF THE SHIP UNDER ITS OWN WEIGHT WILL CAUSE UNCONTROLLABLE RELEASE OF FUELS, OILS AND OTHER SUBSTANCES CONTAMINATING THE ENVIRNMENT

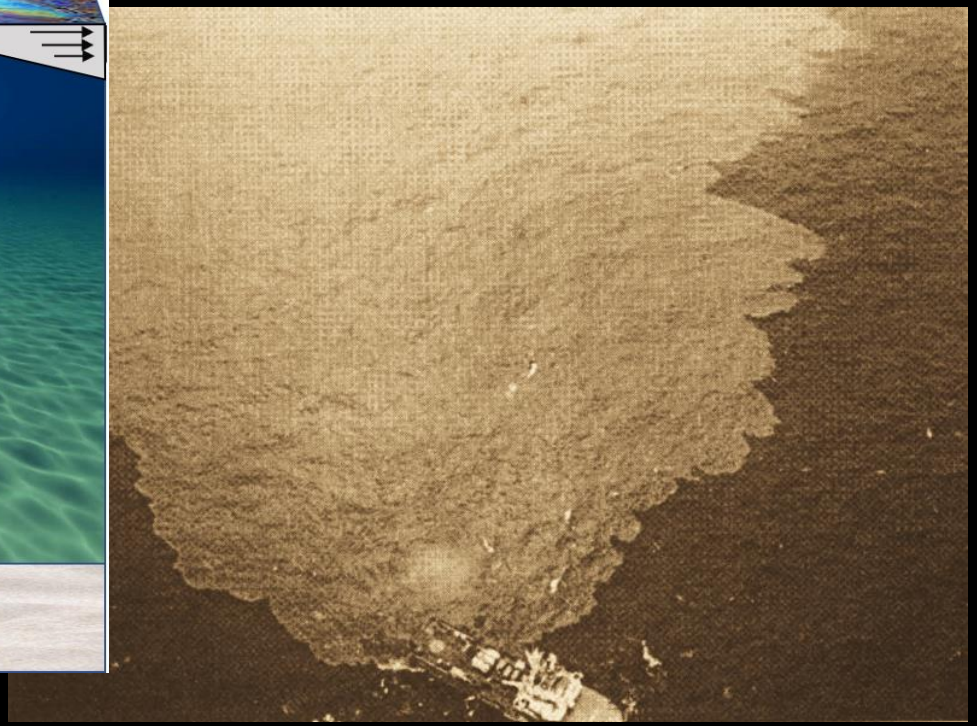
5. We do not know the possible scenarios of such a spillage – but we do know, that the wreck is located in an area, which is highly sensitive to contamination and the current system in the area will cause the spillage to be directed to the area of the nearby beaches located in the distance of 10 to 25 km from the place of wreck's settling.

6. In result of the location of the wreck (the middle of the Gdańsk Bay) a very intense contamination of the whole Gdańsk Bay area can be expected with a particular emphasis on the shores from Piaski to the Harbour of Hel.

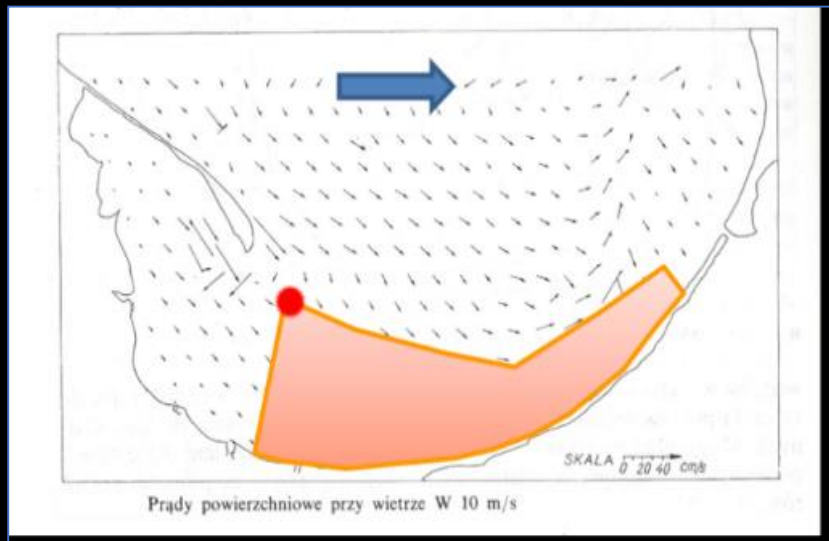
Current state of knowledge

Standard distribution of oil leaking from wreck

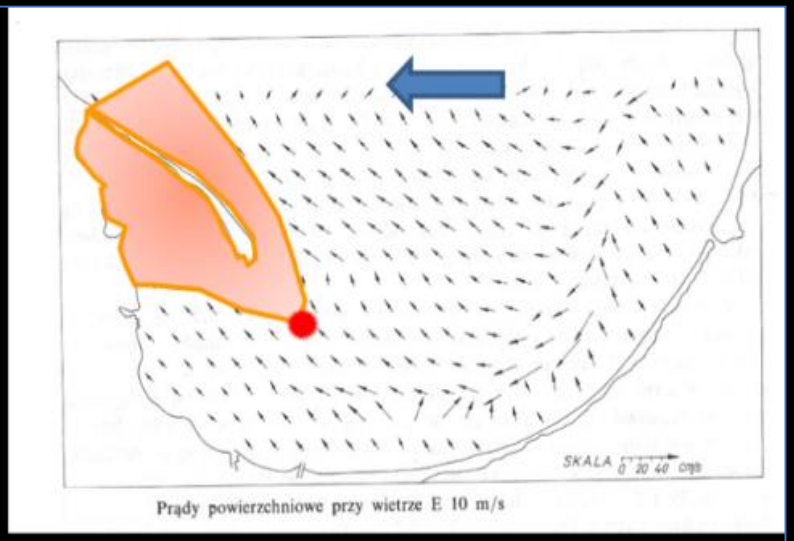




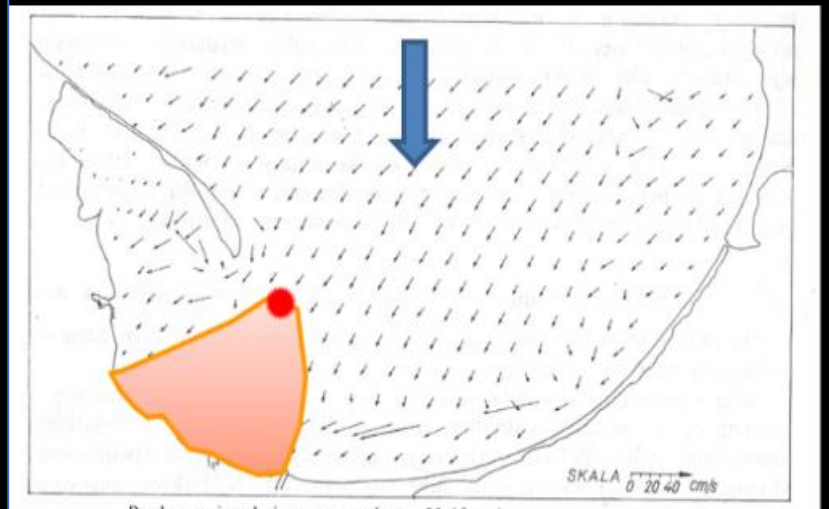
Current state of knowledge



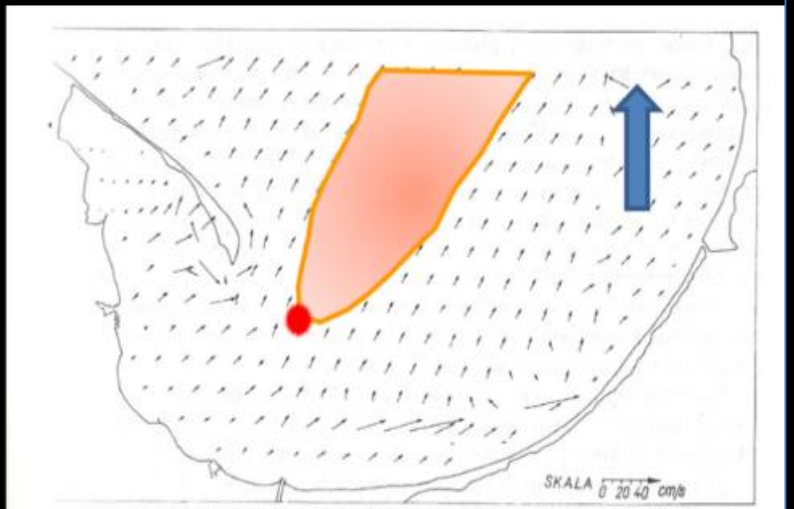
Prądy powierzchniowe przy wietrze W 10 m/s



Prądy powierzchniowe przy wietrze E 10 m/s

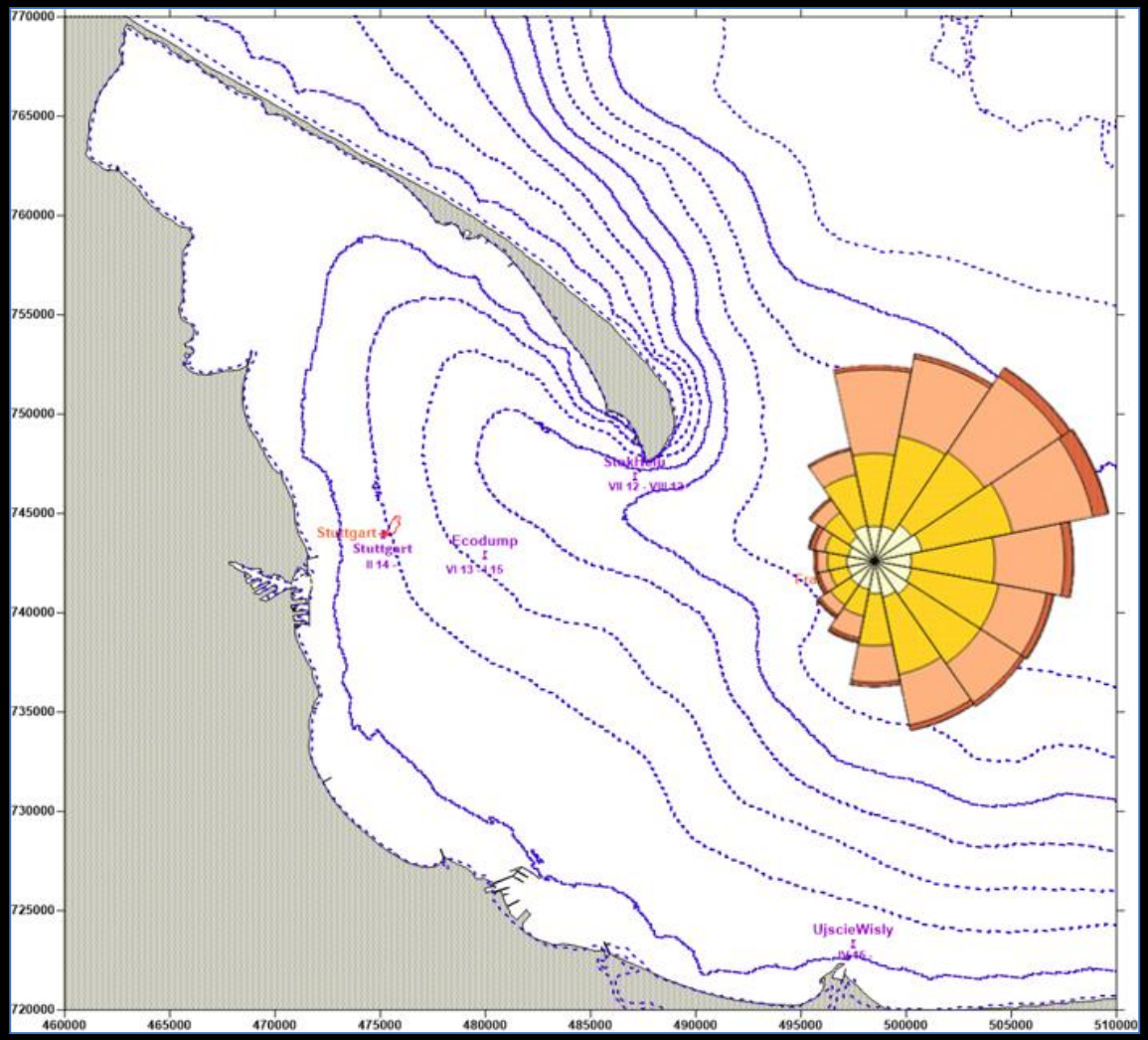


Prądy powierzchniowe przy wietrze N 10 m/s



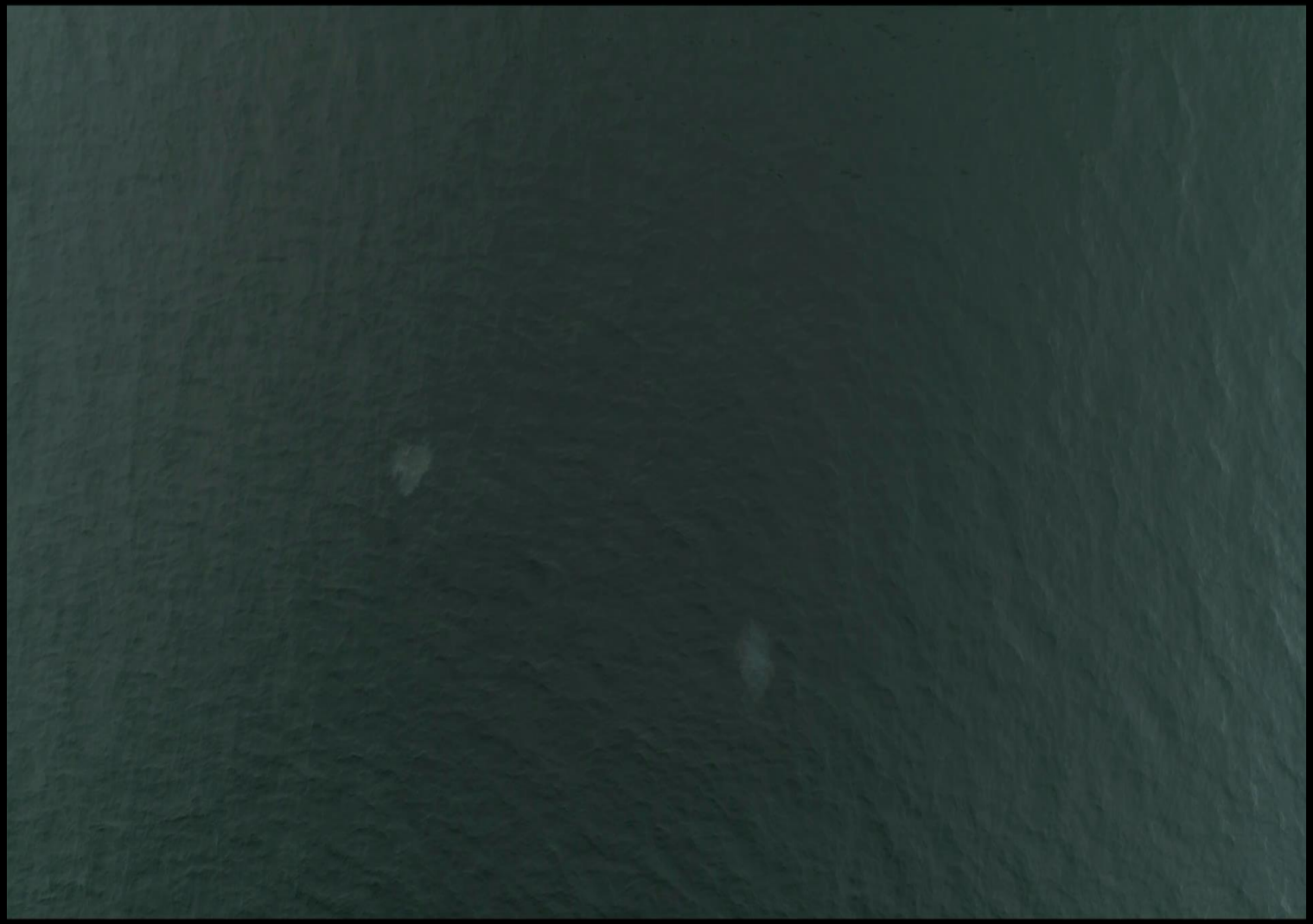
Prądy powierzchniowe przy wietrze S 10 m/s

Current state of knowledge

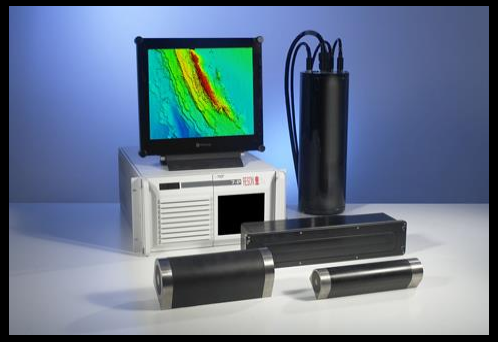


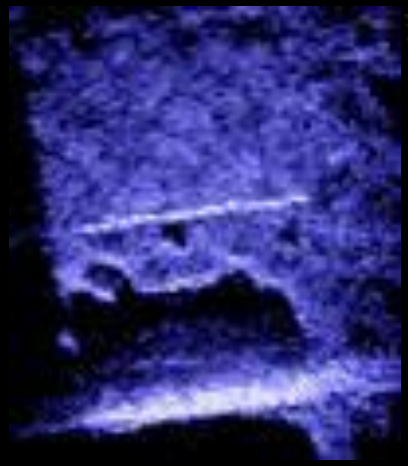
Distribution of currents in the depths of the water at the level of 4 meters in position of Franken

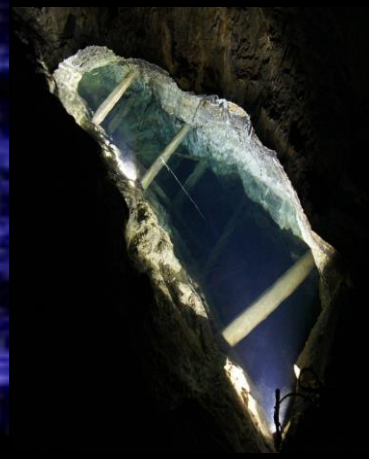
Current state of knowledge



Expediton on wreck 23- 28 of April 2018







Reduction of the negative impact of fuel leaks from the wreck of the Franken tanker

1. Measurement activities - IMOR ship

Participation is taken by the ship's crew, measuring group, media group - altogether 14 to 16 people for 6 days

1. Works:

- Setting of lighting lamps on the wreck position.
- Preparation of photographic documentation using ROV cameras.
- Taking technical photos for the mosaic.
- Making sheet thickness measurements.
- Making measurements with an acoustic camera.

Reduction of the negative impact of fuel leaks from the wreck of the Franken tanker

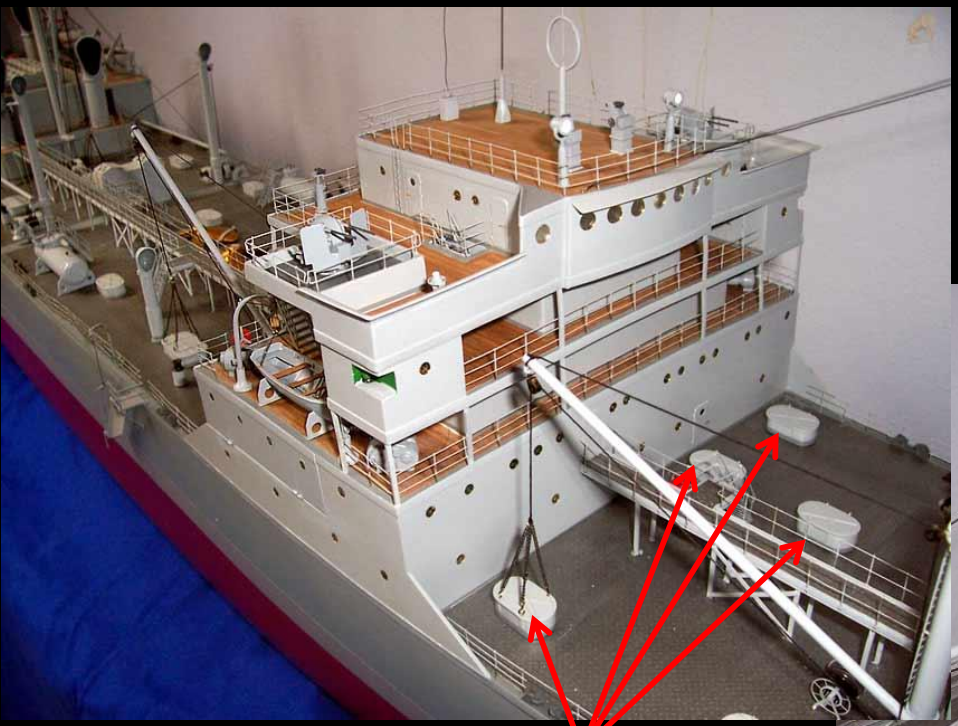
Diving activities - LITORAL ship:

Participation is taken by the LITORAL ship crew and 6 divers for 4 days

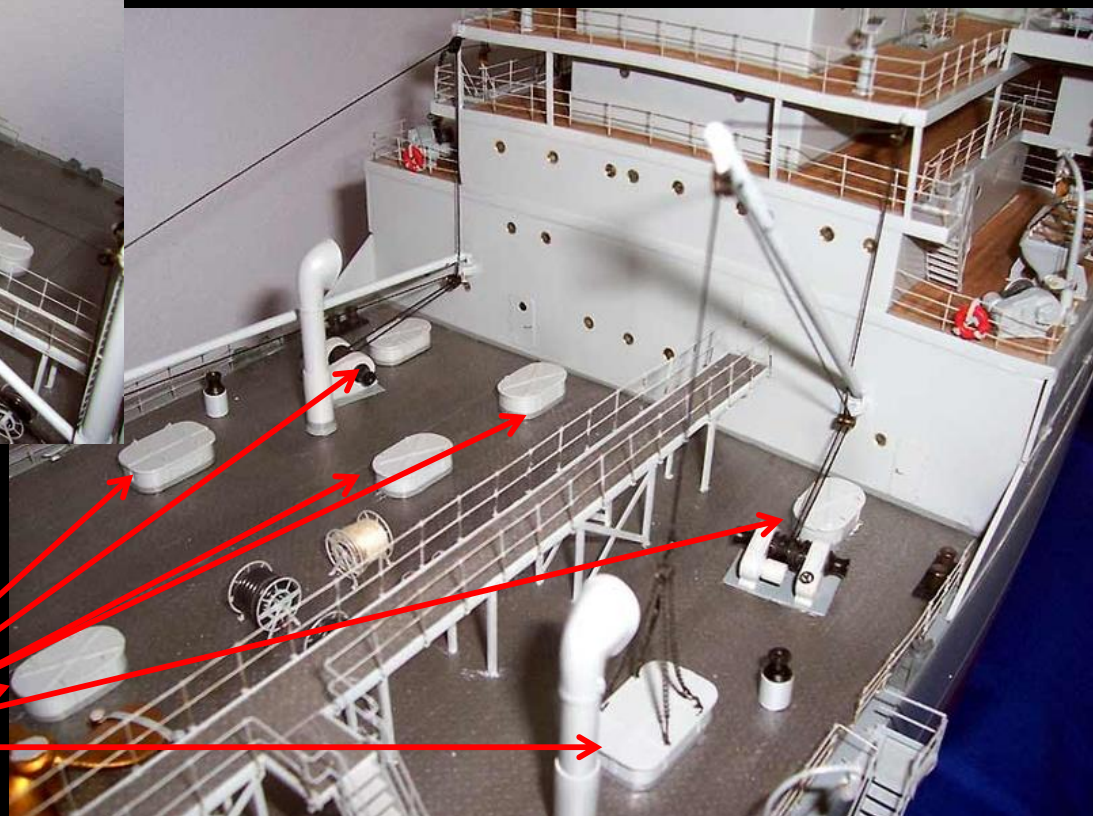
Works:

- Preparation of photographic documentation for the needs of the film.
- Preparation of photographic documentation for the needs of a documentary mosaic.
- Performing an inspection of the tanks
- Setting traps on fuel.
- Search for places where fuel is visible - sampling.
- Selection and Preparation of places for measuring sheet thickness.
- Sheet thickness measurement.
- Collecting traps.
- Preparation of acoustic documentation for the needs of documentation of wreck

How to clean the wreck from fuels and lubricating oils



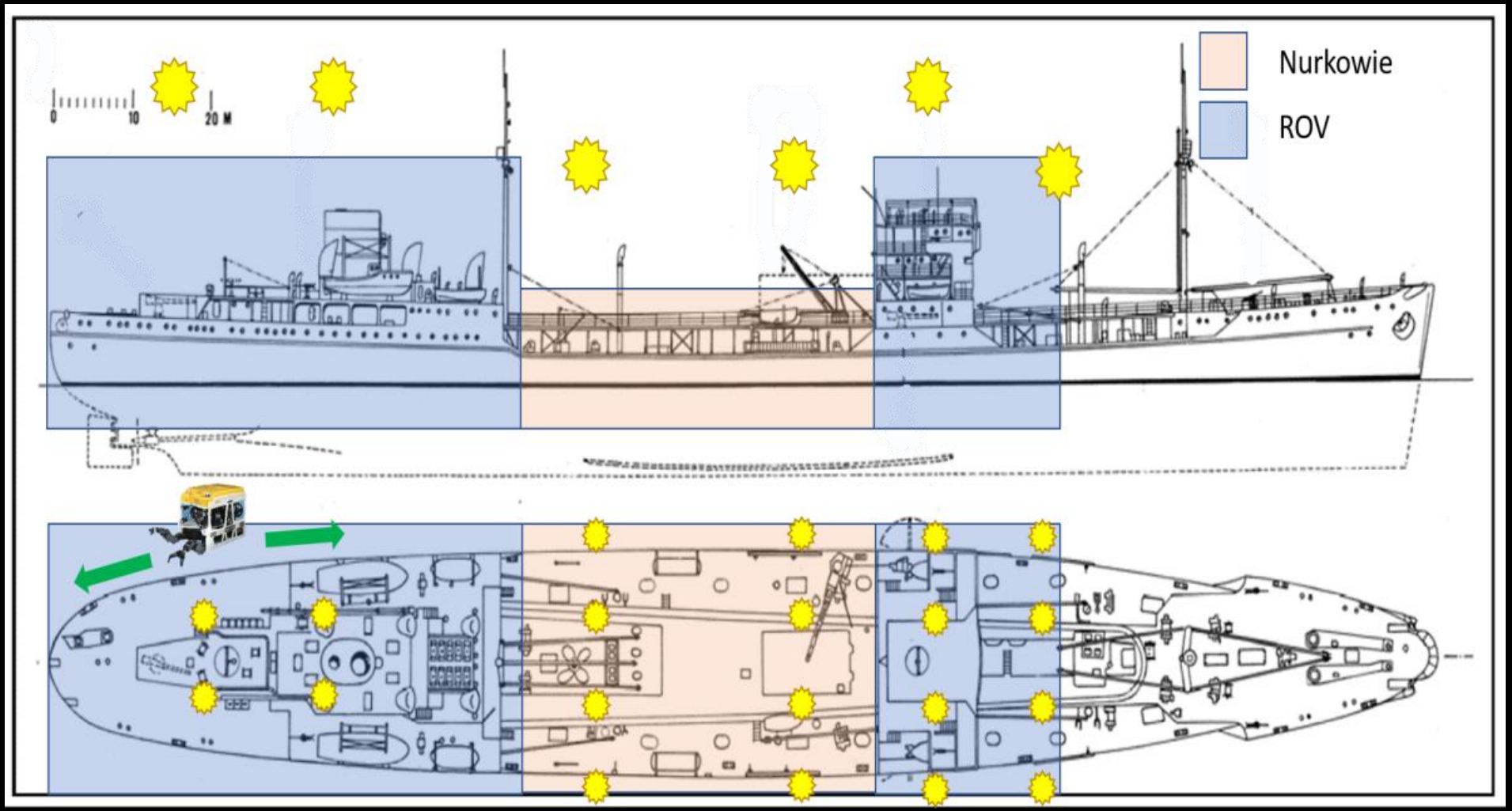
Model of the T/S Altmark (twin ship of T/S Franken)



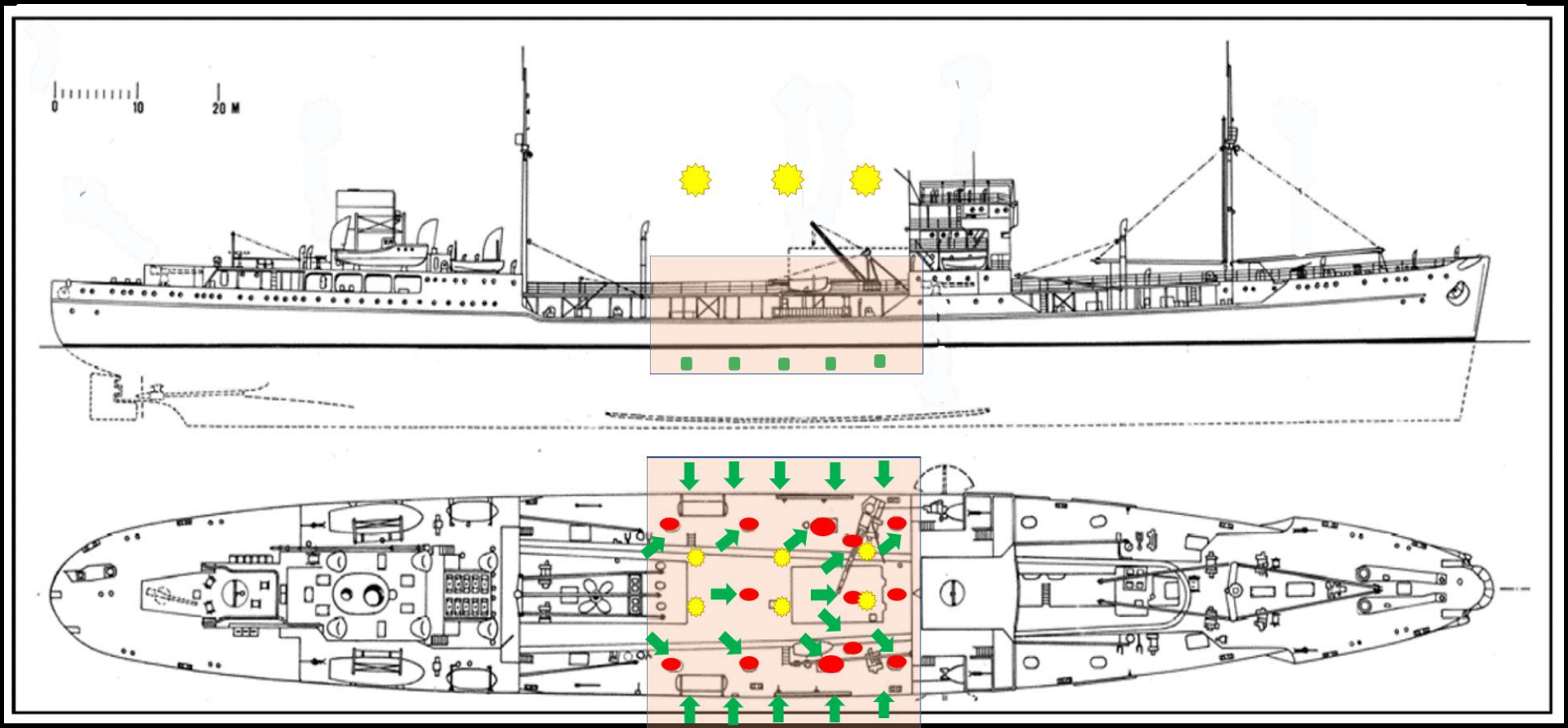
Fuel tank inspection hatches on the fore deck

Amidship fuel tank inspection hatches

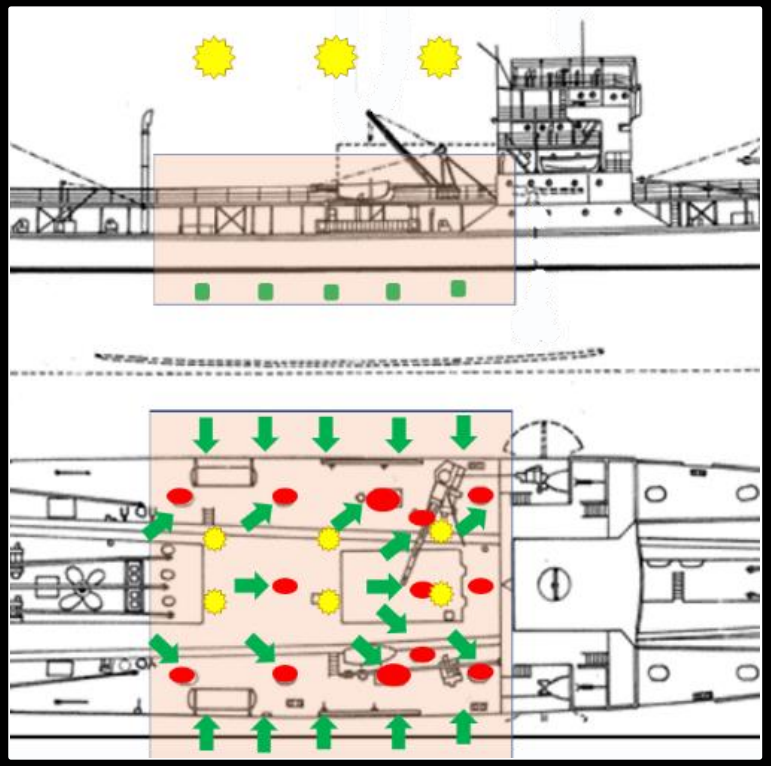
Reduction of the negative impact of fuel leaks from the wreck of the Franken tanker



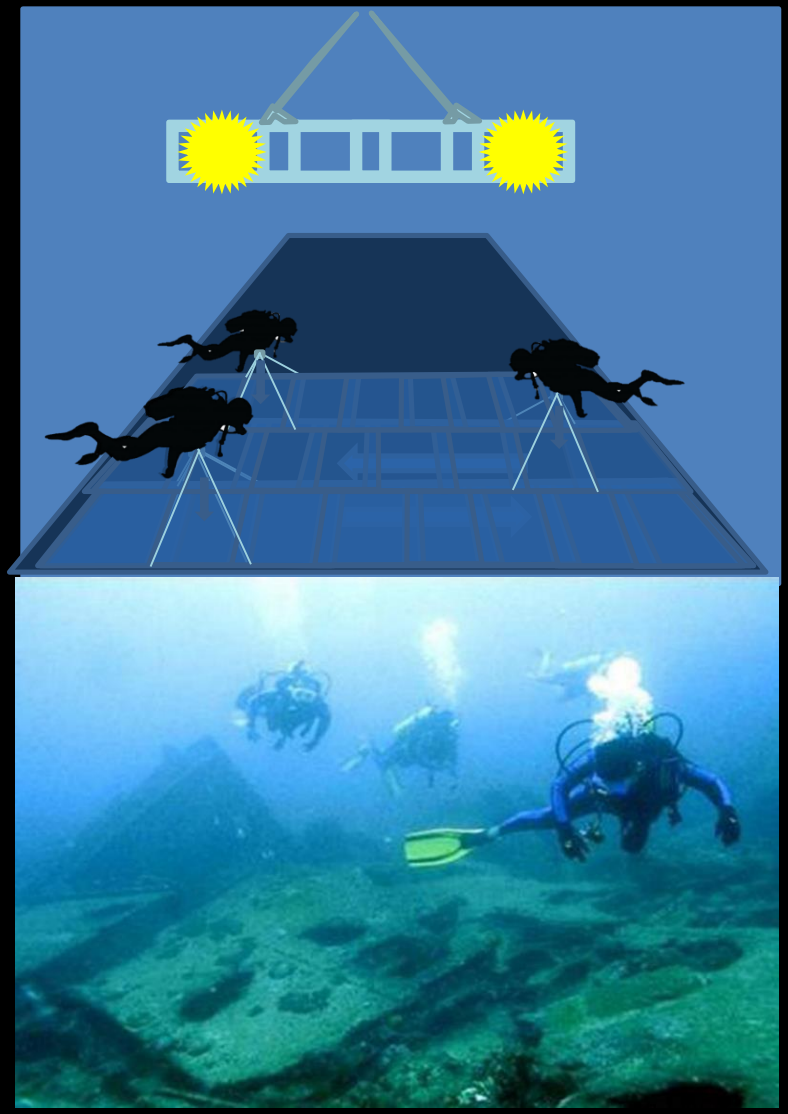
Reduction of the negative impact of fuel leaks from the wreck of the Franken tanker



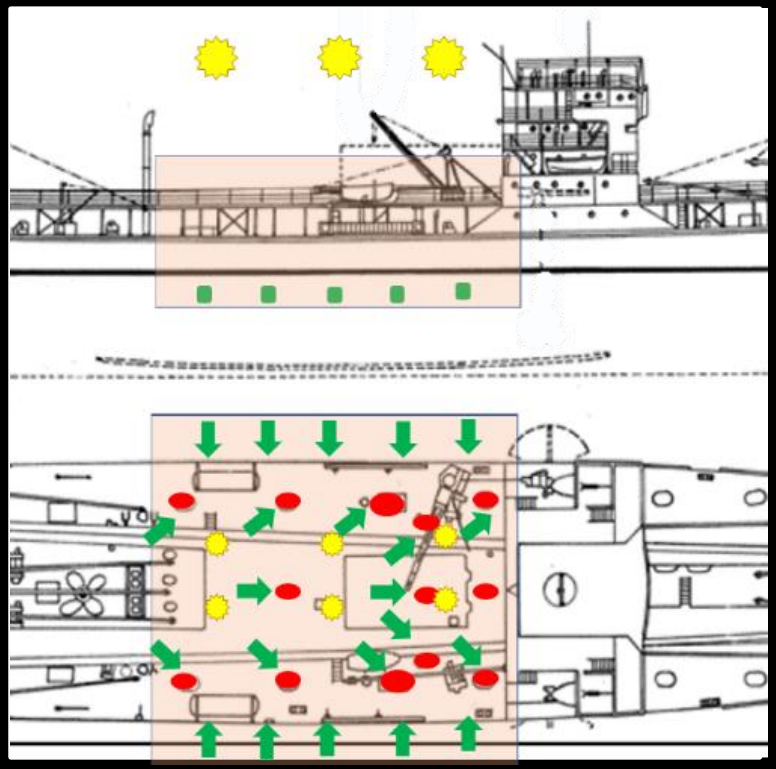
Reduction of the negative impact of fuel leaks from the wreck of the Franken tanker



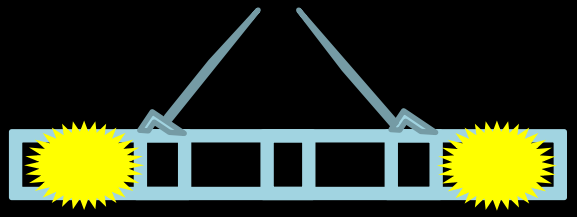
mosaic design

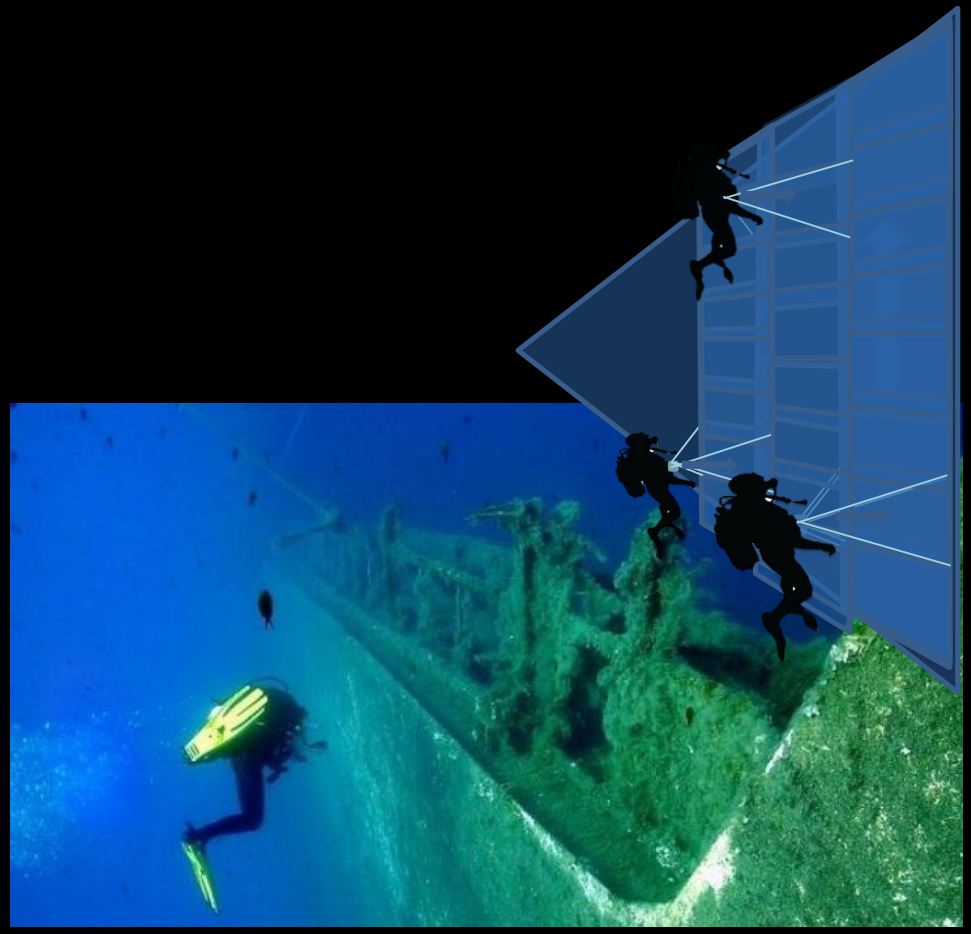


Reduction of the negative impact of fuel leaks from the wreck of the Franken tanker



mosaic design





Reduction of the negative impact of fuel leaks from the wreck of the Franken tanker

spills we were looking for

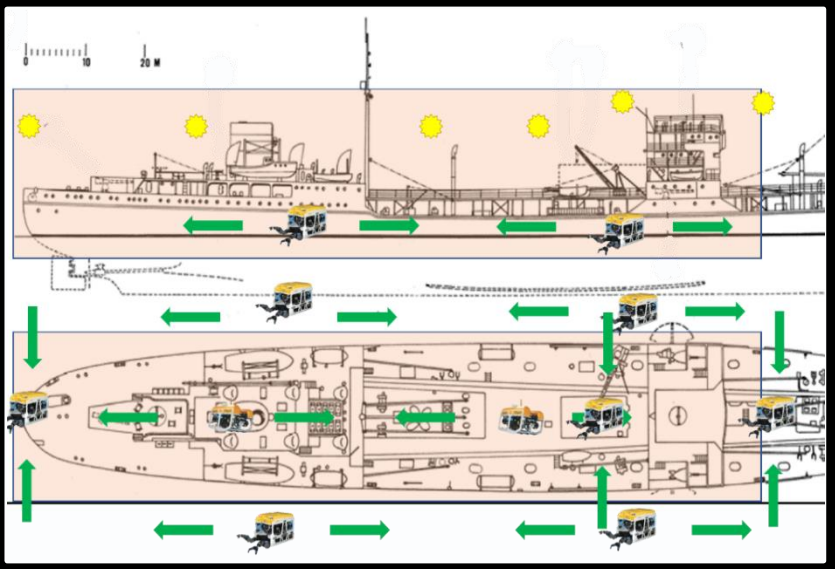
Reduction of the negative impact of fuel leaks from the wreck of the Franken tanker

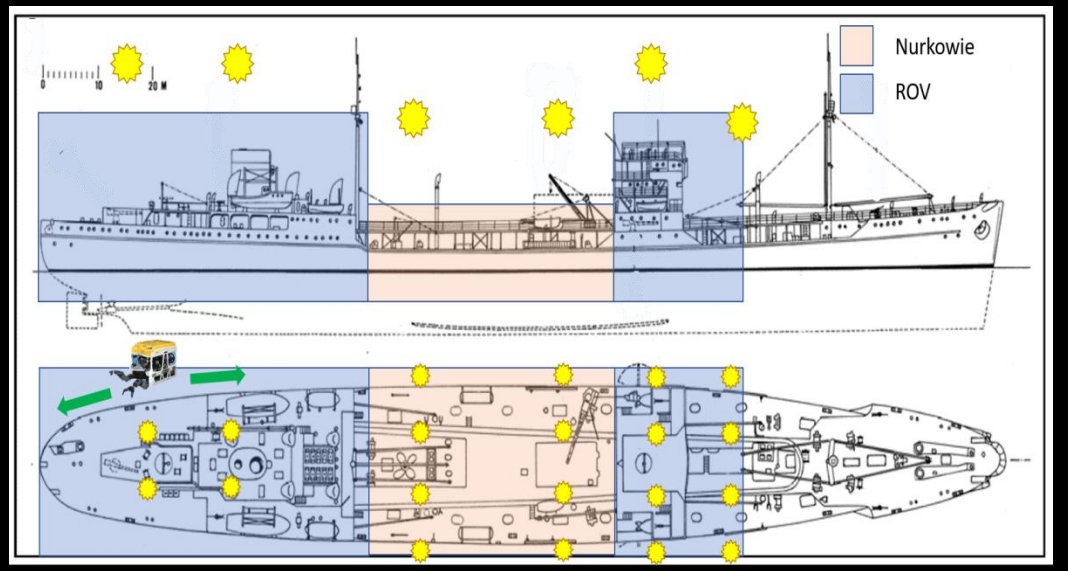
traps for leaking fuel

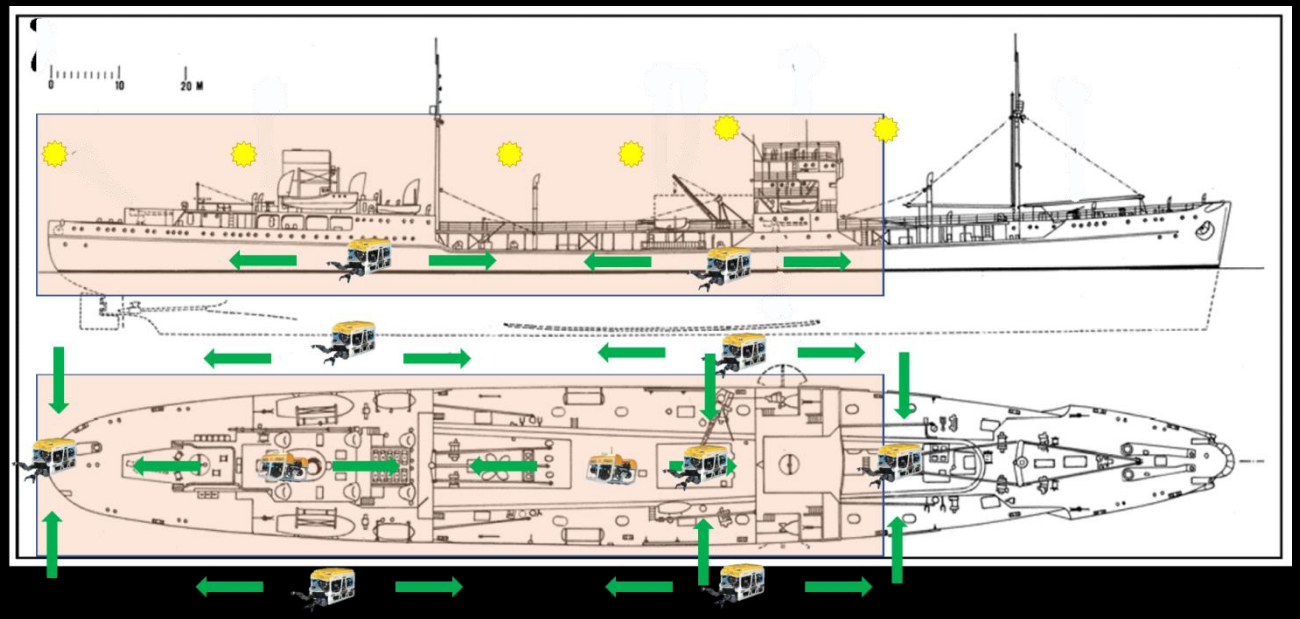
Reduction of the negative impact of fuel leaks from the wreck of the Franken tanker

we are looking for fuel that leaked and is under the ceiling

Reduction of the negative impact of fuel leaks from the wreck of the Franken tanker



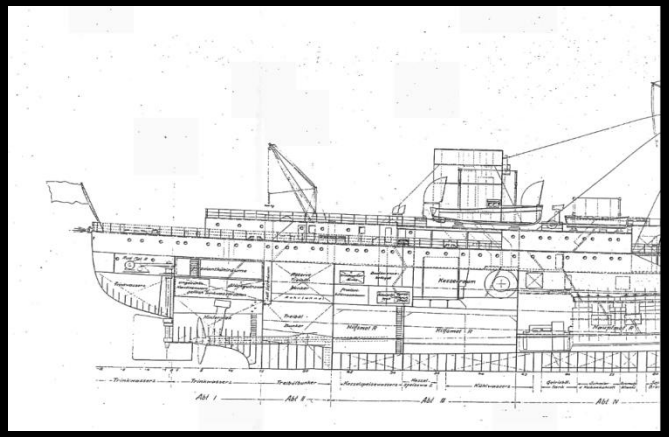


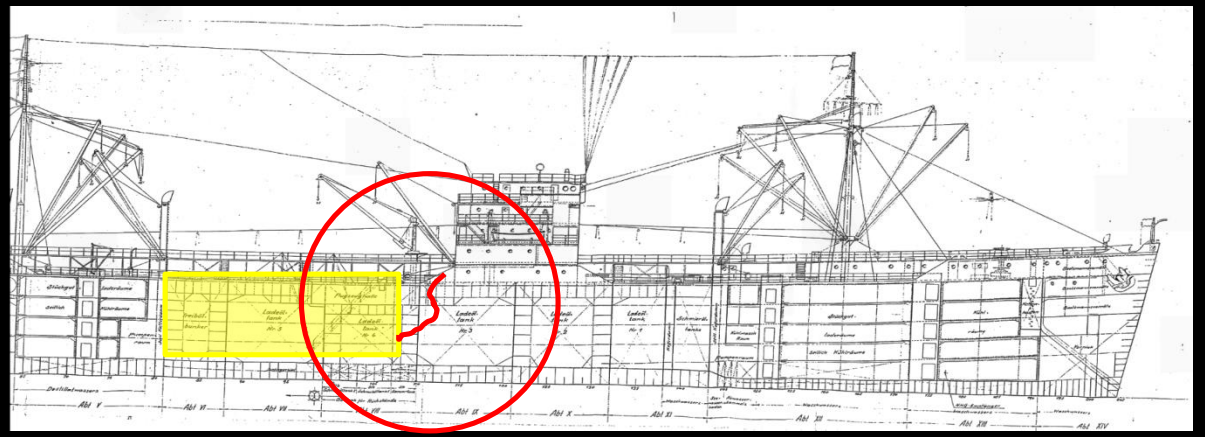


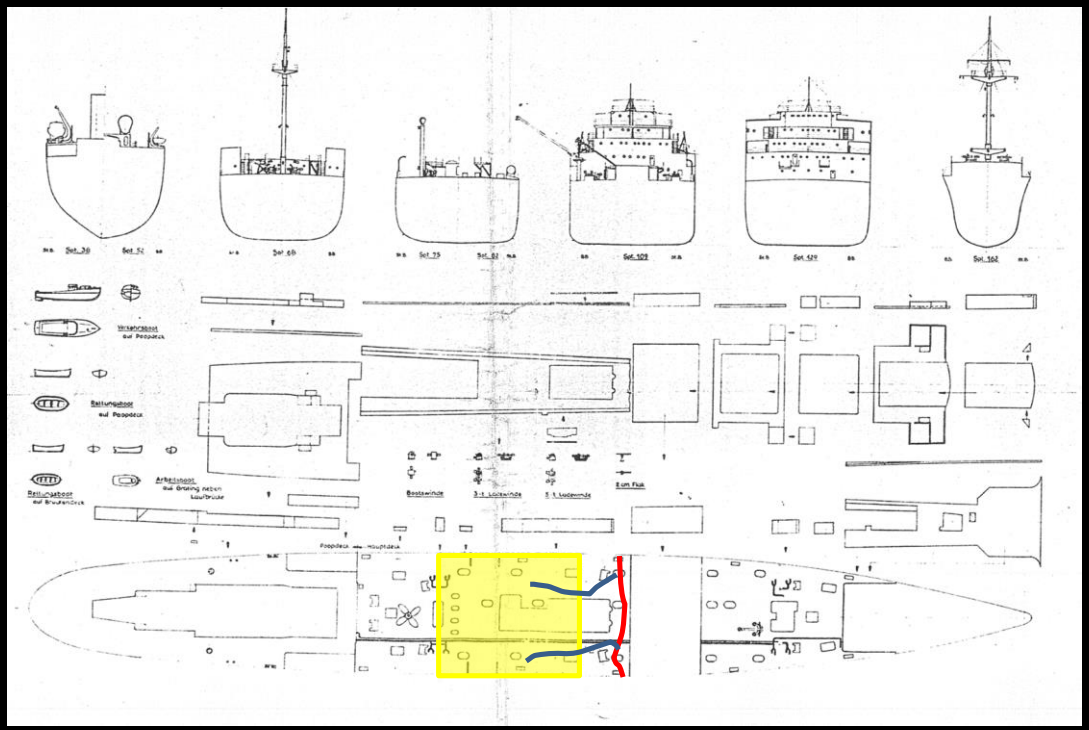
Reduction of the negative impact of fuel leaks from the wreck of the Franken tanker

150 mm ammunition close to aft antiaircraft gun

Reduction of the negative impact of fuel leaks from the wreck of the Franken tanker







Conclusions

1. The T/S FRANKEN wreck is the most dangerous wreck of the Gdańsk Bay

2. There is an urgent need to determine the state of environment's contamination in the area of the wreck

3. There is an urgent need to undertake actions leading to a reliable assessment of contamination risk through identifying the actual amount of harmful substances and identifying the current technical state of the wreck.
4. Undertake actions:
   - In order to create a project of cleaning the wreck,
   - Obtain financial resources,
   - Determine the technology of actions related to cleaning
   - Commencement of operations involving the removal of harmful substances' remains.
5. After the completion of the cleaning operation perform another assessment of the environement's state.

What we are waiting for?

Time is going very quickly – currently on the wreck, nothing happens
We are waiting for rapid response Maritime Administration and the Ministry of the Environment
If we wait long time for reaction - on our beaches We will see it:

Thank you for your attention

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