Sommaire

Il est question des risques affectant les câbles sous-marins dans la mer du Nord méridionale. On définit le secteur présentant le maximum de risques et l'on considère dans quelle mesure les défaillances des câbles sont dues à la formation du lit marin et à l'effet des chaluts à perche. On indique les mesures qu'il serait possible de prendre pour protéger les câbles.

International Council for the Exploration of the Sea

C.M. 1977/B:32
Gear and Behaviour Committee
(Ref. Fisheries Improvement Committee)

FISHING INTERFERENCE WITH SUBMARINE TELEPHONE CABLES IN THE SOUTHERN NORTH SEA

by

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Summary

Risks to underwater cables in the southern North Sea are discussed. The area of highest risk is defined and the contribution made to cable faults by the sea bed formation and by the action of beam trawls is considered. Possible action to protect cables is indicated.

1) Since the first submarine cable was laid between England and France in 1850 interference has been caused to cables by fishermen. Despite the introduction of legislation making it an offence to "break or injure a submarine cable wilfully or by culpable negligence in such a manner as might interrupt or obstruct telegraphic communication" there has been no reduction in the number of cable faults so caused.

2) Before about 1960, the expectations with submarine cables were that they would be free of faults for the first few years and then show a fault rate of about one fault every two years. However, this low rate was not experienced with two cables laid from Covehithe, in Norfolk, England to Katwijk in Holland during the mid 1960's. These cables exhibited a very high fault incidence in their early life and this fault rate steadily increased to the mid 1970's. The situation is made more peculiar when compared with two cables from Lowestoft in Norfolk to Scheveningen in Holland which lie close to the Covehithe to Katwijk cables, but have fairly normal fault records (see Fig. 1). It should be noted that the Lowestoft cables were laid 10 years earlier than those from Covehithe.

3) The North Sea can be broken into four areas of risk due to damage by trawlers:-

   i) That area approximately north of 55°N where cables can be said to be fairly free of fault hazard except for random cases which can probably never be avoided.

   ii) That area approximately between 52°30'N and 55°N where a fault hazard of about one per cable per year is experienced.

   iii) That area south of 52°30 N to a point south of the Hinder Banks or more accurately 51°20'N. This area has recently experienced a degree of flat fish trawling unprecedented in the North Sea using beam trawlers much larger than hitherto. Since 1974 the fault rate in this area has increased drastically and it can be reasonably stated that the No. 1 cable running between Covehithe and Katwijk was rarely in service between 1974 and 1976.

iv) That area between the Straits of Dover and the southern end of the Hinder Banks. This area contains all the UK to Belgium cables which, since 1960, have enjoyed a low fault rate commensurate with the cables in the northern North Sea.

4) The vast majority of faults in area (iii) lie between latitudes 52°15'N and 52°20'N and longitudes 3°00 and 3°30'E. This location corresponds with an area of high sand waves as shown on the contour map of sand wave heights as published by Dr McCave in 1971. This contour map has been superimposed on a cable chart showing fault incidence (Fig. 2). The evidence convincingly demonstrates the apparent correlation between sand wave height and fault rate.

5) It is significant that this area also corresponds with the location of maximum beam trawling by Dutch and Belgian vessels for the year 1975 as shown in the chart produced by the Netherlands Institute for Fishery Investigation (Fig. 3). This fact, together with the area of sand waves known to exist in this part of the North Sea combine to provide a set of conditions in which the probability of cable survival is very low.

6) The question to be answered is, - are cable faults due to the formation of the sea bed, or to the increase in the use of the beam trawl? It is believed that the new generation of beam trawlers, much larger and more powerful, which has been increasingly brought into service since 1970 has been the deciding factor in the increased fault rate, but the sea bed conditions must be contributory to this rate or the demonstrable correlation between sand wave height and cable faults could not have been established.

7) It had been thought that sand wave movement would have set up cable suspensions between sand peaks which could easily be fouled by trawls. However, recent surveys carried out with a submersible have shown this is not the case. These surveys carried out over the two Covehithe - Katwijk cables that had suffered so badly in 1975 also disproved the belief that the cables were being fouled by trawlers because of the bights of slack cable that result from a cable repair. During the surveys, both cables were observed to be lying half buried in the sea bed in a very proper manner.

It is now believed that the existence of sand waves together with the method of operation of the large beam trawlers combine to hazard submarine cables. Beam trawling for flat fish is not new, nor is the demand for such fish in the Eu opean market. Cable owners had too easily attributed part of the blame for the increased fishing activities to the subsidy offered to trawlermen in 1973-74 by the Netherlands government. It is no appreciated that this is not the case as the subsidy has been withdrawn and quotas placed on the tonnage of fish landed; yet the fault rate persists.

8) Investigation into beam trawling carried out by the MAFF Marine Laboratory at Lowestoft indicated that beam trawls barely penetrate the sea bed. One hypothesis put forward by the cable industry is that a powerful beam trawler of greater than 1200 HP, fishing with two 10 metre beams at speeds of up to 7 knots could chop the crest off the top of a sand wave peak and barely notice it. Should a cable be in the way it would be fouled but not necessarily broken. There is evidence that trawlers lift their gear with a fouled cable and cut the cable with an axe or even a gas burner.

9) What can the owner do to protect his cables?

There are four possible approaches to the problem.

i) Select cable routes where fishing is at a minimum.

ii) Make it more difficult for fishermen to break cables.

iii) Bury the cable beneath the sea bed.

iv) Investigate the possibility of designing fishing gear that will not foul cables.

9i When new cable routes are planned areas of fishing activity are carefully studied, but these areas, with some exceptions, are constantly changing. Studies of existing cable routes have failed to produce a reliable forecast of active areas, eg Lowestoft - Scheveningen route. There is a definite connection between fishing activity, high sand waves and fault incidence. It is therefore prudent to avoid this combination. However, large route deviations to avoid constantly changing fishing areas are neither economical nor viable.

9ii It has been suggested that large objects of considerable mass be deliberately deposited on the sea bed at calculated intervals along cable routes to impede trawls and cause fishermen to give greater regard to cables, but cable owners would never resort to such an anti-social act and in any case, the laws concerning dumping at sea would prohibit such action.

There is however, a strong case to look at the armouring on present day cables. Double armour has successfully been used in areas where cables lie on rocky sea beds. The answer to the problem may be to use double or even triple armour in sandwave areas. The disadvantage of this is the very large increase in costs and the problems likely to arise on small cable ships when repairing the more heavily armoured cable.

9iii There is evidence that cables that have been buried or trenched into the sea bed have a greater immunity to trawler damage than those that lie on the sea bed. Such action has been taken on the continental shelves of North America and Europe with a fair amount of success, but burial or trenching in the North Sea is a different proposition.

Oil companies who have spent large sums of money on pipeline burial are now finding that in certain areas the pipeline is no longer buried due to the scouring effect of tide or possibly the migration of sand.

The high tidal flow together with poor underwater visibility has to date ruled out the use of manned submersibles for cable trenching in the southern North Sea. The sea plough that has been used successfully in European and American waters is not really suited to the shallow areas of the North Sea. However, developments in burial and trenching methods are being closely followed by Cable Administrations and the solution may well lie in this field.

9iv In the mid 1960's a research programme was undertaken by the British Post Office, with support from the Marine Laboratory, Aberdeen, into the possibility of designing fishing gear which would minimise the likelihood of otterboards fouling cables. Unfortunately no actual hardware resulted from this programme due to lack of funds.

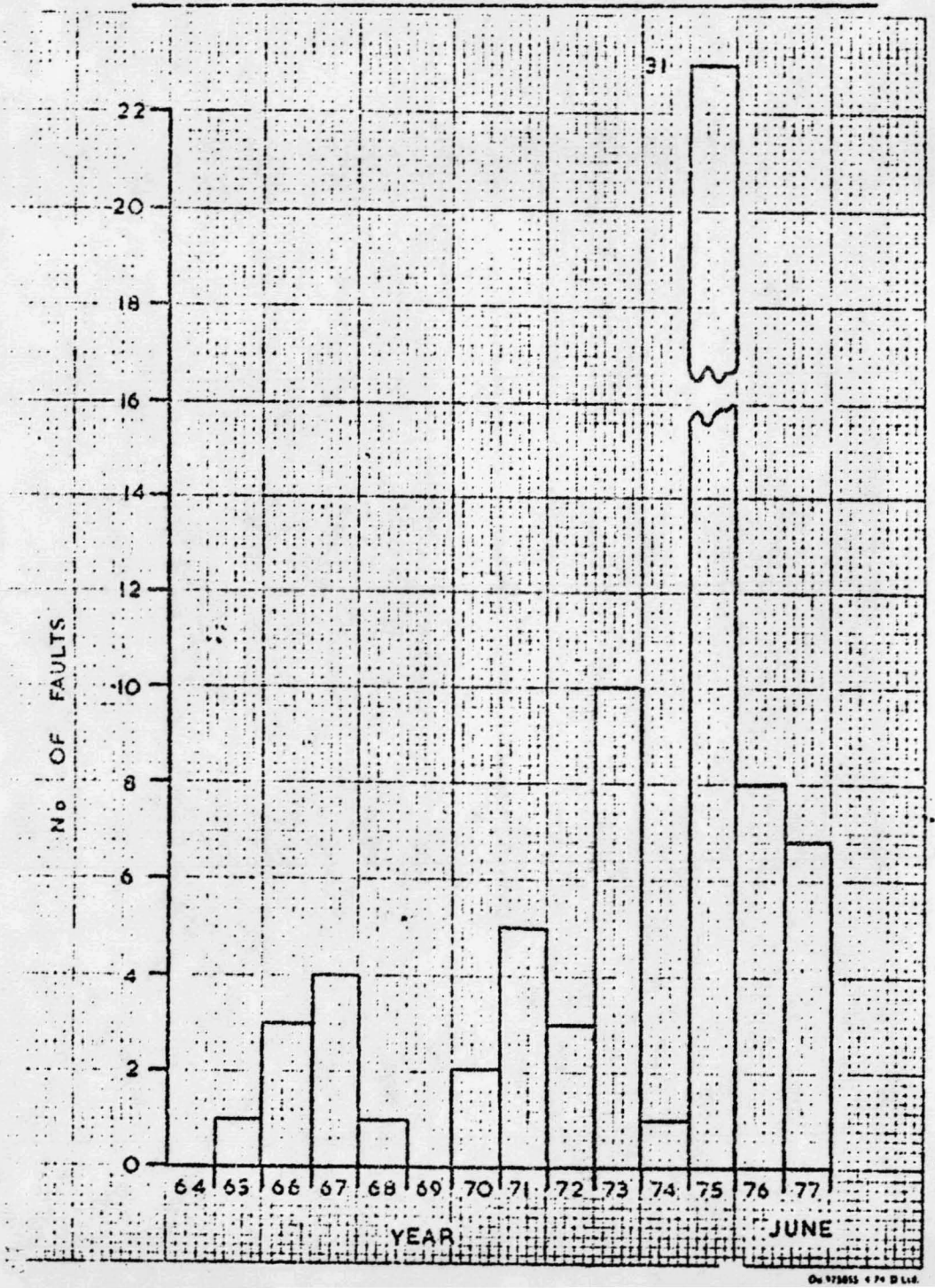
Recently, a series of tests into the effect of bottom fishing gear on submarine pipelines has been conducted by VHL in Trondheim, Norway. This presented an ideal opportunity for cable owners to further research into the conflict between otterboards and beam trawls on the one hand and submarine cables on the other. Regrettably, mainly because of lack of time, the cable owners were unable to take advantage of this opportunity. However it is hoped that in the near future work on this subject will resume. But it must be recognised that once a safe otterboard or modified beam trawl has been designed the cable owners will then have to convince the fishermen that they should use the new gear!

10) The International Cable Protection Committee was formed a number of years ago with a prime objective of reducing the number of cable faults by advising fishermen of the location of cables. The individual fishing vessel skipper is answerable only to himself.

International laws and conventions are forgotten when the fisherman is "on fish". Publicity put out on cable protection is not heeded if the result of it is going to be no catch.

In July 1974 a UK Fisheries and Offshore Oil Consultative Group was formed to exchange information on general matters concerning the fishing and oil industries. It may be that such a group comprised of the telecommunication and fishing industries could do much to reduce the ever increasing fault rate now being experienced by submarine cables.

COVEHITHE–KATWIJK No 1 LAID 1964



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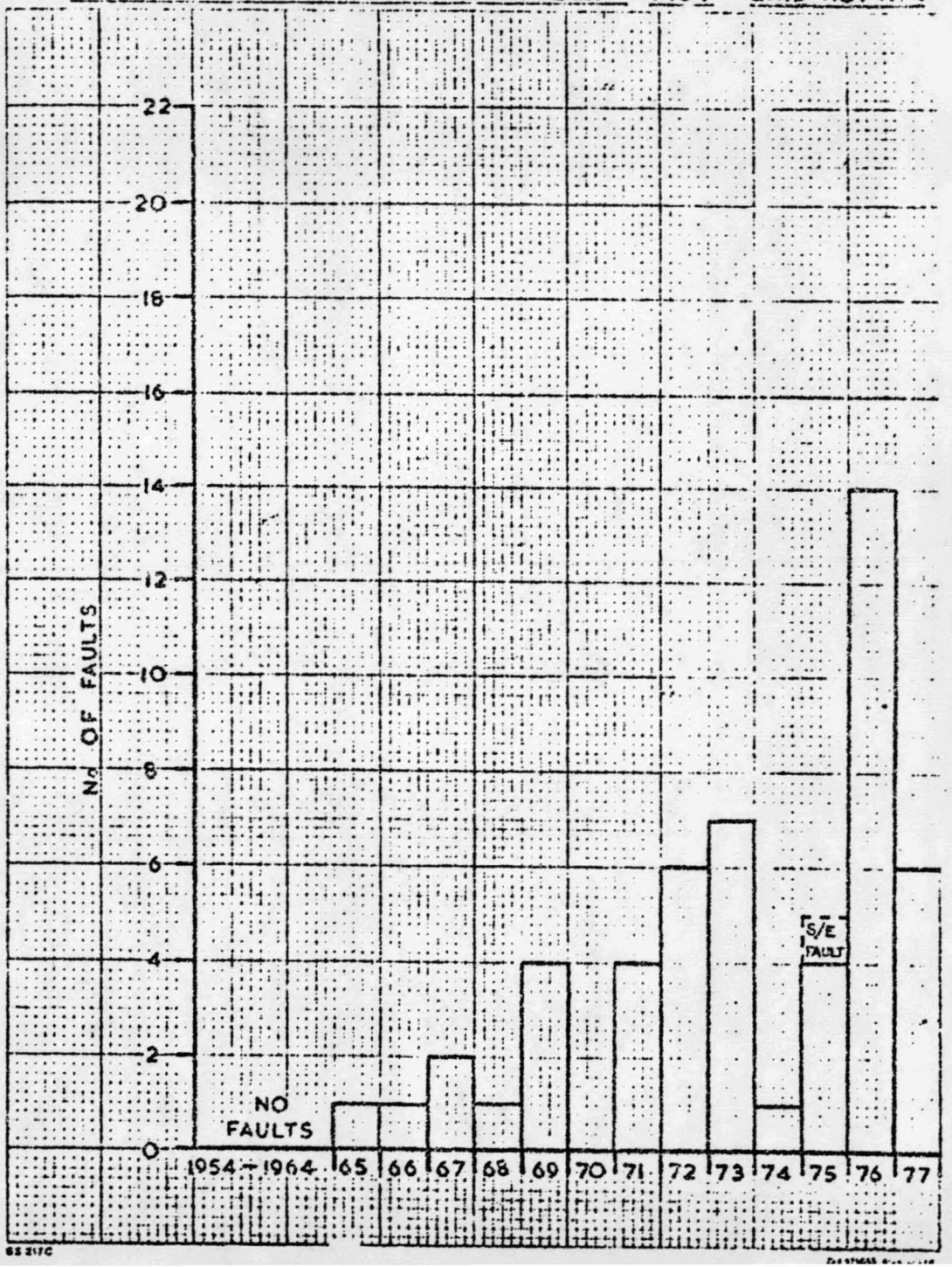

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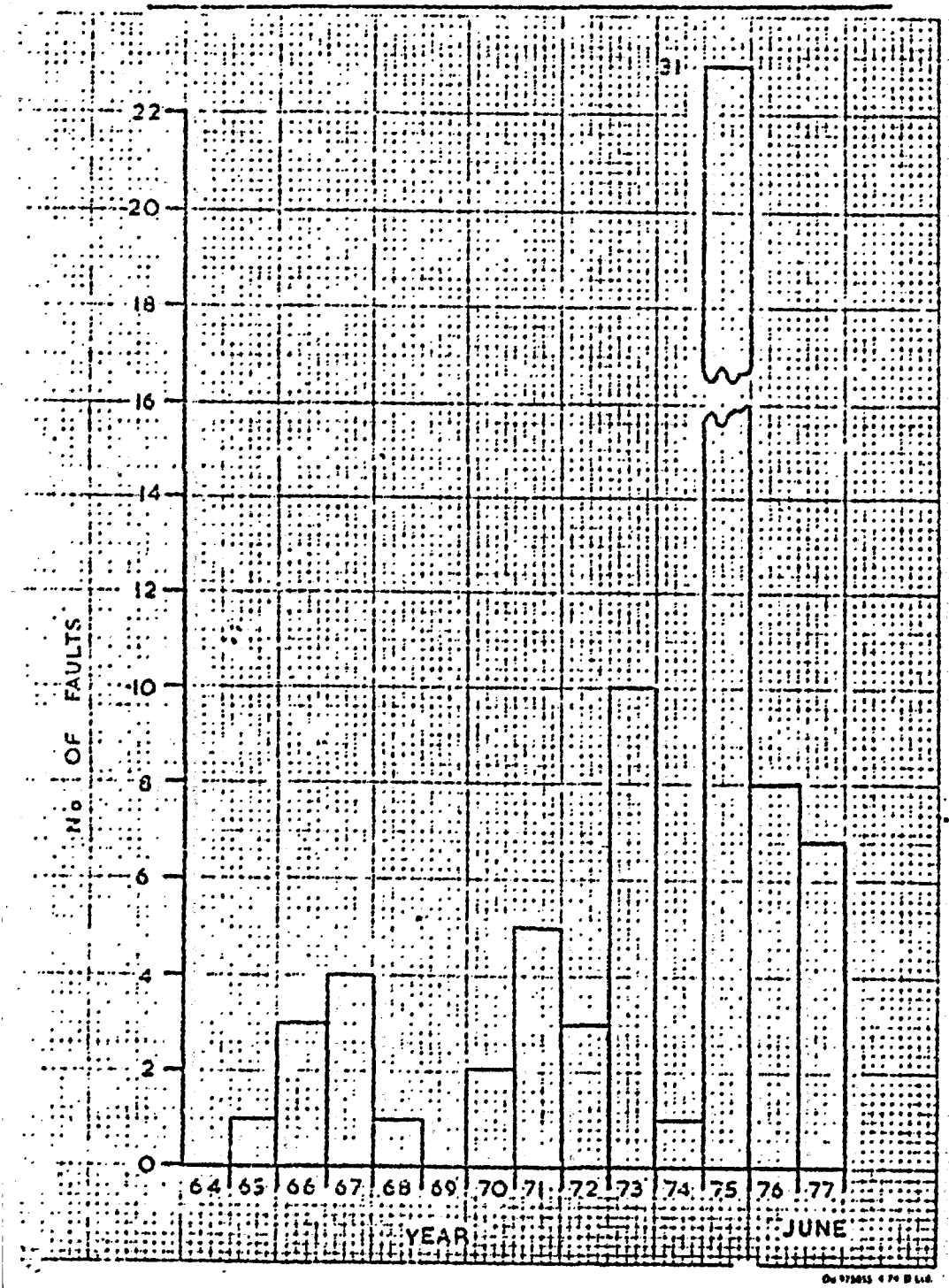

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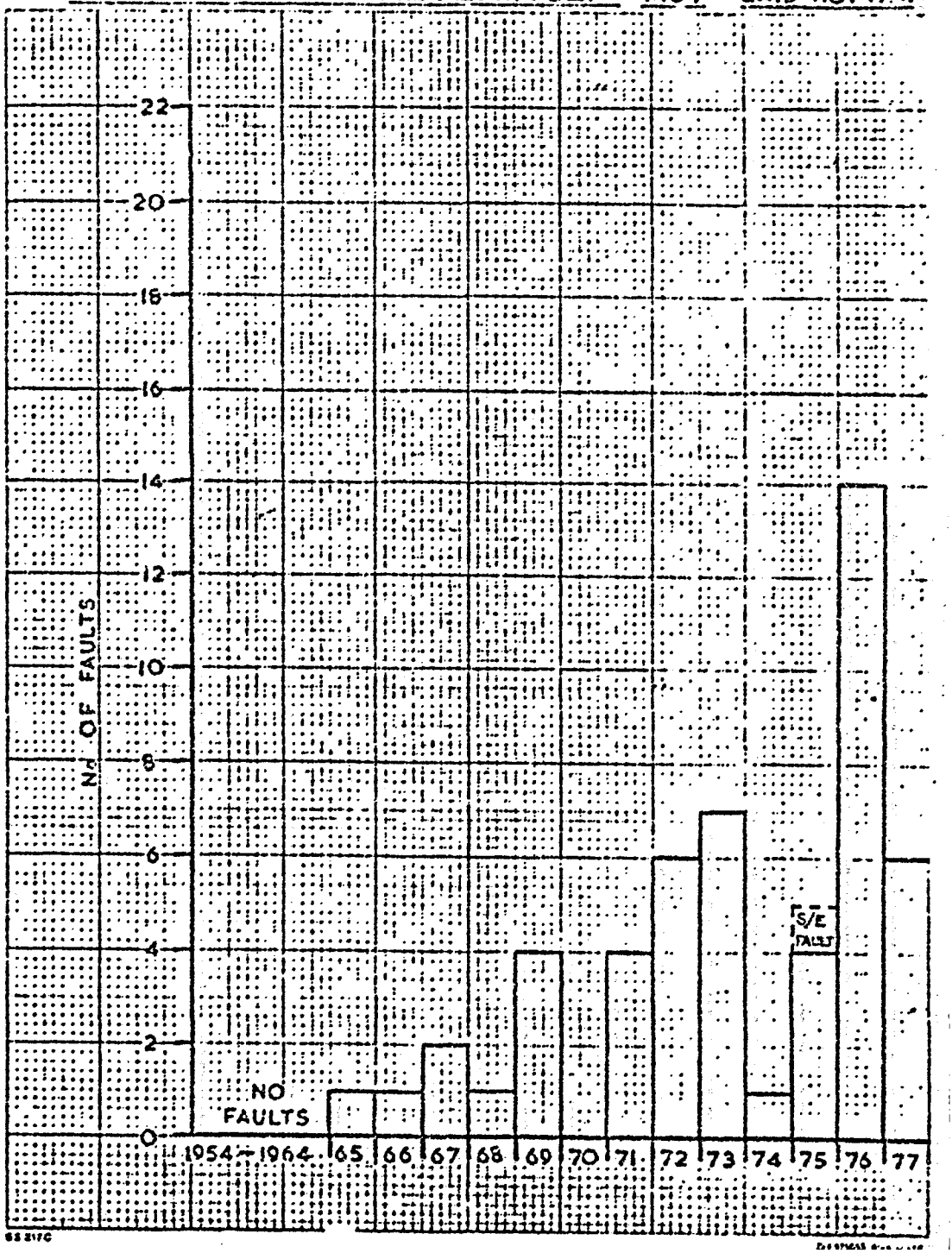

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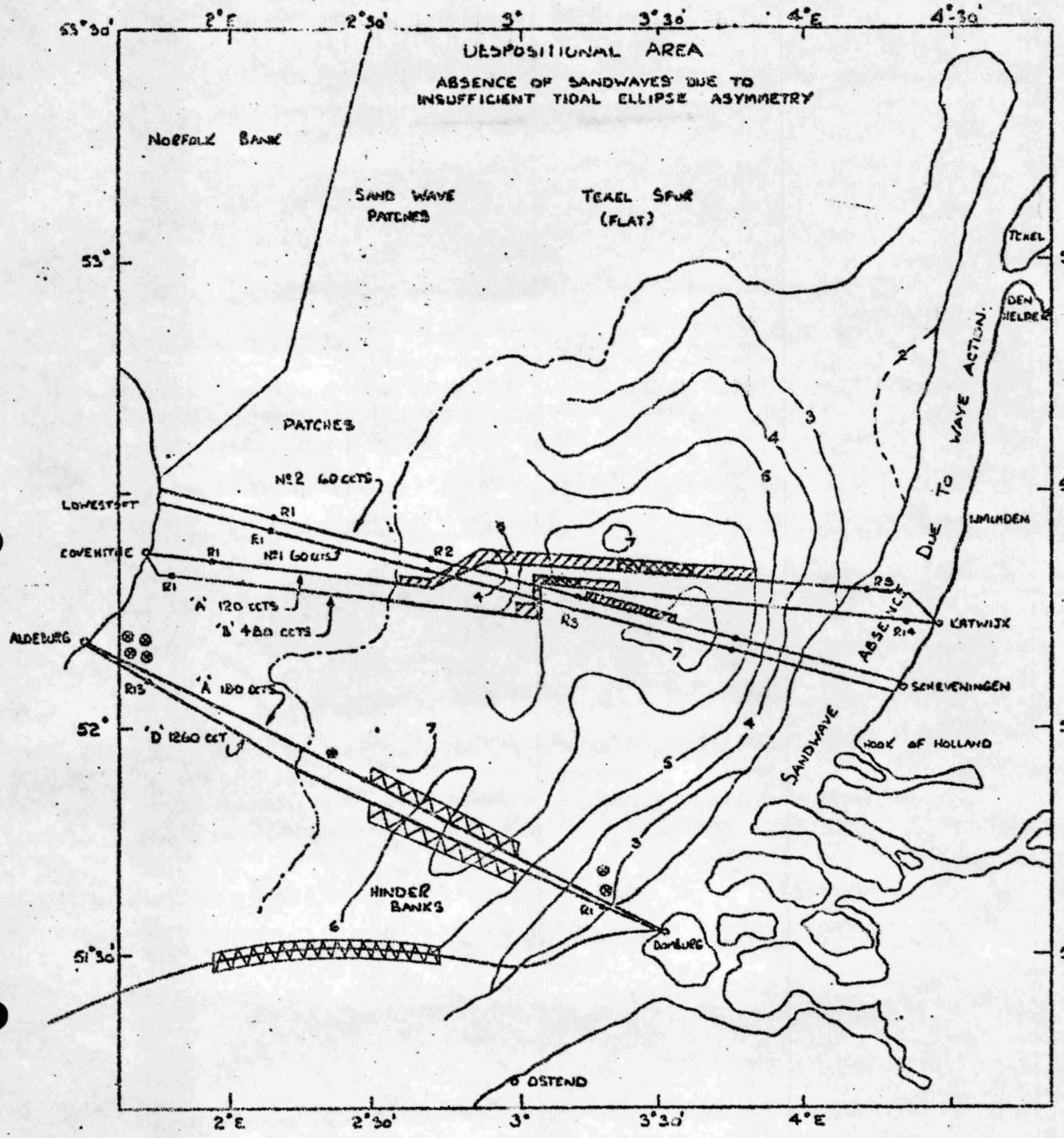


SIGNIFICANT SANDWAVE HEIGHT AVERAGED OVER THE PERIOD
AUGUST 1968 - MAY 1969

CONTOURS ~ SANDWAVE HEIGHT IN METRES

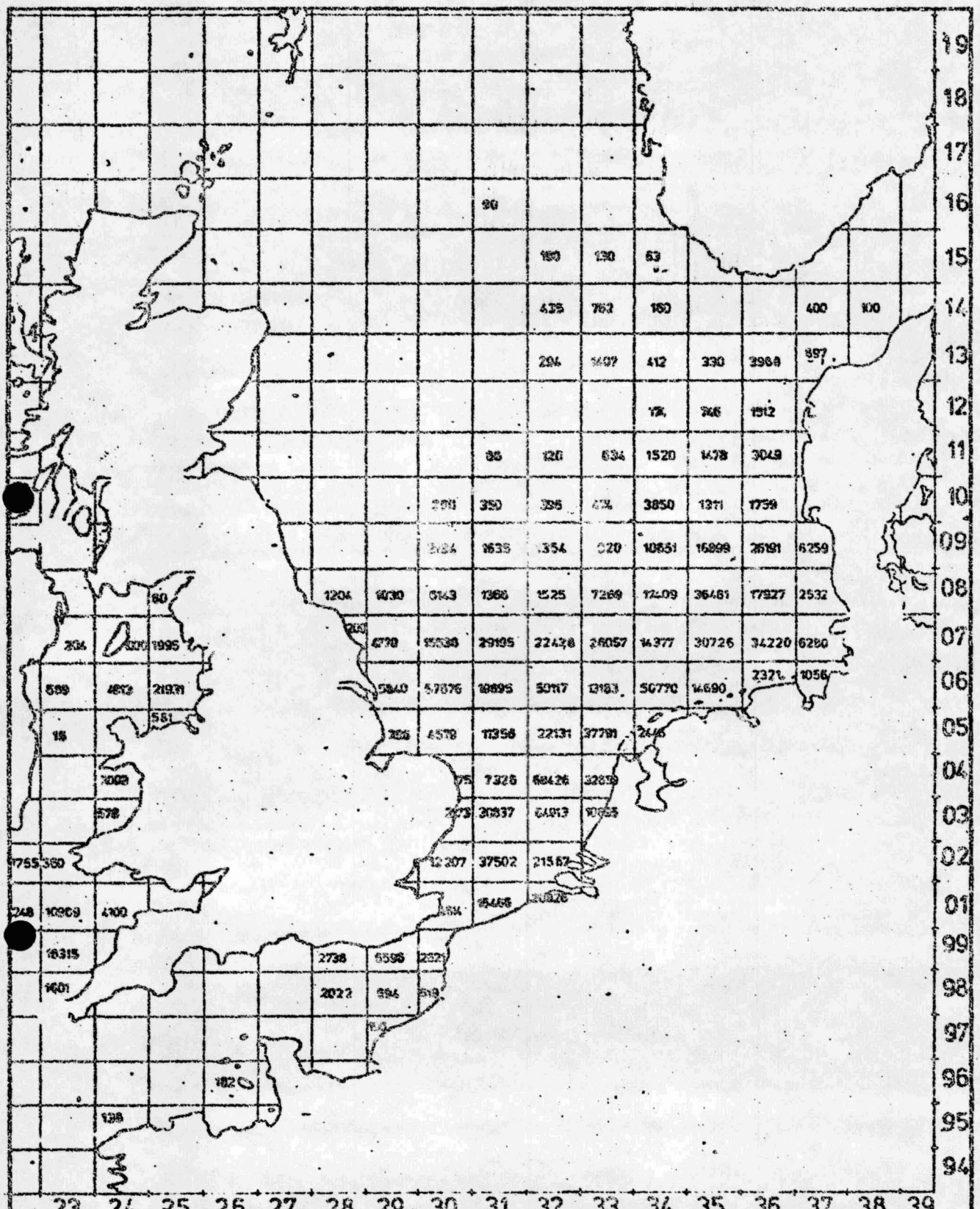
⊗ INDICATES FAULTS

//// AREAS WITH NUMEROUS FAULT INCIDENTS. BUT UNDER 25 TOTAL.

XXXX AREAS WHERE 25 OR MORE FAULTS HAVE OCCURED.

∧∧∧∧ AREAS WITH FAULT INCIDENTS BELOW 10.

NOTE : WESTERN AREA OF N. SEA AT ENDS OF CONTOURS IS AS YET UNSURVEYED.



Volgens gegevens „Rivo" te Ymuiden en het Rijks-station voor de zeevisserij Oostende.

Belgische/Ned. visuren met Boomkor.
1 Jan. 1975 tot 1 Jan. 1976

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