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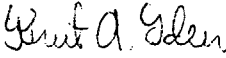
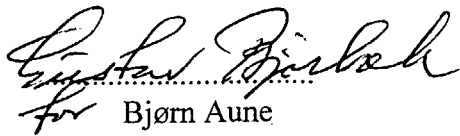
klima

BLOCK 5604/20 IN THE NORTH SEA, DANISH SECTOR. NUMBER OF OCCURRENCES OF SPECIFIED WEATHER CONDITIONS IN AUGUST AND SEPTEMBER.

Helle Tønnessen and Knut A. Iden

REPORT NO. 20/97 KLIMA



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<p>TITLE BLOCK 5604/20 IN THE NORTH SEA, DANISH SECTOR. NUMBER OF OCCURRENCES OF SPECIFIED WEATHER CONDITIONS IN AUGUST AND SEPTEMBER.</p>	
<p>AUTHOR</p> <p>Helle Tønnessen and Knut A. Iden.</p>	
<p>PROJECT CONTRACTOR</p> <p>KVÆRNER OIL & GAS, PROJECT NO. 3760</p>	
<p>SUMMARY</p> <p>6 hourly values of significant wave heights from the point 1258 (1955-1996) in the Norwegian hindcast archive are analysed with regard to 4 specified weather conditions during a 72 hours period. The number of occurrences are plotted against the different years together with the average waiting time.</p>	
<p>SIGNATURE</p> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">  <p>..... Knut A. Iden Senior scientist</p> </div> <div style="text-align: center;">  <p>..... for Bjørn Aune Head of the Climatology Division</p> </div> </div>	

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Contingency tables of wave height/period (HMO/TP) for Hindcast point 1258 for the months August and September.

APPENDIX 2

The specification of cases given by Kværner in telefax of 19.8.97.

Summary

6 hourly values of significant wave heights from the point 1258 (1955-1996) in the Norwegian hindcast archive are analysed with regard to 4 specified weather conditions during a 72 hours period. The number of occurrences are plotted against the different years together with the average waiting time.

1. Introduction

Statistical Weather information are very helpful when a feasible plan for conducting an installation offshore is made. However, meteorological and oceanographic observations offshore are not plentiful. For the actual position at block 5604/20, the nearest location with such data is Ekofisk. Here the measurements started in 1980. Missing data are occurring in this data series. This makes these data series unsuitable for the analysis needed without an infill procedure for generating the missing data.

2. About the data used

The data used is time series of waves (HM0) from the Norwegian hindcast archive. This is data generated from 6 hourly pressure fields for the period 1955-1996. The source of the pressure fields are until 1981 digitised weather maps and thereafter the numerical weather prediction system. From the pressure maps wind speed and direction are modelled. Through a hindcast technique, the wave fields are computed from the wind fields by our wave model WINCH 2.

The grid of the model is 75 km. The nearest grid point is the point 1258 (56.3°N,4.9°E) The position for the block 5604/20 where the weather information is sought is :

56°28'59''N
4°54'43''E

The point 1258 is thus very close to the actual position.

3. Results

For each weather condition defined below two periods of the year are analysed. These are August and September. Thus, for each weather condition definition two sets of figures are presented. The figures should be self-explanatory.

The counting of the weather conditions is done discrete. This means, a 72 hour period fulfilling the criterion will only appear once in the counting. Each wave height is given a duration of 6 hour.

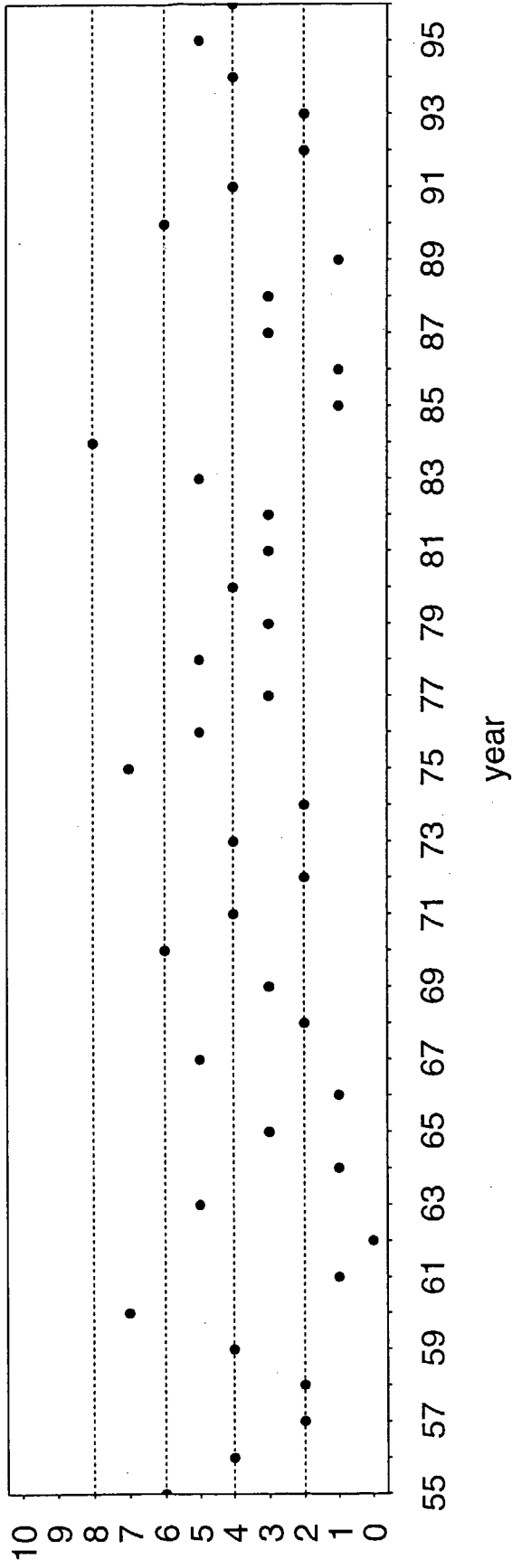
The waiting time for the first occurrence of an individual month is computed from the starting point of the month. The waiting time for the second occurrence is computed from the end of the first and so on. No occurrence will give the number of days in the month or in the period analysed (Aug.-Sept.) as the waiting time.

3.1.1 Definition of weather condition 1

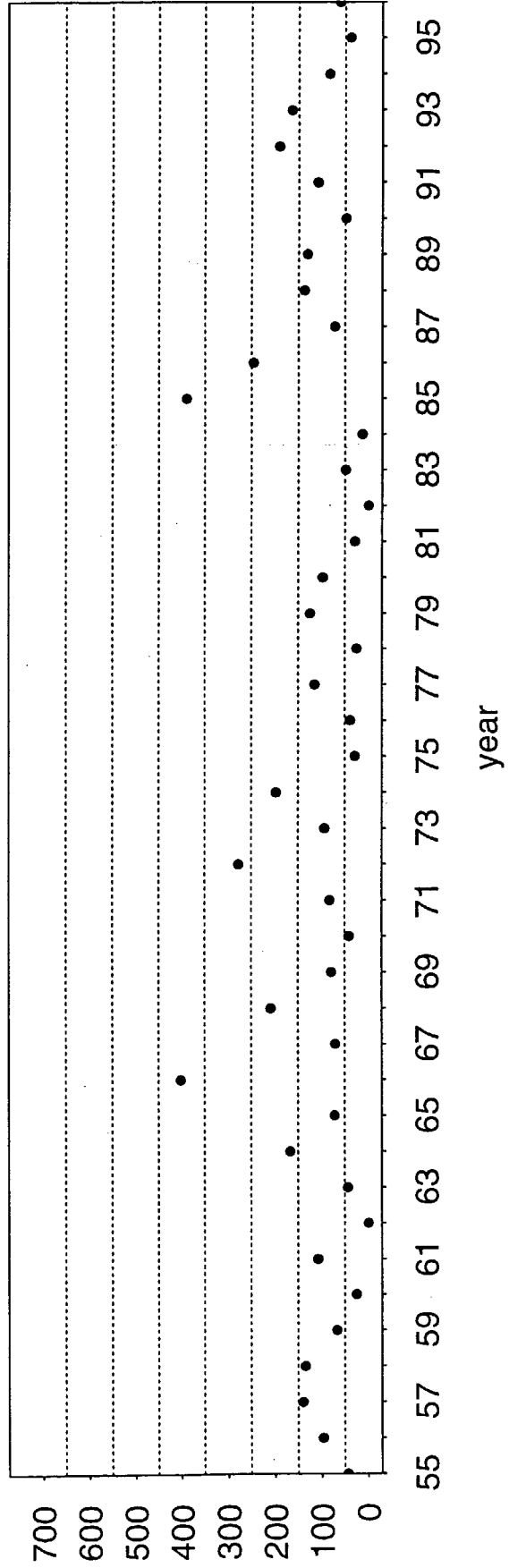
Hs below 1.5 m for a period of 72 hours.

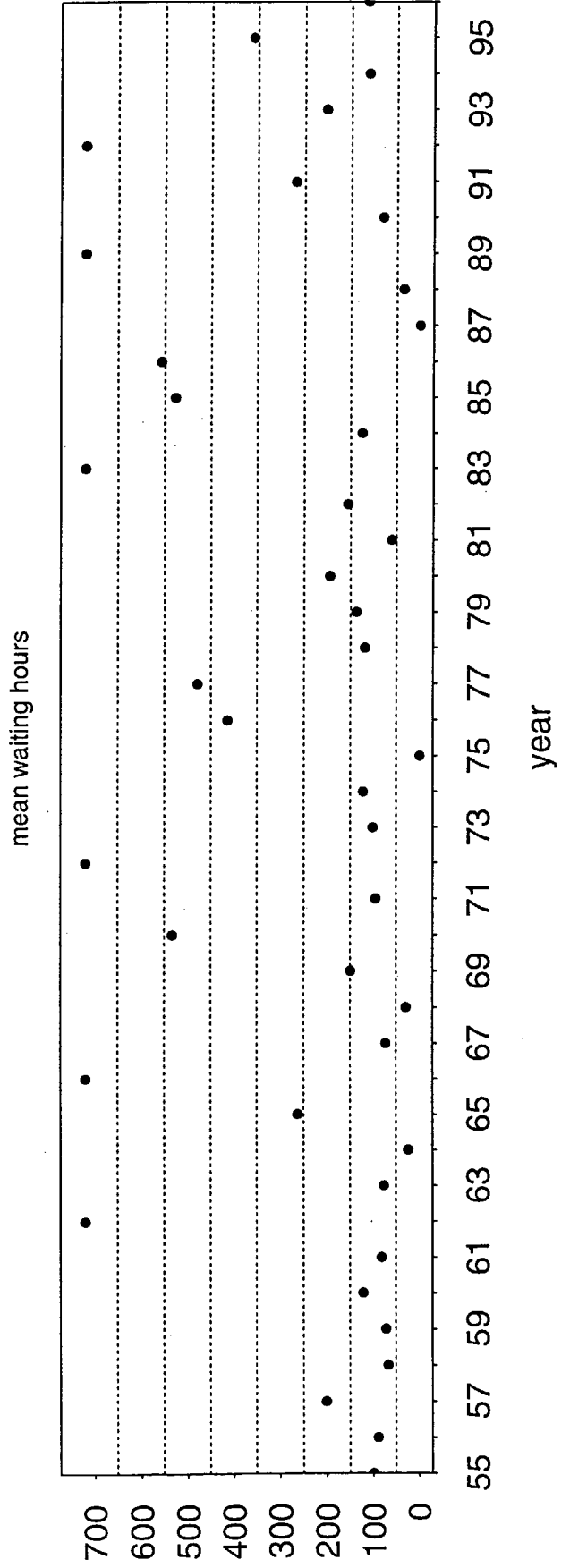
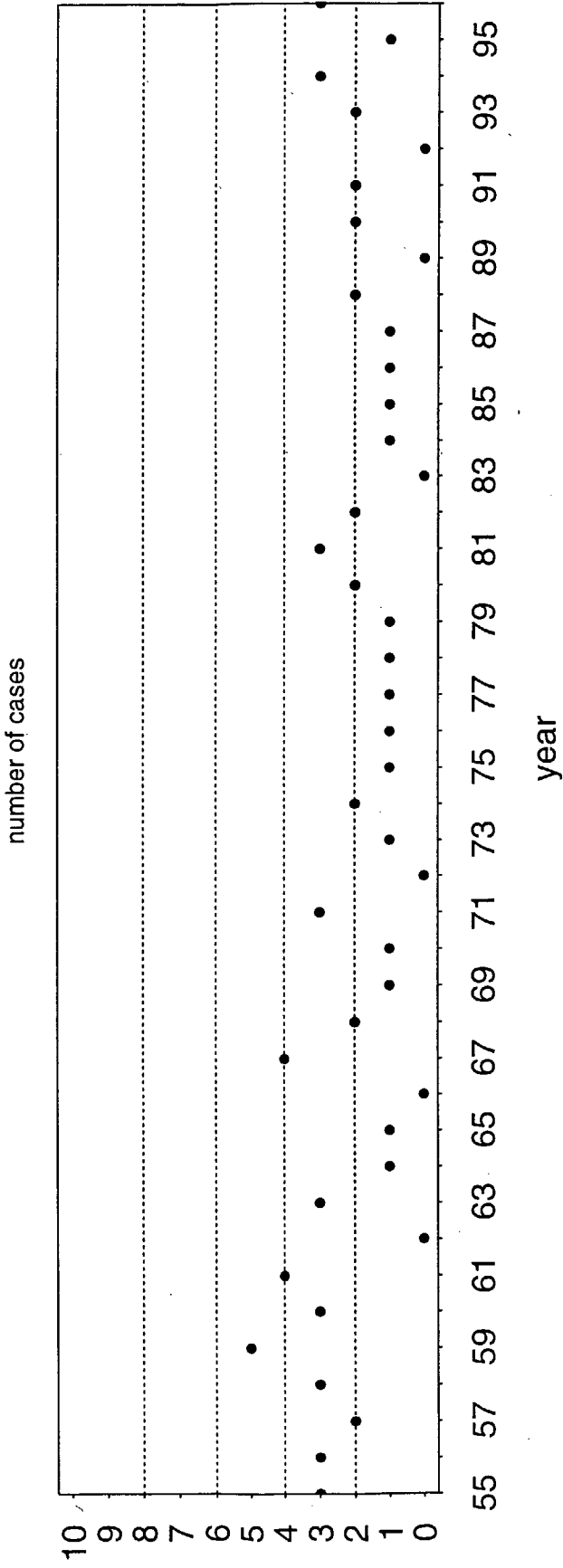
3.1.2 Number of occurrences - condition 1

number of cases



mean waiting hours

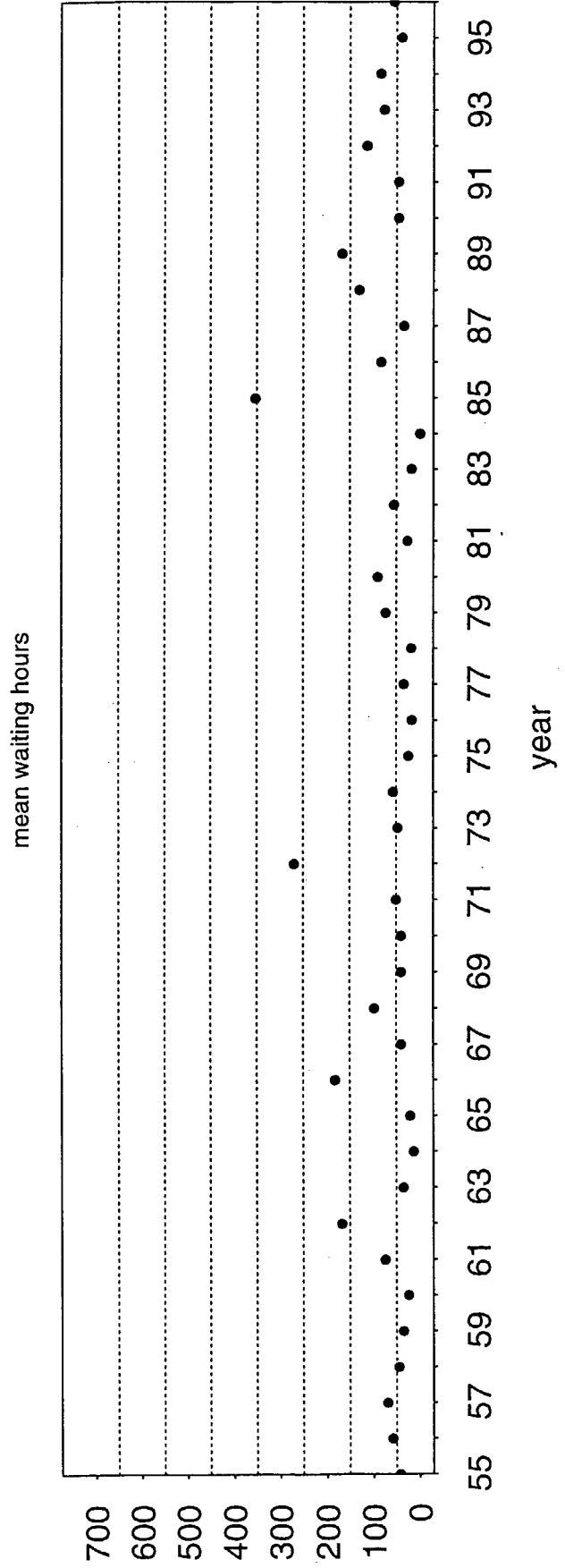
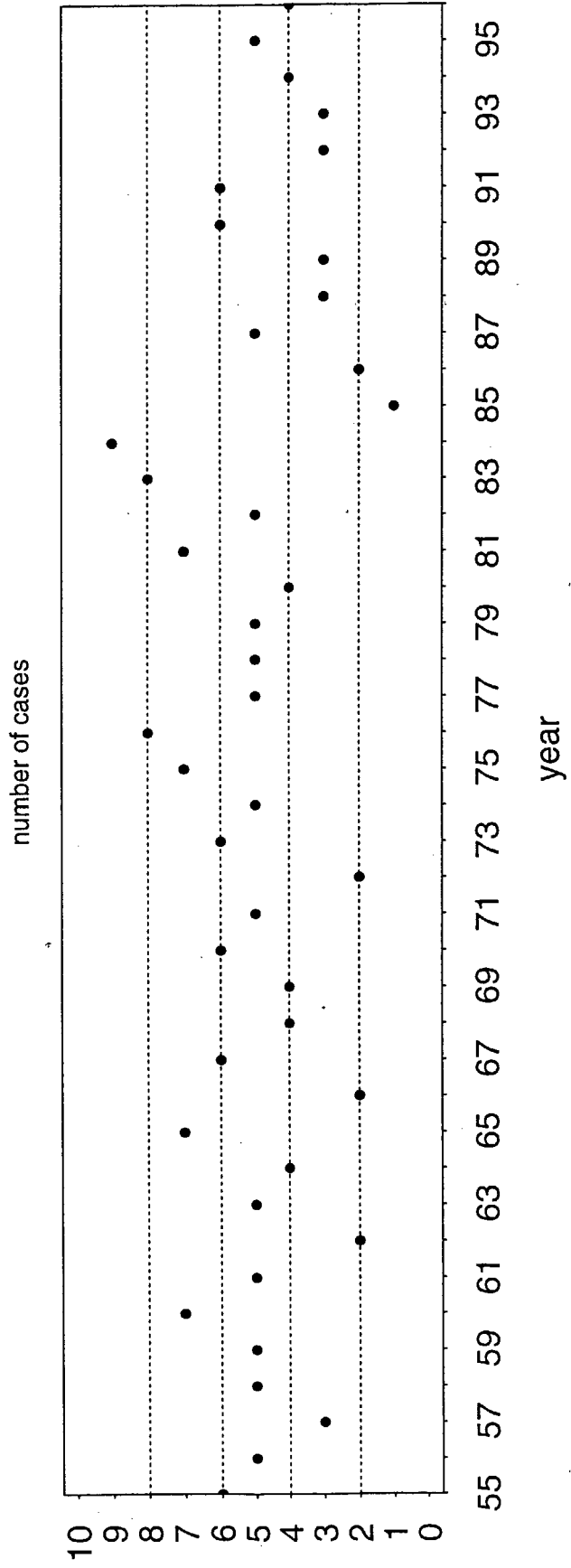




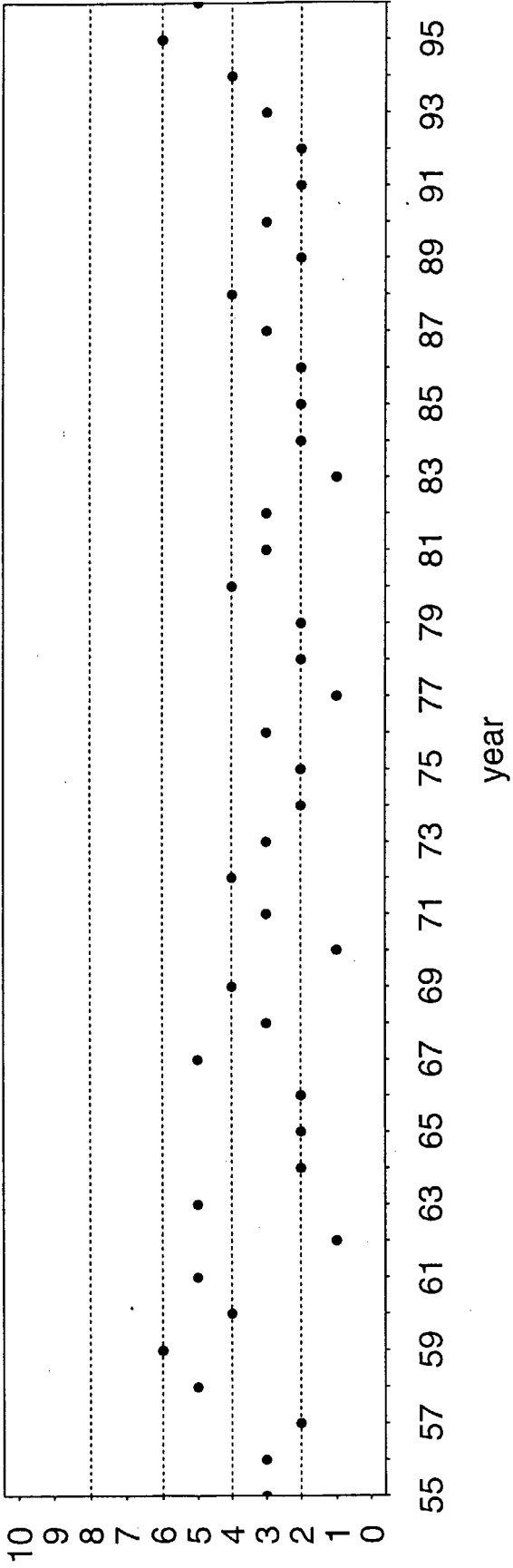
2.2.1 Definition of weather condition 2

Hs below 3 m for a period of 48 hours, decreasing to Hs 1.5 m for 24 hours (Total 72 hours).

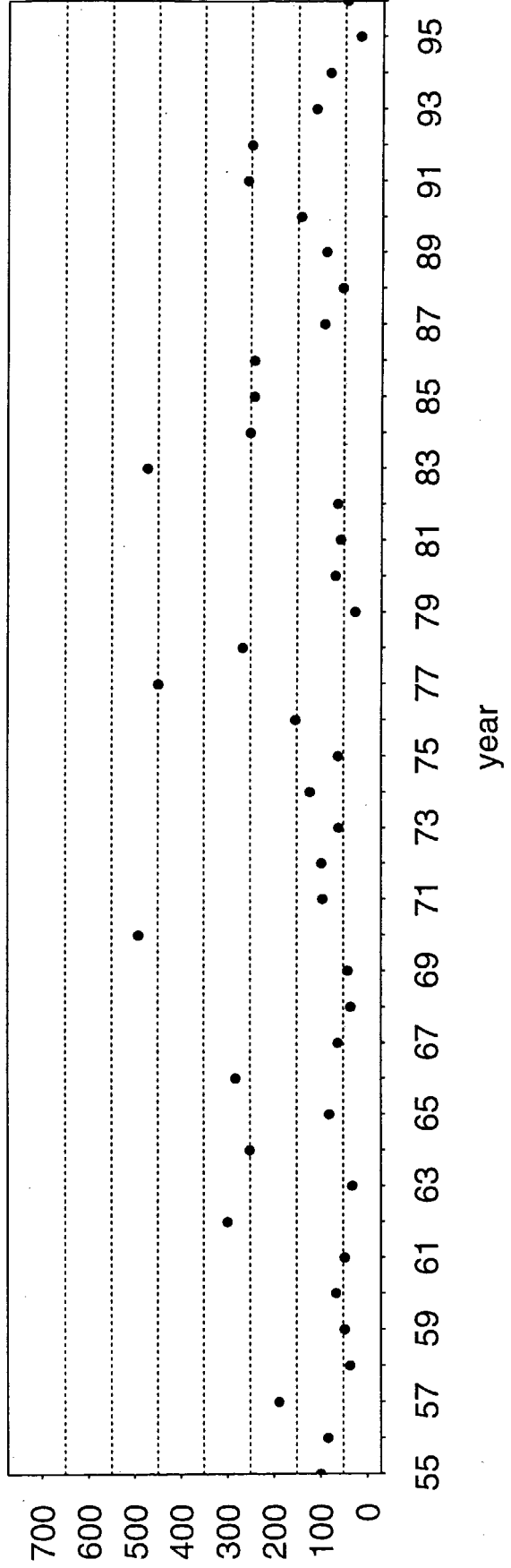
3.2.2 Number of occurrences - condition 2



number of cases



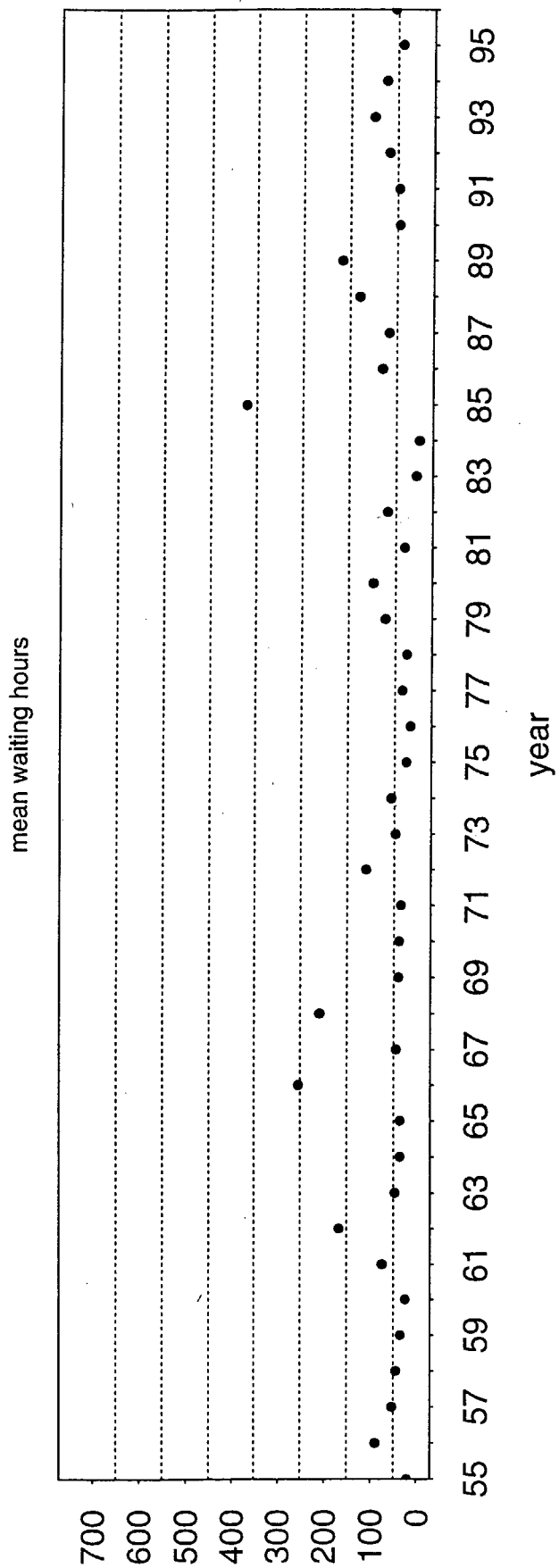
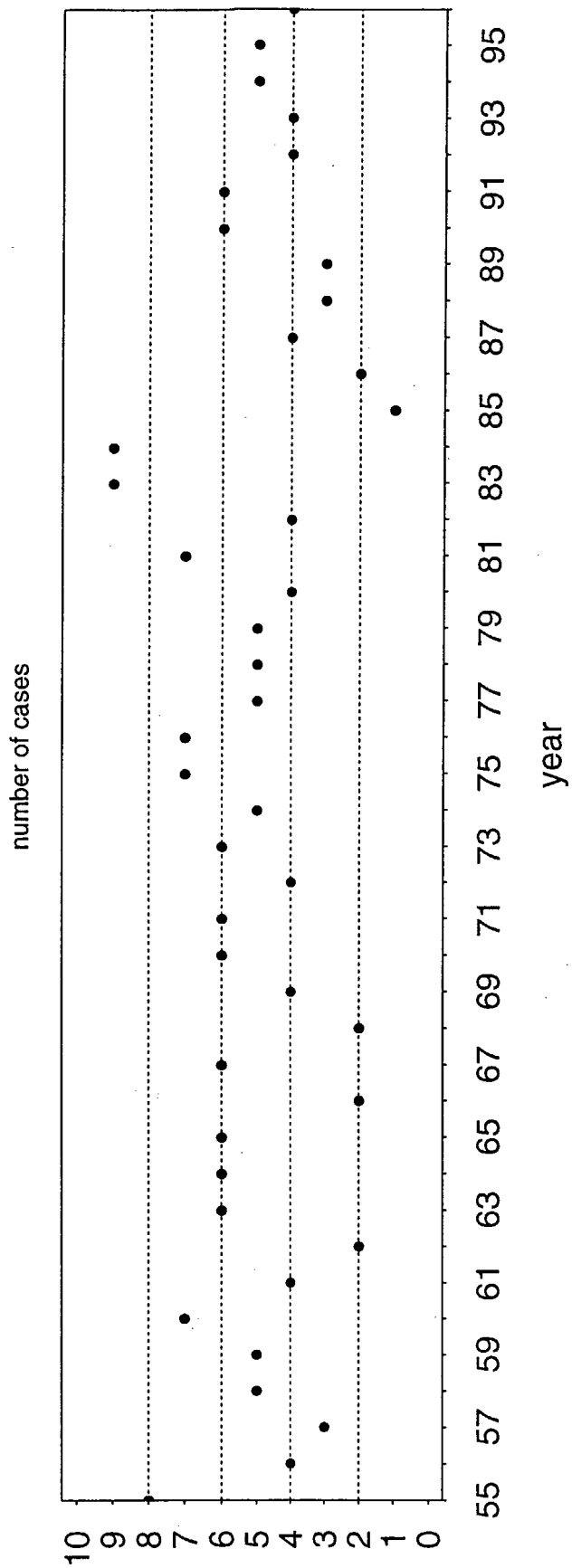
mean waiting hours



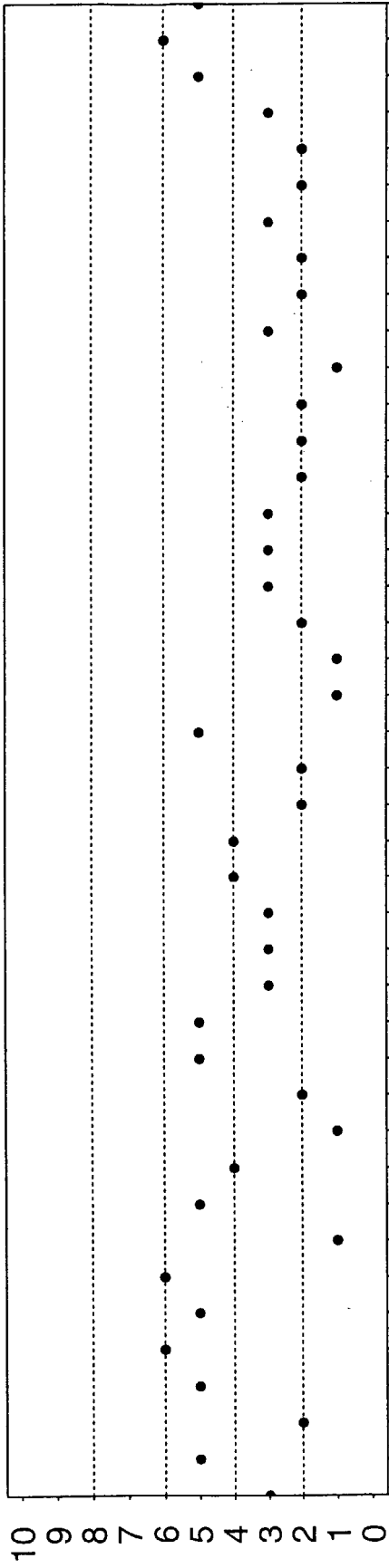
3.3.1 Definition of weather condition 3

Hs below 5 m for a period of 48 hours decreasing to Hs 1.5 for 24 hours (Total 72 hours).

3.3.2 Number of occurrences - condition 3

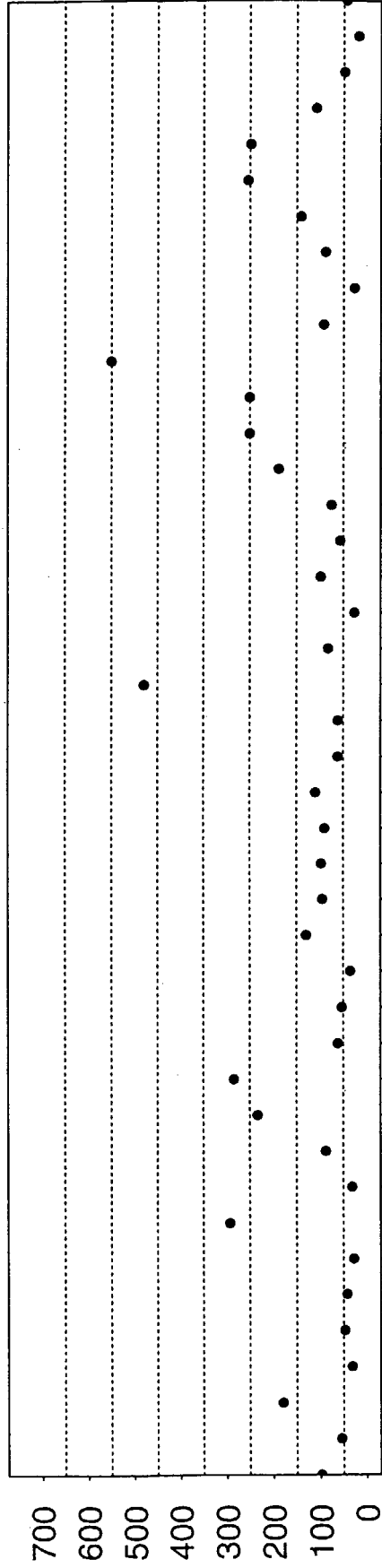


number of cases



year

mean waiting hours

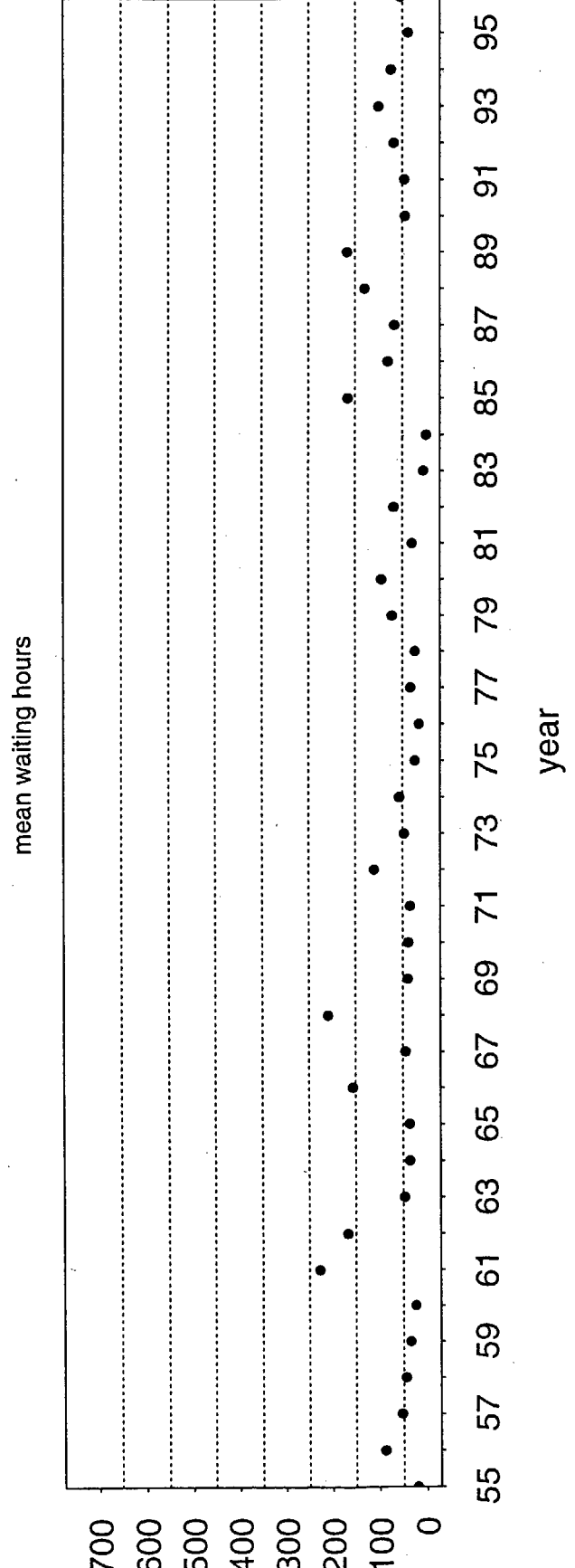
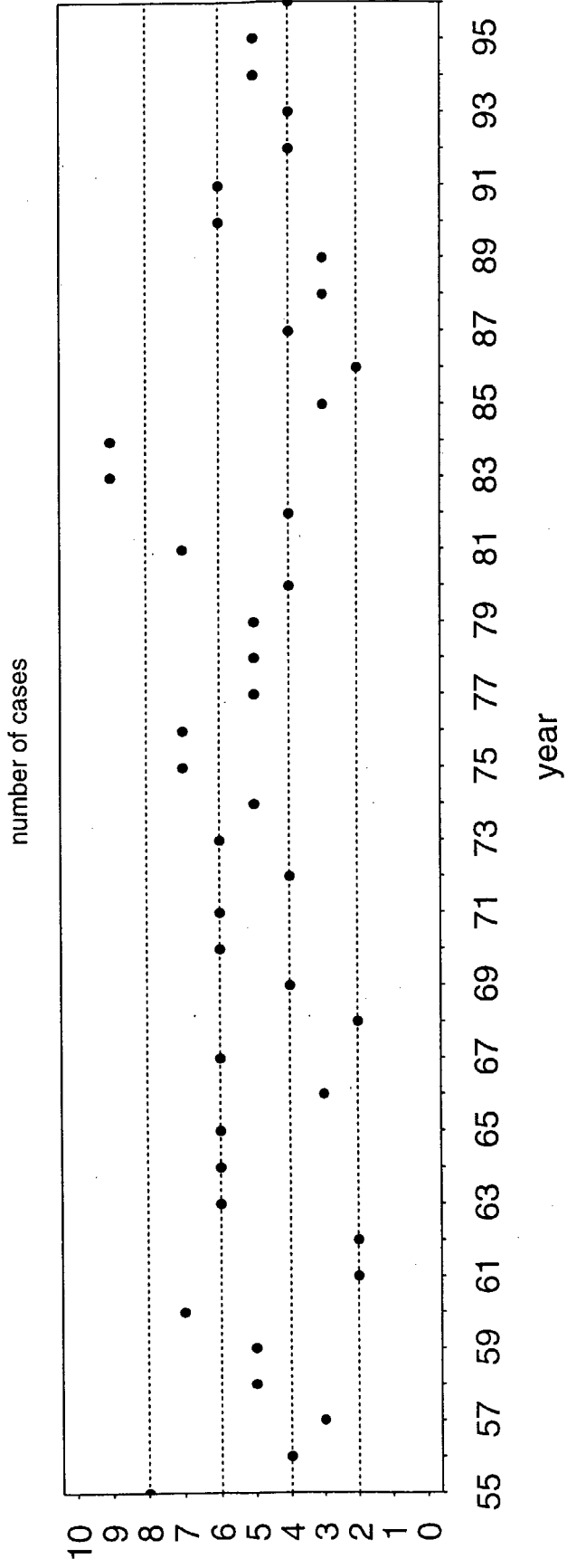


year

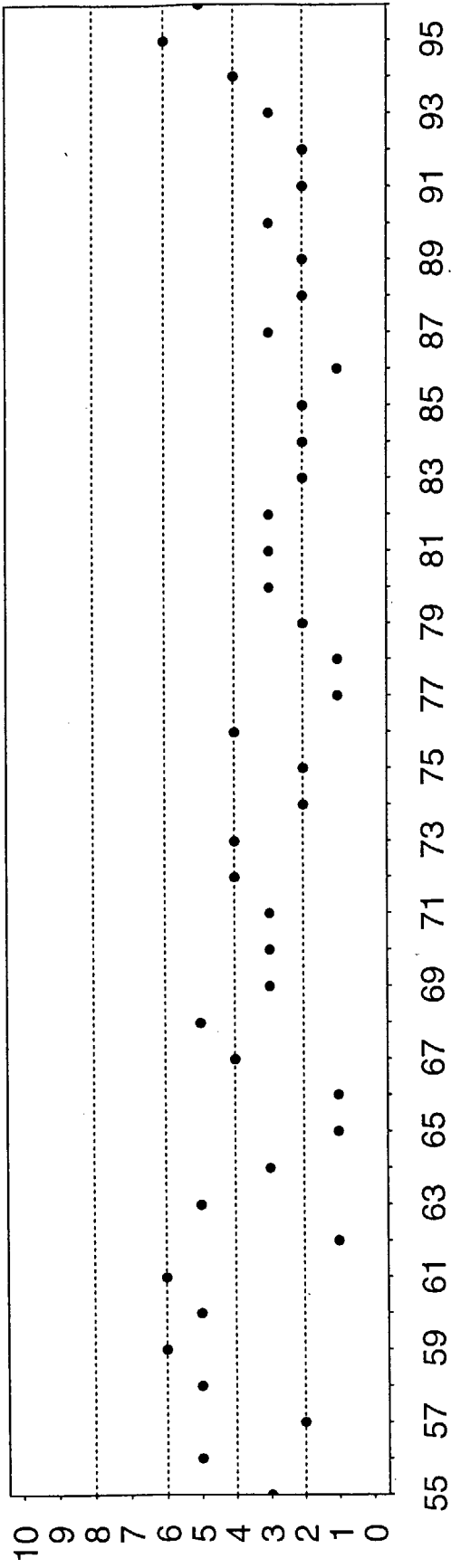
3.4.1 Definition of weather condition 4

Hs Below 8.5 m for a period of 48 hours, decreasing to Hs 1.5 m for 24 hours (Total 72 hours).

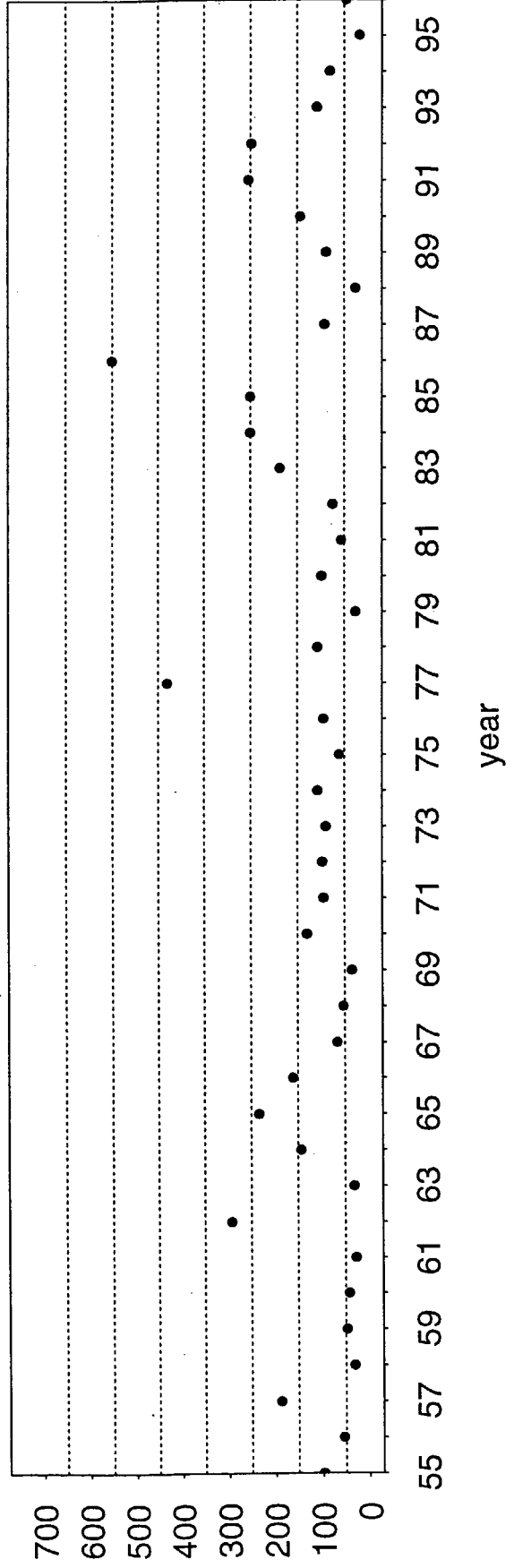
3.4.2 Number of occurrences - condition 4



number of cases



mean waiting hours



APPENDIX 1

Contingency tables of wave height/period (HMO/TP) for Hindcast point 1258 for the months of August and September.

FREQUENCY TABLE: TOTAL SEA HMO/TP
 HINDCAST DATA POINT : 1258
 POSITION: 56.3 N 4.9 E

AUGUST 1955 - 1996

TP(s)	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	13.9	>=14.0	SUM	MARG. PROB.	CUM. PROB.	MEAN TP	STDEV. TP	
HMO	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	13.9	>=14.0						
m	34	41	174	434	543	132	61	76	67	37	22	34	17	28	18	1718	32.99	32.9877	4.98	2.72		
0.0-0.9	2277	43.72	76.7089	6.45	1.65	
1.0-1.9	291	749	744	203	85	80	64	31	14	9	7	842	16.17	92.8763	7.64	1.13		
2.0-2.9	3	244	389	142	35	11	5	5	7	1	242	4.65	97.5230	8.87	0.86		
3.0-3.9	1	44	111	63	19	2	2	.	.	.	.	.	.	.
4.0-4.9	15	43	27	1	.	.	.	.	.	1.65	99.1743	9.68	0.63	
5.0-5.9	6	13	9	1	2	.	.	.	0.60	99.7696	10.74	0.94	
6.0-6.9	5	5	1	.	.	.	.	0.21	99.9808	11.14	0.54	
7.0-7.9	1	.	.	.	.	0.02100	0.0000	12.21	0.00	
8.0-8.9	0	0.00100	0.0000		
9.0-9.9	0	0.00100	0.0000		
10.0-10.9	0	0.00100	0.0000		
11.0-11.9	0	0.00100	0.0000		
12.0-12.9	0	0.00100	0.0000		
13.0-13.9	0	0.00100	0.0000		
>=14.0	0	0.00100	0.0000		

SUM	34	41	174	434	834	884	1050	712	420	264	161	87	41	46	26	5208
MAR. PROB.	0.65	0.79	3.34	8.33	16.01	16.97	20.16	13.67	8.06	5.07	3.09	1.67	0.79	0.88	0.50	
CUM. PROB.	0.65	1.44	4.78	13.11	29.13	46.10	66.26	79.93	88.00	93.07	96.16	97.83	98.62	99.50	100.00	
MAX. HMO	0.04	0.16	0.36	0.64	1.64	2.03	3.01	3.57	4.83	5.28	6.21	6.86	7.86	5.77	2.88	
MEAN HMO	0.00	0.10	0.27	0.51	0.94	1.28	1.71	2.05	2.33	2.54	2.66	1.98	1.66	1.26	0.91	
STDV. HMO	0.01	0.03	0.06	0.08	0.22	0.32	0.44	0.69	1.06	1.39	1.69	1.94	1.69	1.16	0.53	

MEAN HMO = 1.51m MEAN TP = 6.36s
 ST.DEV. HMO = 0.97m ST.DEV. TP = 2.33s
 MAX. HMO = 7.9m, 80 21 18, TP = 12.2s
 MAX. TP = 18.1s, 93 8 19 12, HMO = 0.6m
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 THE ENVIRONMENTAL DATA CENTER, P.O. BOX 43 BLINDERN,
 N 0313 OSLO, NORWAY.

FREQUENCY TABLE: TOTAL SEA HMO/TP
 HINDCAST DATA POINT : 1258
 POSITION: 56.3 N 4.9 E

SEPTEMBER 1955 - 1996

TP (s)	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	13.9	>=14.0	SUM	MARG. PROB.	CUM. PROB.	MEAN TP	STDEV. TP
HMO	0.9	1.9	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9	10.9	11.9	12.9	13.9	13.9						
m	10	24	69	201	333	75	60	58	47	23	21	25	22	20	19	1007	19.98	19.9802	5.55	2.99	
0.0-0.9	214	608	686	180	124	105	76	55	23	26	29	2126	42.18	62.1627	6.89	2.11	
1.0-1.9	7	312	482	203	42	39	54	51	31	23	11	1204	23.89	86.0516	8.09	1.76	
2.0-2.9	99	193	76	35	21	14	11	13	462	9.17	95.2183	9.19	1.63		
3.0-3.9	20	63	32	17	7	6	4	149	2.96	98.1746	10.26	1.41		
4.0-4.9	7	31	16	3	3	8	1	66	1.31	99.4841	11.07	1.26	
5.0-5.9	5	9	2	2	4	20	0.40	99.8810	12.07	1.51		
6.0-6.9	1	4	0.08	99.9603	12.90	1.55		
7.0-7.9	2	0.04100	.0000	14.78	0.69		
8.0-8.9	0	0.00100	.0000			
9.0-9.9	0	0.00100	.0000			
10.0-10.9	0	0.00100	.0000			
11.0-11.9	0	0.00100	.0000			
12.0-12.9	0	0.00100	.0000			
13.0-13.9	0	0.00100	.0000			
>=14.0	0	0.00100	.0000			

SUM	10	24	69	201	547	690	1058	819	587	316	239	199	100	97	84	5040				
MAR. PROB.	0.20	0.48	1.37	3.99	10.85	13.69	20.99	16.25	11.65	6.27	4.74	3.95	1.98	1.92	1.67					
CUM. PROB.	0.20	0.67	2.04	6.03	16.88	30.58	51.57	67.82	79.46	85.73	90.48	94.42	96.41	98.33	100.00					
MAX. HMO	0.04	0.16	0.35	0.64	1.62	2.29	2.97	3.95	4.72	5.45	6.59	7.15	5.63	7.15	8.84					
MEAN HMO	0.01	0.11	0.27	0.51	0.97	1.36	1.77	2.23	2.53	2.75	2.92	2.70	2.20	2.46	2.39					
STDV. HMO	0.02	0.03	0.06	0.08	0.22	0.32	0.46	0.72	0.96	1.33	1.61	1.66	1.32	1.65	1.92					

MEAN HMO = 1.89m MEAN TP = 7.30s
 ST. DEV. HMO = 1.10m ST. DEV. TP = 2.54s
 MAX. HMO = 8.8m, 90 9 20 6, TP = 15.3s
 MAX. TP = 16.6s, 95 9 22 18, HMO = 0.9m

THE NORWEGIAN METEOROLOGICAL INSTITUTE,
 THE ENVIRONMENTAL DATA CENTER, P.O. BOX 43 BLINDERN,
 N 0313 OSLO, NORWAY.

APPENDIX 2

The specification of cases given by Kværner in telefax of 19.8.97.

Kværner Oil & Gas Norway

Kværner Rosenberg a.s, Kværner Engineering a.s

SIRI CENTRAL FIELD DEVELOPMENT PROJECT

TELEFAX

Date: 19.08.97
To Company: DNMI
Fax no.: 22 96 30 50
Att: Knut A Iden
From: Siri Central Field Development Project Team
c/o Kværner Engineering a.s.
P.O. Box 222
1324 Lysaker
Norway
Telefax No. (+47) 67 59 47 50
Telephone: (+ 47) 67 59 50 50

*Copy: MSE
EVO
KOH*

Name: Jan Skjong/K.O.Haakonsen

Subject: **Hindcast for SIRI field :**
Wave occurrence investigation for block 5604/20 in
the Danish sector 56deg 28' 59" North 4deg 54'
43" East for August and September

Our Ref.: C080-FAX-KV-MI-00036

Project. No.: _____ No. of Pages _____ + this page

KOGAS are presently investigating tow and installation of a jack-up. As part of this investigation DNMI have previously performed an analysis of weather pattern for October and November for Block 5604/20 in the Danish sector (DNMI report 15/97 KLIMA). KOGAS intend to perform an investigation at DNMI for the same weather pattern for August and September. Please perform the analysis for a specified weather pattern over the years from 1955- 1996 taking into account that the waves needs time to settle.

- Condition 1 Below 1,5 m Hs for a period of 72 Hours
- Condition 2 Below 3 m Hs for a period of 48 hours decreasing to 1,5 m Hs for 24 Hours (Total 72 hours)
- Condition 3 Below 5 m Hs for a period of 48 hours decreasing to 1,5 m Hs for 24 Hours (Total 72 hours)
- Condition 4 Below 8,5 m Hs for a period of 48 hours decreasing to 1,5 m Hs for 24 hours (Total 72 hours)



SIRI CENTRAL FIELD DEVELOPMENT PROJECT

TELEFAX

The analysed months shall be August and September

Reporting:

Reporting language: English

The report shall present the results:

- 1 Number of occurrence pr month
- 2 Maximum waiting time until the condition is met

The analysis shall be performed on an agreed hourly rate up to an agreed limit of hour.
Official purchase order will be issued within a few days.

As agreed the report to be finished within Friday 23/8-97

If any clarifications are required please contact undersigned 67 59 48 82

Best regards


Jan Skjong

KVÆRNER

SIRI PROJECT

SIRI PROJECT 47 6759 4750

21.AUG.1997 8:54

NR. 433 S. 2/2