Geschäftsbereich
Montage

BABCOCK
DEUTSCHE BABCOCK
WERKE
AKTIENGESELLSCHAFT

~~NTSB D003~~
NTSB D08

Dokumentation

Kennwort SS Norway

Kom.-Nr. 18-9790-999

NCL-139375

Box 9

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

WORK CARRIED OUT

Code

Job No. 18-9790-999

SS NORWAY

Repair to the Steam and Lateral Drum of Boiler 21 in the SS Norway from 7.11. - 21.11.1987

On the above-mentioned drums, the signs detected by the VETCO Co. in September 1987 were to be repaired by building up. For the work, working instructions were drawn up (Appendix 1) which were handed in to the Veritas office for authorization.

Repair of the Lateral Drum

The straight seams were prepared for inspection by means of slight grinding at those points previously ground and they were subsequently subjected to a surface cracking test.

An MP Test was firstly carried out which did not result in a satisfactory result as the corrosion pitting was too deep and sharp-edged.

Following that, a FE Test was effected. Here again, an assessment was very difficult. Photos 1 - 4 show the upper seam. The lengths refer to the distance from the rear circumferential seam to the front. Phot 5 shows the area of the indications recorded in the report at approx. 2280 mm. As the area was ground prior to the testing, only a 7 mm. long sign remains. To the left on the photo, corrosion pitting is recognizeable which, despite the most thorough cleaning,resulted in indistinct signs.

After the surface crack test, wall thickness measurements were carried out on a random basis with the result that partial areas had to be applied.

NCL-139376

Erection division	Date	Signature	Date	Signature
	18.2.88	DEUTSCHE BABCOCK WERKE AG G ZAC AU 12		

SS NORWAY

As welding could not be avoided, the deep corrosion pitting was ground. The large extent of corrosion pitting was in the transitional zone of filler metal to basic material.

Photos 6 - 8 show a part of the deeply grounded points of the upper seam and photos 9 - 11 reveal the grounded sections of the lower seam. A list of the grounded sections is attached in Appendix 2. The absence of defects of the grounded sections was proven by means of a MP Test.

Working in sections, the seams were pre-heated from inside, welded and post-heated for 1 hour. Photo 12 shows the upper seam and photo 13 the lower seam with the resistive elements provided. A welded seam can be seen on photo 14. Photos 15 - 22 show sections of the upper seam.

After post-heating and cooling the seam, the annealing layers were smoothed and the build-up was worked for as long as it was flush to the metal.

After grinding, a MP Test was carried out which revealed no inadmissible indications. The test report is attached in Appendix 3.

A dimensional report (Appendix 4) was drawn up for the subsequent wall thickness measurements.

A hardness test for the completed seam was carried out by means of the EQUOTIP appliance of the PRECEY SA company. The result has been compiled in Appendix 5, Pages 1 - 4. No inadmissibly high hardness values were detected.

NCL-139377

SS NORWAY

Photos 24 - 29 show the finished upper seam and the photos 30 - 32 show the finished lower seal.

On photos 33 and 34, corroded sections of the lower seam are to be seen which were left as they were.

Repair of the Steam Drum

The front circumferential seam of the steam drum according to the inspection report of the VETCO Co. revealed an indication which could not be removed without going under the minimum wall thickness. This sign was also checked from the BK Werkstofftechnik Co.. The defect position was stated approx. 14 mm beside the welding seam melting line in the course and as a 7 mm length.

During the inspection for the repair, there were doubts raised as to the defect position. At the same time at a distance of around 300 mm a grounded trough was found which was to be filled in when proceding with the designated repair.

The position of both troughs is given in Appendix 6. As the preparation for a FE Test, both points were lightly ground. At trough 1, the following signs were found on a length of 13 mm (from l. to r.): linear 1mm; point-shaped; linear 2mm; point-shaped. Photo 35 shows the result.

At trough 2, 4 point-shaped signs were found which are to be seen on photo 36. Photo 37 shows both troughs.

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SS NORWAY

The signs were removed in both troughs by grinding and the absence of cracks was established by means of a MP Test.

In both troughs, the signs were found at the melting line between circumferential seam and coating metal.

The trough was in a section which had already been repaired once before.

This repair is in the base section and is probably the reason for the wrong indication of the defective position by the BK Werstofftechnik Co. Appendix 7 shows a diagram of the situation and photo 38 shows the grounded trough and, on the right, one can make out the circumferential seam made visible through macro-etching.

Prior to welding, the repair area was subjected to a hardness test and the result is compiled in Appendix 8. The grounded point as such could not be checked with the EQUOTIP appliance used as it was not possible to support the appliance in view of the prevailing shape. For welding, both points were jointly heated from outside with resistor elements. Appendix 9 shows the arrangement of the elements. The temperature readings were taken from inside.

NCL-139379

SS NORWAY

After the post-heating, the annealing layers were ground and a hardness test was carried out. The result is compiled in Appendix 10. Appendix 11 contain the measured results of the wall thickness measurements. The final MP Test revealed no signs and the test report is attached in Appendix 12.

Photos 39 and 40 show the finished defective position 1.
On the photos, the course of the melting line is marked in chalk.

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Job No. 18-9790-999

SS NORWAY

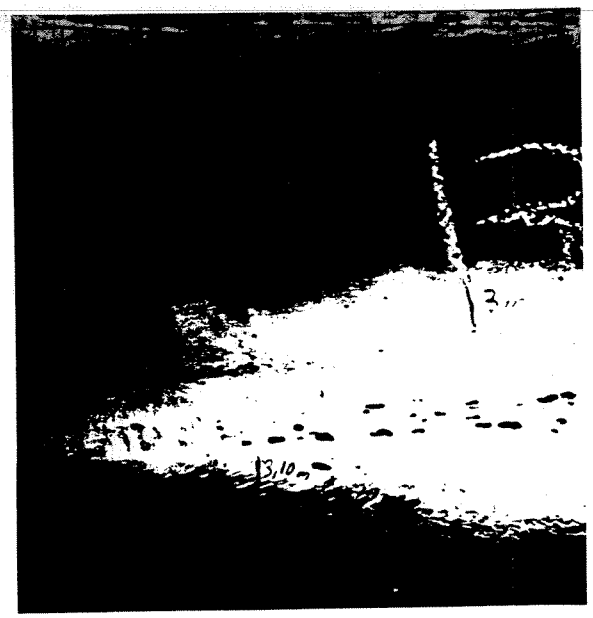


Photo 1

Upper seam lateral Drum

Photo 2

NCL-139381

Vordruck Ausgabe

Erection division	Date	Signature	Date	Signature

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

WORK CARRIED OUT

Code

Job No. 18-9790-999

SS NORWAY

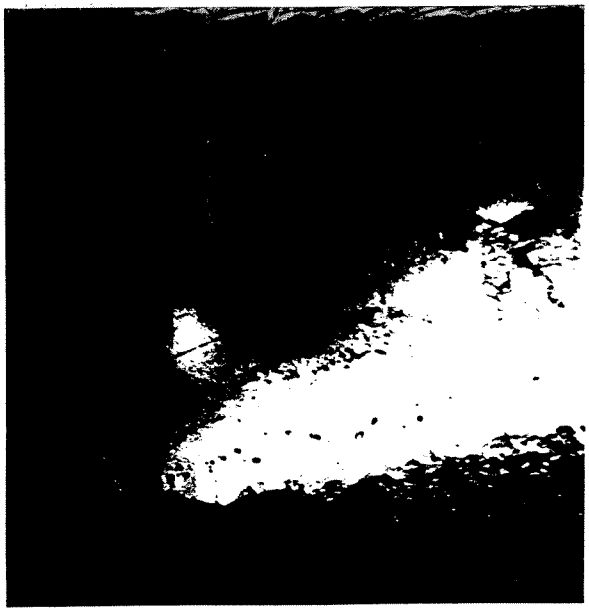


Photo 3

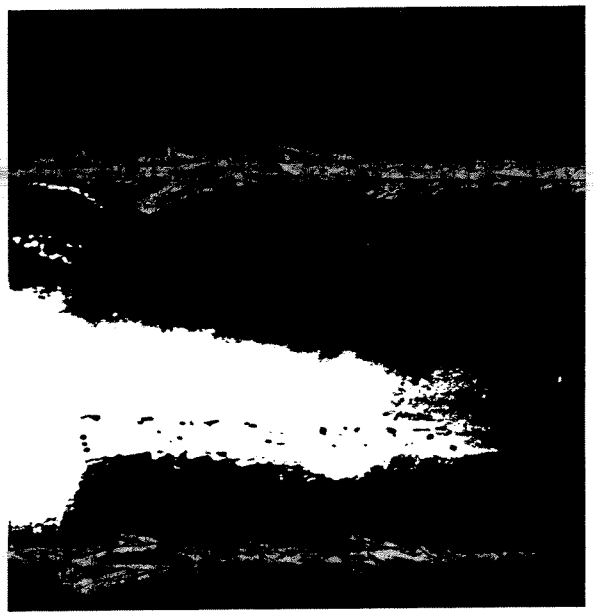


Photo 4

NCL-139382

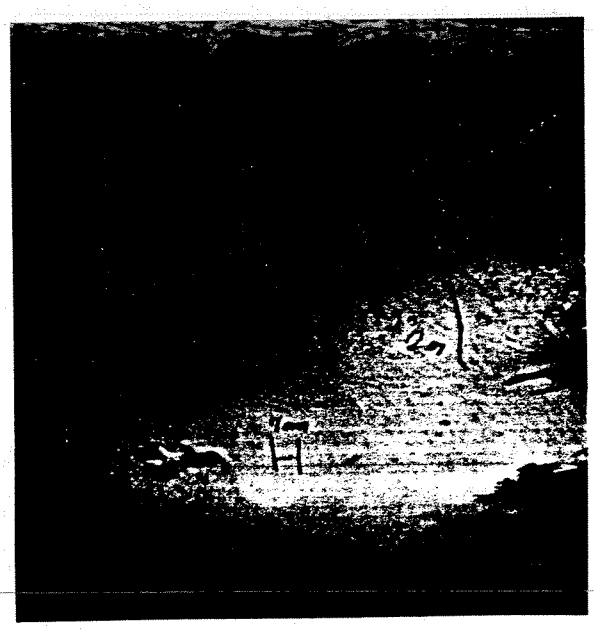
Vordruck Ausgabe

Erection division	Date	Signature	Date	Signature
		DEUTSCHE BABCOCK WERKE AG BETRIEB G ZACHAU		

Code

Job No. 18-9790-999

SS NORWAY



Indication at approx. 2280 mm.

Photo 5

Photo 6

NCL-139383

Deeply grounded points of the upper seam

Vordruck Ausgabe

Erection division	Date	Signature	Date	Signature
		DEUTSCHE BABCOCK WERKE AG ZACHAU		

Code

Job No. 18-9790-999

SS NORWAY

Photo 7

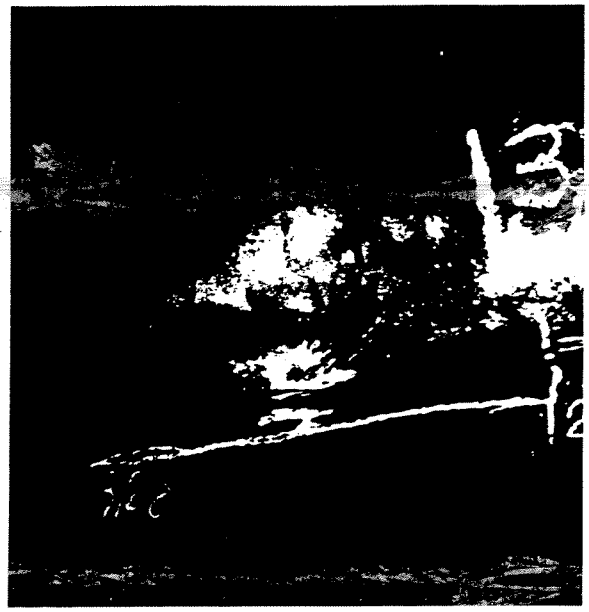


Photo 8

NCL-139384

Code

Job No. 18-9790-999

SS NORWAY

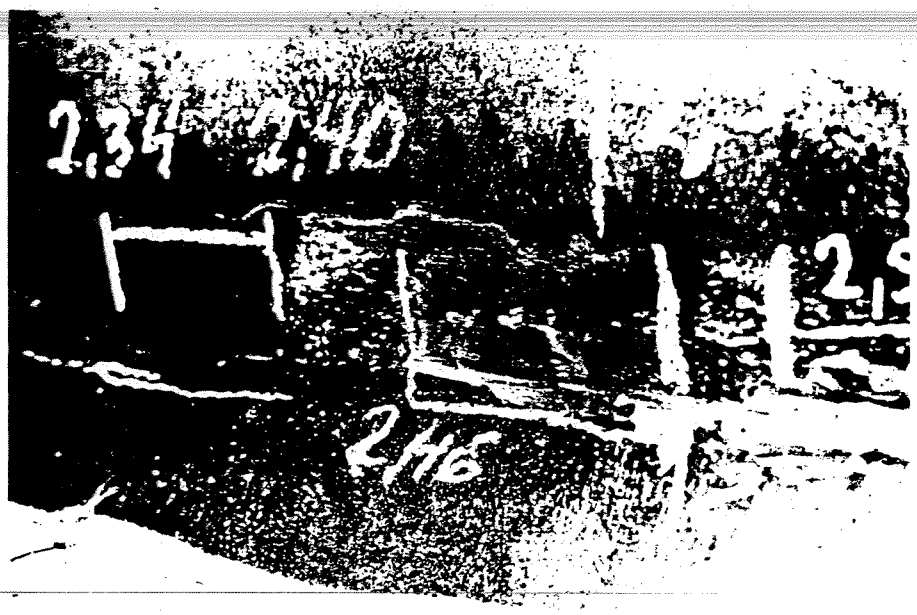


Photo 9

Deeply grounded points of the lower seam

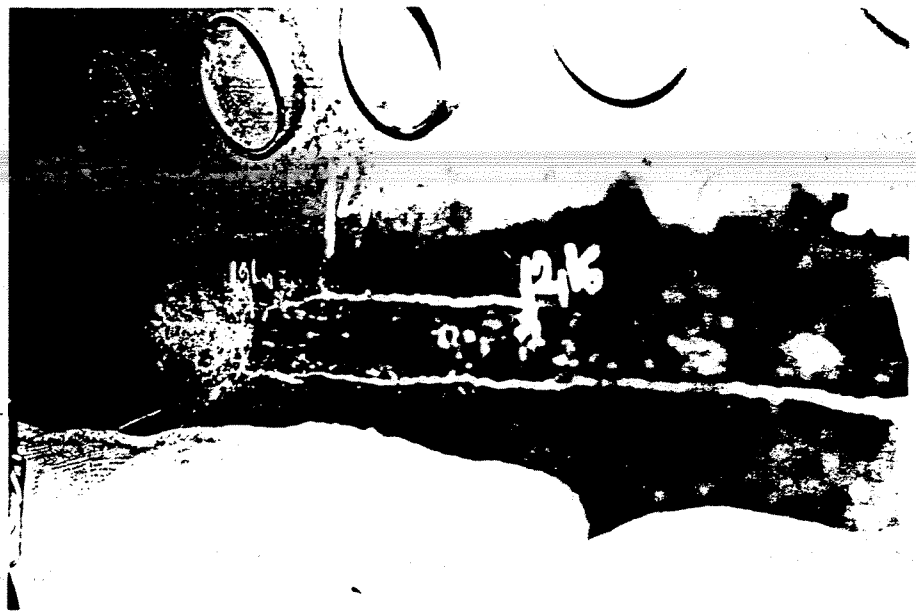


Photo 10

NCL-139385

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DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

WORK CARRIED OUT

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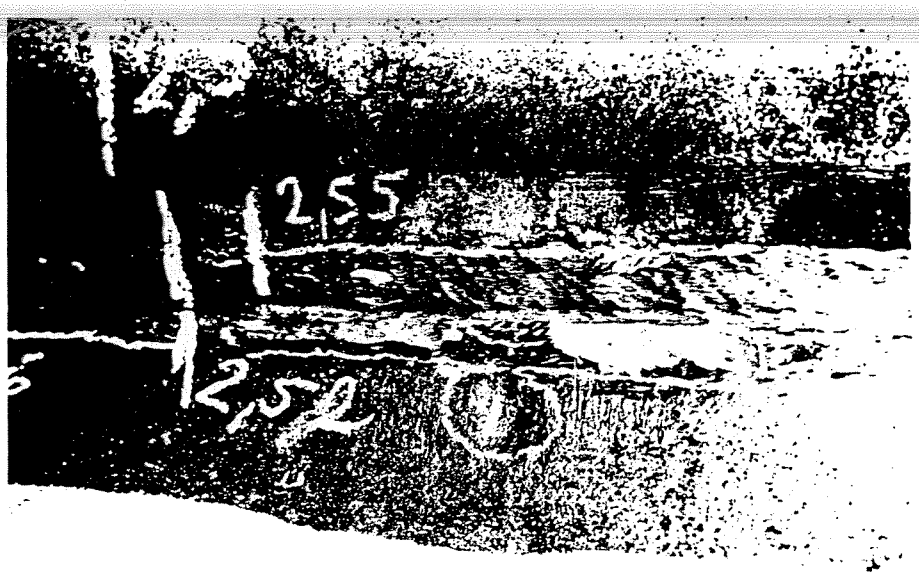

Photo 11

Photo 12

Upper seam with the resistive elements provided

NCL-139386

Vordruck Ausgabe	Erection division	Date	Signature	Date	Signature

SS NORWAY

Photo 13

Lower seam with the resistive elements provided

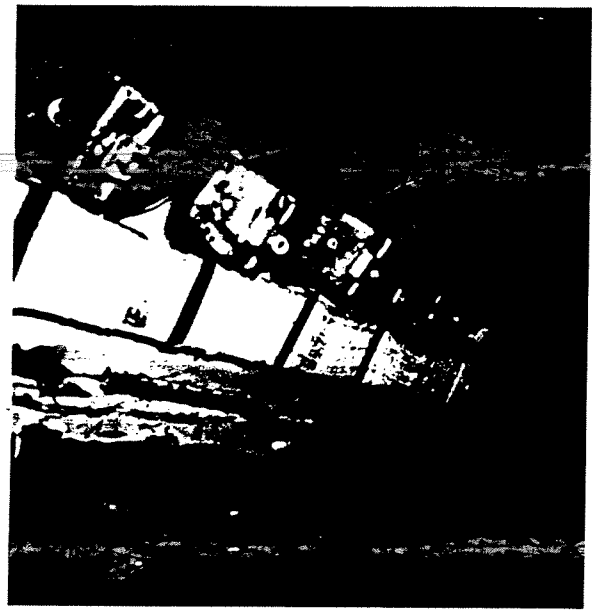

Photo 14

Welded seam

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Job No. 18-9790-999

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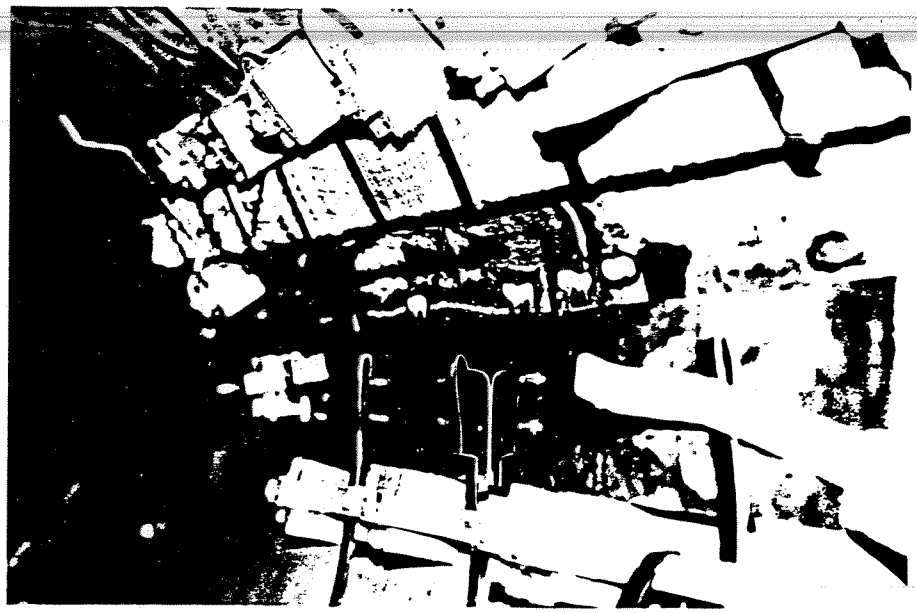

Photo 15

Section of the upper seam

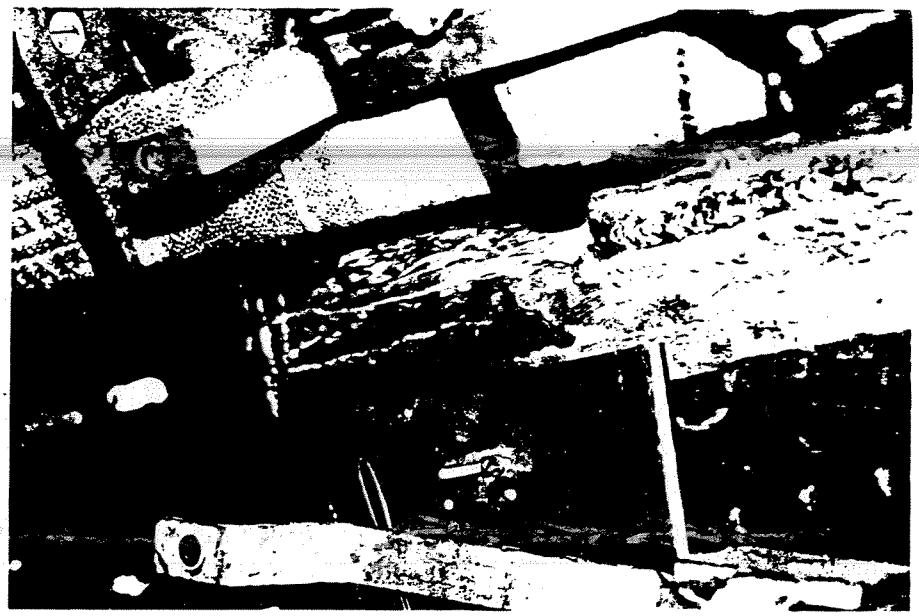

Photo 16

NCL-139388

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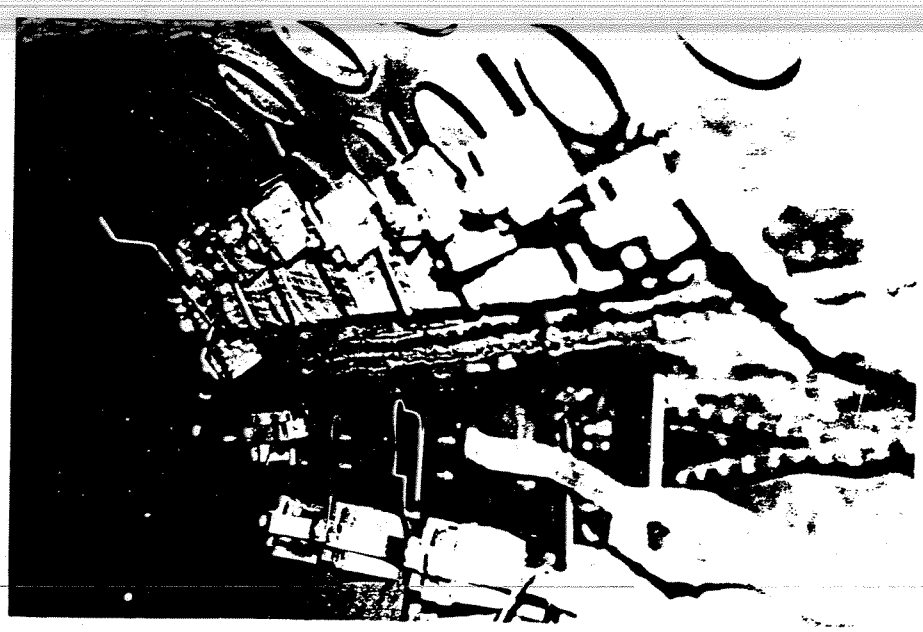

Photo 17

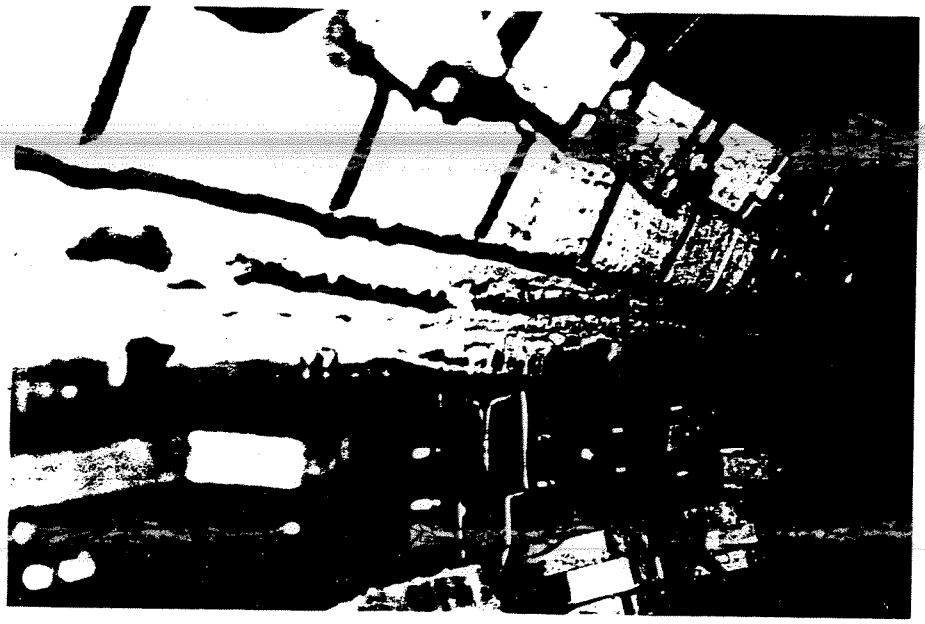

Photo 18

NCL-139389

Vordruck / Ausgabe		Date	Signature	Date	Signature
	Erection division		DEUTSCHE BABCOCK WERKE AG G. ZACHAU		

Code

Job No. 18-9790-999

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Photo 19

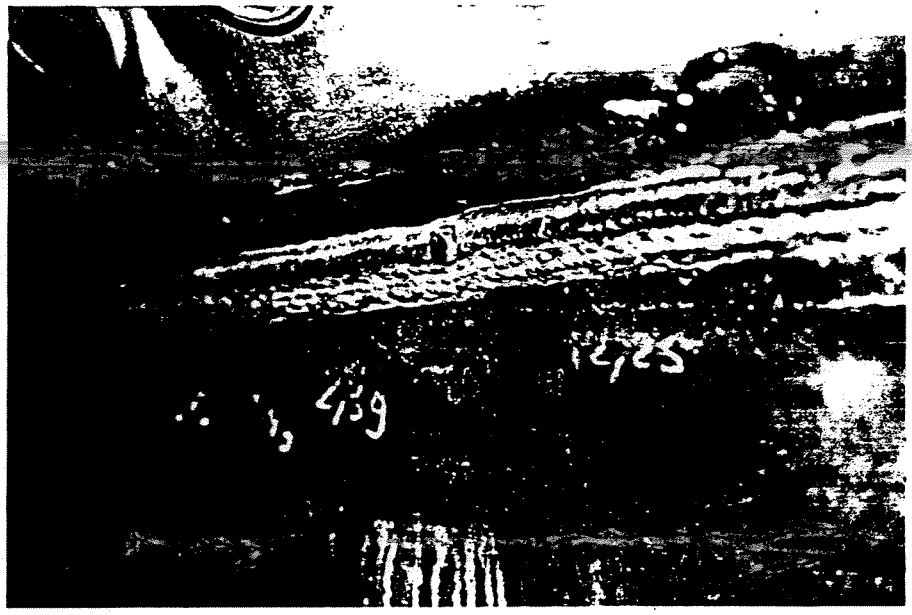

Photo 20

NCL-139390

Code

Job No. 18-9790-999

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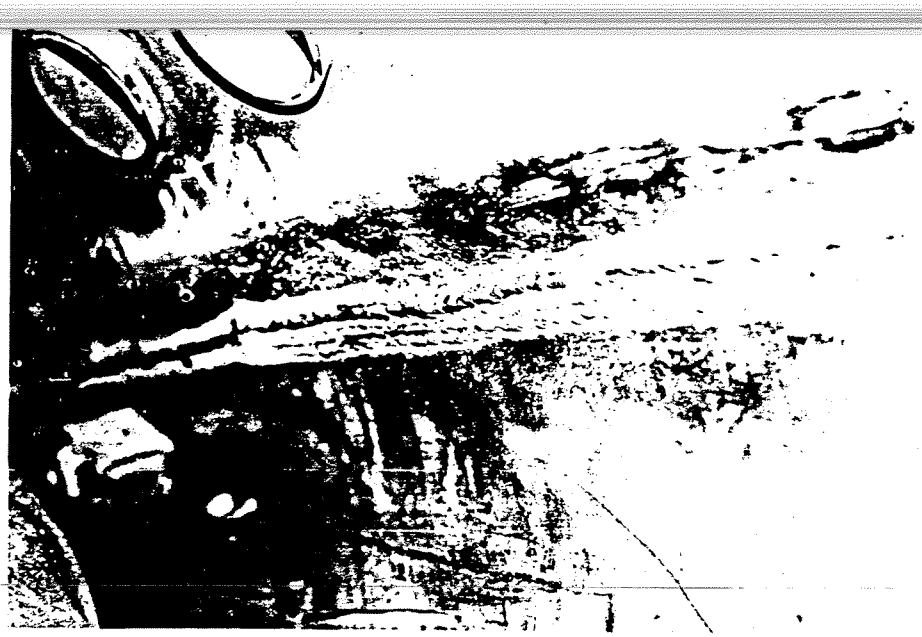

Photo 21

Photo 22

NCL-139391

SS NORWAY

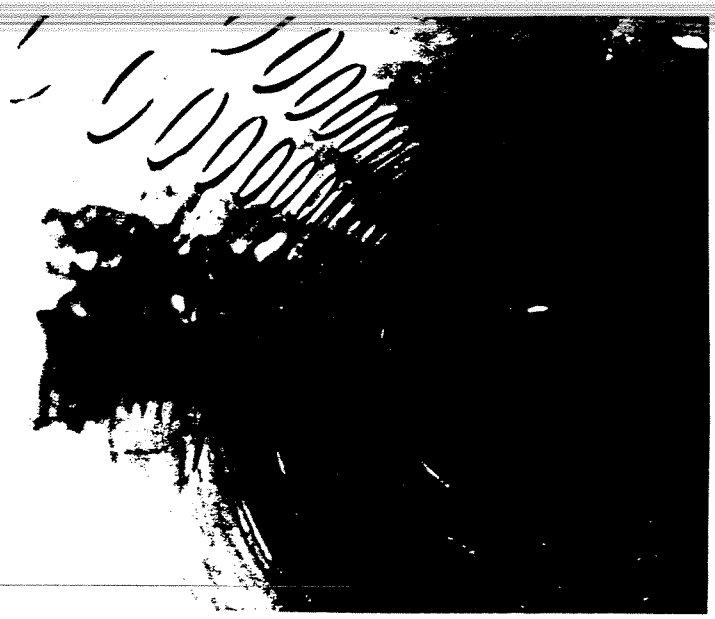

Photo 23

Upper seam lateral Drum

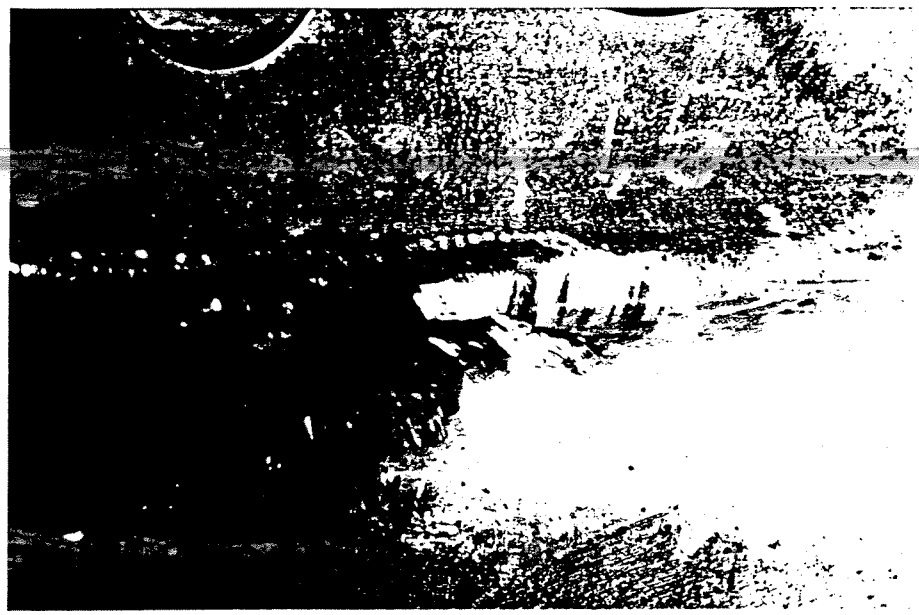

Photo 24

Section of the upper seam

NCL-139392

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DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

WORK CARRIED OUT

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Job No. 18-9790-999

SS NORWAY

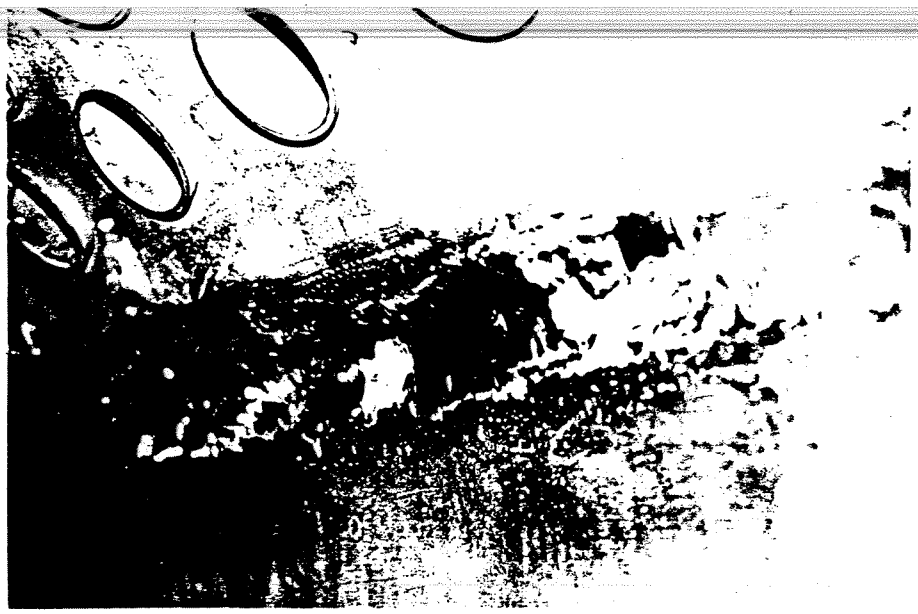

Photo 25

Photo 26

NCL-139393

Vordruck Ausgabe

Erection division	Date	Signature	Date	Signature
		DEUTSCHE BABCOCK WERKE AG G. ZACHAU 12		

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DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

WORK CARRIED OUT

Code

Job No. 18-9790-999

SS NORWAY

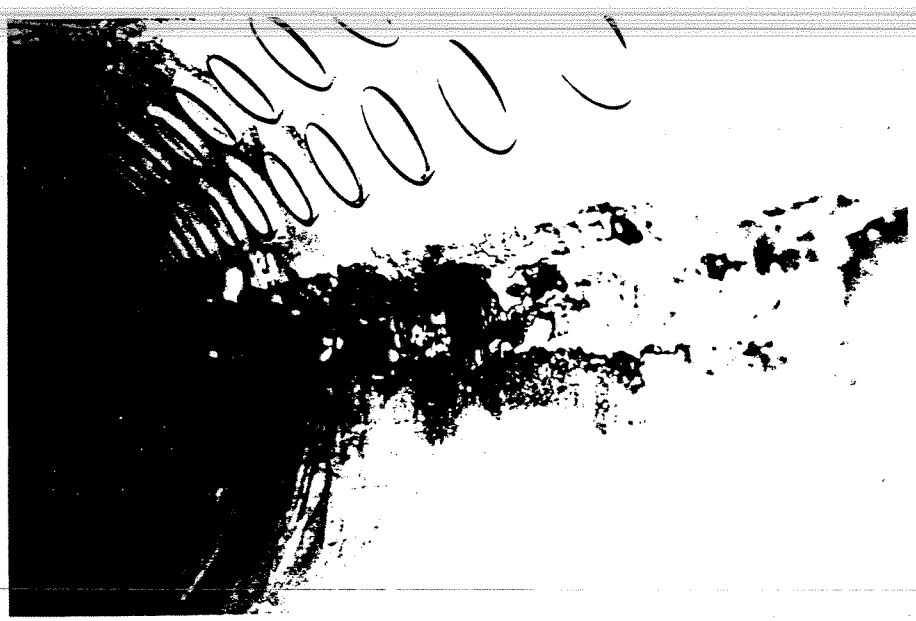

Photo 27

Photo 28

NCL-139394

Vordruck Ausgabe

Erection division	Date	Signature	Date	Signature
		DEUTSCHE BABCOCK WERKE AG G. ZACHAU		

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Job No. 18-9790-999

SS NORWAY

Photo 29

Photo 30

Lower seam Lateral Drum

NCL-139395

Vordruck Ausgabe	Date	Signature	Date	Signature
Erection division		DEUTSCHE BABCOCK WERKE AG G. ZACHAU 12		

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DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

WORK CARRIED OUT

Code

Job No. 18-9790-999

SS NORWAY

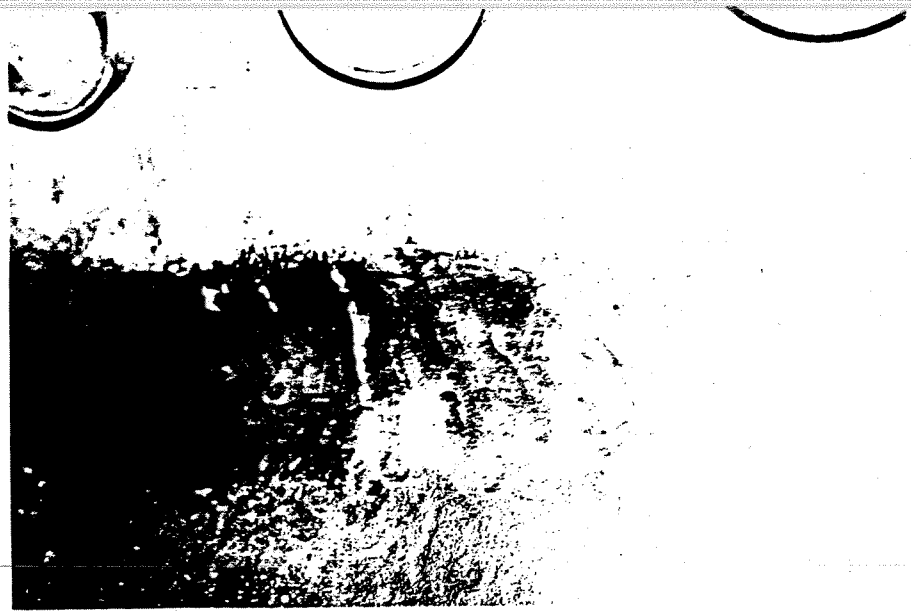


Photo 31

Finished lower seam

Photo 32

NCL-139396

Vordruck Ausgabe

Erection division	Date	Signature	Date	Signature
		DEUTSCHE BABCOCK WERKE AG G. ZACHAU 12		

Code

Job No. 18-9790-999

SS NORWAY

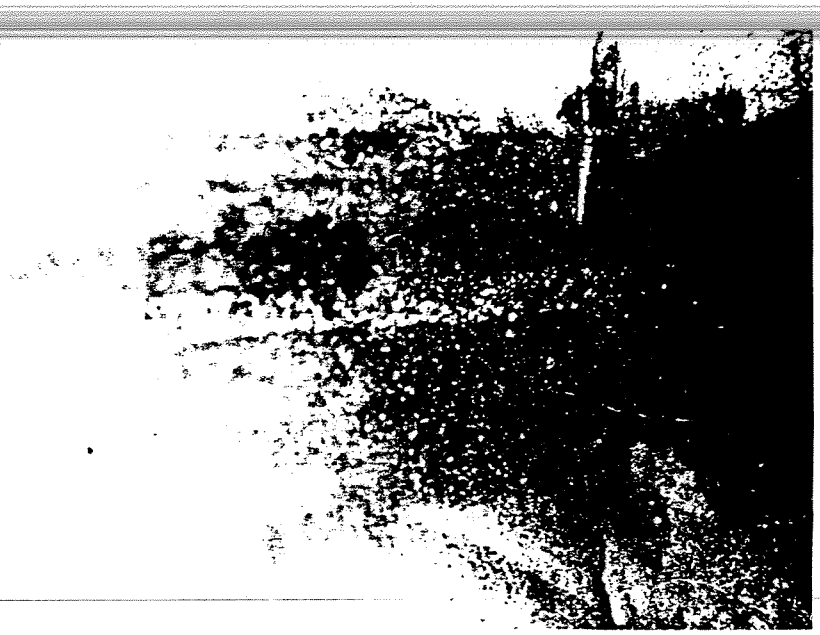


Photo 33

Lower seam with corroded sections

Photo 34

NCL-139397

Code

Job No. 18-9790-999

SS NORWAY

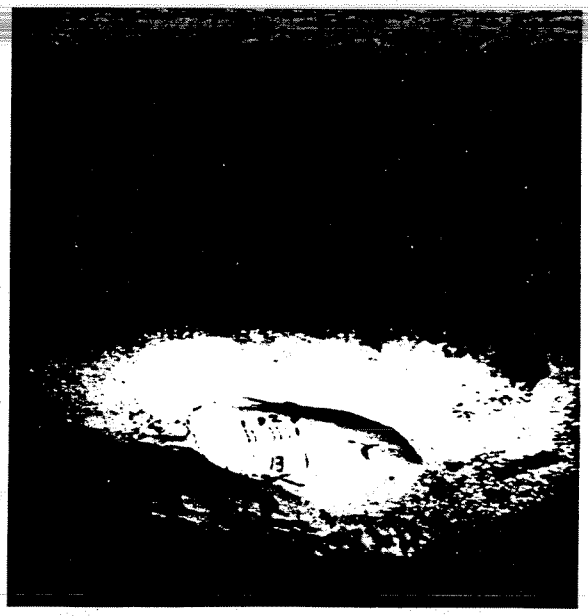


Photo 35

Upper Drum defective position 1 with indications

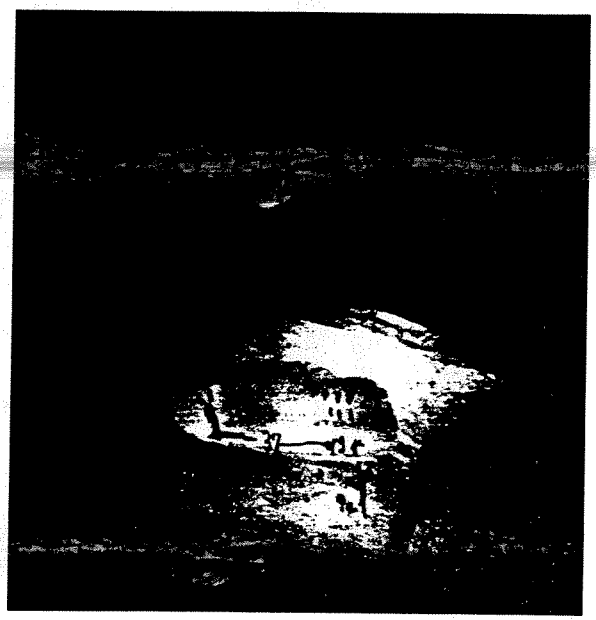


Photo 36

Upper Drum defective position 2
with indications

NCL-139398

Code

Job No. 18-9790-999

SS NORWAY

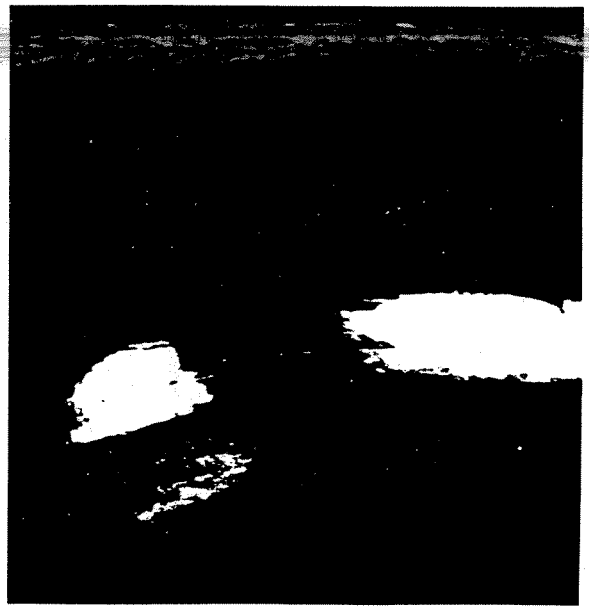
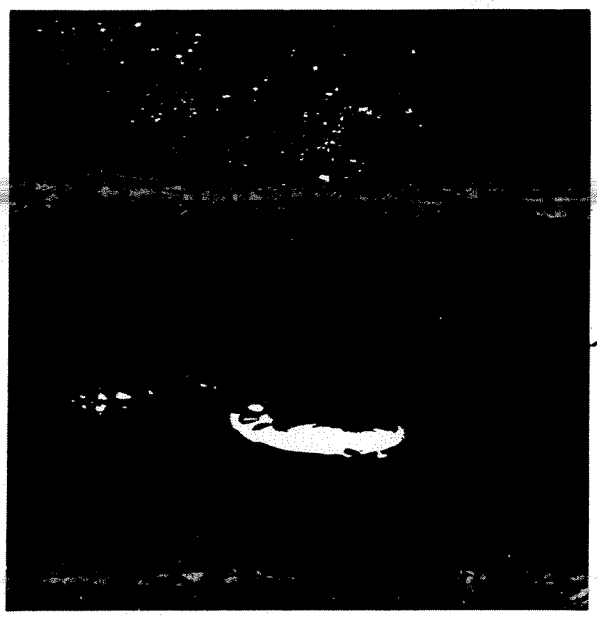


Photo 37



Melting Line

Photo 38

NCL-139399

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

WORK CARRIED OUT

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Job No. 18-9790-999

SS NORWAY

Photo 39

Finished defective position 1

Photo 40

NCL-139400

Vordruck / Ausgabe		Date	Signature	Date	Signature
	Erection division		DEUTSCHE BABCOCK WERKE AG G. ZACHAU 12 Montage / Schweißtechnik		

Welding and Repair Instructions for the Upper and Lateral Drum of Boiler 21 of the SS Norway

During a surface crack inspection of the drums, there were readings which made a repair necessary. For the position and extent of the indicators, refer to the reports of the Vetco Services firm from 15. and 18.09.1987. Below, the course of the repair work is separately described for upper and lateral drum.

Upper Drum

Description of damage

In the upper part of the circumferential seam 2, an approx. 7 mm long crack was discovered which can not be removed by grinding without undercutting the minimum wall thickness.

Working the damaged area

The crack is to be worked in a through shape by milling and/or grinding. The absence of cracks is to be demonstrated through a magnetic crack test detection procedure. Furthermore, a hardness test is to be carried out to ensure that the hardening detected during the inspection was removed.

Pre-heating and Welding

The welding point and the surrounding area of at least drum wall thickness is to be pre-heated to about 150°C. Resistive heating is employed for the pre-heating. Thermocouples measure the temperature from the inner side of the drum.

For the filler metal, an electrode E Mo B according to DIN 8575, trade name SH Schwarz 3 MK is to be used. Welding is to follow in string beads.
On the worked area having been filled, "annealing layers" of basic material are welded on. Subsequently, the annealing layers are again worked off.

The completed welding area is then subjected to a surface crack inspection.

Lateral Drum

Description of damage

The longitudinal seam No. 1 of the lateral drum reveals signs that cannot be removed by grinding without undercutting the minimum wall thickness. It is evident that cracks are not involved from all indications.

Working the damaged area

The signs will be prepared in a trough form and the absence of defects of the areas is to be shown by means of magnetic crack test detection. Subsequently, the wall thickness will be measured. On going below the min. wall thickness, filling will have to occur.

Pre-heating and Welding

The point of application and a surrounding area of at least drum wall thickness is to be pre-heated to about 150°C. Resistive heating is employed for the pre-heating. Thermocouples measure the temperature from the inner side of the drum. For the filler material, the electrode SH Schwarz 3 MK is to be used and string beads are to be welded. On the required wall thickness being reached, additional annealing layers are to be welded which are then re-worked. The completed welding area is finally subjected to a surface crack inspection.

DEUTSCHE BABCOCK WERKE AG
G. ZACHAU
12
Montage Rohrleitungstechnik

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

DIMENSIONAL REPORT

Appendix 2

Code

Job No. 18-9790-999

SS NORWAY

Component: Lateral drum Boiler 21

Position of the deeper grinding points measured from the circumferential seam 1 [rear] towards the front:

A) upper seam:

1,34	- 1,44	Welding between
1,65	- 1,73	
2,03	- 2,25	1.32 m - 4.08 m
2,28	- 2,39	
2,43	- 2,49	
2,99	- 3,28	
3,40	- 3,50	
3,65	- 3,98	
4,02	- 4,07	

B) lower seam:

1,91	- 2,16	Welding between
2,34	- 2,40	
2,46	- 2,52	1.90 m - 3.94 m
2,55	- 2,81	
3,11	- 3,18	

NCL-139403

Erection division	Date	Date	Signature
	17.2.88		

DEUTSCHE BABCOCK WERKE AG WERK G ZACHAU 12

Vordruck Ausgabe

BABCOCK

OBERFLÄCHENRISSPRÜFUNG
SURFACE CRACK TEST

Besch.-Nr.: Anlage 13
Certif.-No.: Appendix:
Blatt: 1 von
Sheet: 1 29 of

Kennwort / Code word: SS NORWAY
AK-Nr. / Plant identification No.:
Kom. / Job.: 18-9790-999
Blatt / Sheet: 1
Pos. / Item:
System / System:
Gegenstand / Subject: Boiler No. 21
Fabr.-Nr. / Fabrication No.:
Bauteil / Component: side Drum
Abmessung / Dimension:
KE-Nr.:
Zeichn.-Nr. / Drawg.-No.:
Schweißverfahren / Welding process: E
Bgr.: TE:
Ass: Term unit:

Prüfflächenzustand / Nahtoberfläche — Surface condition of test area / Surface of seam: grind
Prüfung nach / Test according to: HP 513

Wärmebehandlung / Heat treatment: vor / before ○ nach / after ○ keine / no ☒
Beurteilung durch / Evaluation by:

Prüfung an / Test on: Grundwerkstoff / Base material ○ Schweißkante / Weld edge ○ Schweißnaht / Weld seam ☒

MAGNETPULVERPRÜFUNG nach / MAGNETIC particel test acc. to: DIN 54130
Testkörper / Testbody: Berthold
Prüfgerät / Test equipment: Deutroplus 3443.042
Stromstärke / Current intensity:
Prüfmittel / Medium for testing: MP 315 Fa. Peters
Magnetisierungsart / Kind of magnetization: JEW
naß / ~~trocken~~ wet / ~~dry~~
Kontrastmittel / Medium of contrast:
fluoreszierend / fluorescent: ~~ja~~ / nein / ~~yes~~ / no
Tangentialfeldstärke / Tangential field intensity: 2,0 - 6,5 KA/m

Pos. / Item or Naht-Nr. / Weld-No.	Gesamtstückzahl / Total Quantity	Prüfumfang % / Testvolume %	geprüfte Stückzahl / tested quantity	Abmessung / Dimension [mm]	Werkstoff / Material	Beurteilung / evaluation: erfüllt / satisfactory: anzeigenfrei / no indication	erfüllt / satisfactory: keine unzul. Anzeigen / no indic. to be recorded	nicht erfüllt / not satisfactory
LN 1	1	100	1		~ 19 Mn 5	X		
LN 2	1	100	1				X	

Bemerkungen / Remarks:

Ort / Place: SS Norway
den / dated: 19.11.1987
Sachverständiger / Expert:

Prüfer / Operator:
DEUTSCHE BABCOCK WERKE AG G. ZACHAU
Prüfaufsicht / Test Supervision:

NCL-139404

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

DIMENSIONAL REPORT

Appendix: 4

Code

Job No. 18-9790-999

SS NORWAY

Component: Lateral drum. Boiler 21

Wall thickness upper seam:

Position*	Filler metal	Basic material	Comments
0.31	22.4 mm	23.1 mm	only ground
0.48	22.6	23.6	"
1.06	21.0	23.4	"
1.40	23.0	22.6	filled in
2.00	21.8	23.8	"
2.50	22.6	23.2	"
2.85	22.6	23.4	"
3.00	22.4	23.2	"
3.27	21.6	24.3	"
3.50	22.5	23.4	"
4.00	23.3	23.8	"
4.07	22.4	23.7	"
4.64	21.6	23.4	only ground

Wall thickness lower seam:

Position*	Filler metal	Basic material	Comments
2.00	25.1 mm	24.0	filled in
2.50	26.4	23.6	"
3.00	25.9	24.9	"
3.50	24.4	24.6	"
4.00	24.0	24.6	"
4.23	23.1	24.5	only ground

* Distance to the rear circumferential seam in meters.

NCL-139405

Erection division	Date	Signature	Date	Signature
	17.2.88	G. ZACHAU 12		

Vordruck Ausgabe

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

HARDNESS TEST

Hypnalix 5.1

Code

Job No. 18-9790-999

SS NORWAY

Component: Lateral Drum Boiler 21

Upper Seam:

Position	Filler metal		HEZ		Base metal	
	Ld gem.	HV	Ld gem.	HV	Ld gem.	HV
1.5 m	456	174	489	203	424	147
	423	146	513	227	409	135
1.75 m	441	160	605	328	444	163
	438	158	589	309	426	148
	458	175	551	267		
			527	241		
2.0 m	428	150	575	293		
	432	153	587	306		
	442	161	564	281		
2.5 m	495	209	619	345		
	488	202	589	309		
	468	184	583	302		
			558	274		
3.0 m	485	200	606	330	430	151
	444	163	553	268	425	147
	496	210	605	328	414	139
3.5 m	482	197	529	243		
	506	220	538	252		
4.0 m	451	170	593	313		
	463	180	575	293		

Note!

The measured Ld-values have to be corrected by the corrective value.

Impact direction: ✳

NCL-139406

Vordruck / Ausgabe		Date	Signature	Date	Signature
	Erection division	17.2.88	DEUTSCHE BABCOCK WERKE AG G. ZACHAU		

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

HARDNESS TEST

Appendix 1 S.2

Code

Job No. 18-9790-999

SS NORWAY

Component: Lateral drum Boiler 21

Lower Seam:

Position	Filler metal		HEZ		Base metal	
	KVgem	HV	KVgem.	HV	KVgem.	HV
2.0 m	453	182	584	315	426	159
	451	180	565	294	435	166
	450	179	*491	216	408	144
	452	181	*496	221	413	148
	460	188	*508	233	418	152
	447	176	602	337		
2,5 m	451	180	*507	232	431	163
	473	200	575	305	427	159
	450	179	*501	226	415	150
	465	192	571	300		
	479	205	577	307		
			582	313		
3.0 m	451	180	603	338	435	166
	462	190	*519	244	431	163
	449	178	576	306		
	471	198				
	455	183				
3,5 m	439	170	*511	236	428	160
	457	185	*485	211	410	146
	446	176	562	289	411	147
	465	192	564	292	409	145
	469	200	575	305		

Note!

The measured KV-values have to be corrected by the corrective value.

Impact direction: 

NCL-139407

* Measuring point approx. 1mm next to the melting line

Erection division	Date	Signature	Date	Signature
	18.2.88	BABCOCK WERKE AG G. ZACHAU 12		

Vordruck Ausgabe

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

HARDNESS TEST

Appendix : S.3

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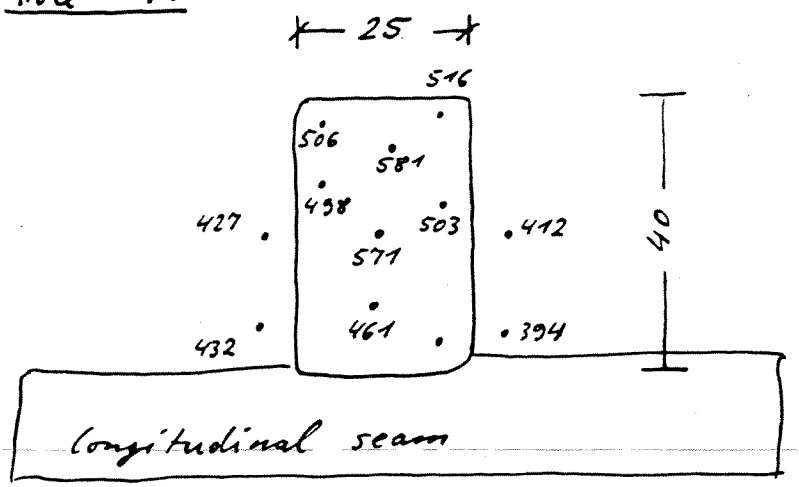
Code

Job No. 18-9790-999

SS NORWAY

Component: Lateral drum Boiler 21

"Hole" 1:



$L_{D\,gem.}$	Correction	$L_{D\,ist}$	HV
394	6	388	133
412	5	407	148
427	5	422	159
432	5	427	164
449	5	444	178
461	5	456	189
498	5	493	223
503	5	498	228
506	6	501	231
516	5	511	241
571	4	567	301
581	4	577	312

Position:

Above the lower seam in the thick metal at the front end.

NCL-139408

Erection division	Date 18.2.88	Date	Signature

DEUTSCHE BABCOCK WERKE AG WERK G. ZACHAU 12

Vordruck Ausgabe

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

HARDNESS TEST

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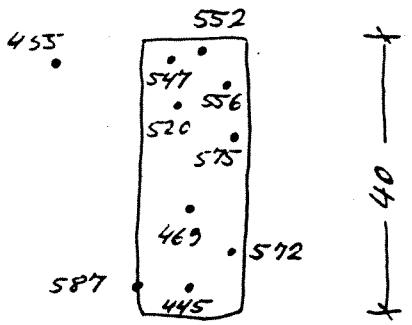
Job No. 18-9790-999

SS NORWAY

Component

Lateral drum Boiler 21

"Hole" 2:



Ldgem	Correction	Ldist	HV
445	5	440	175
455	5	450	183
469	5	464	196
520	5	515	245
547	5	542	273
552	4	548	230
556	4	552	284
572	4	568	302
575	4	571	305
587	4	583	319

Position:

Next to the lower seam in the sheet metal at the front end.

NCL-139409

Erection division	Date	Signature	Date	Signature
	19.2.88	BABCOCK WERKE AG G. ZACHAU 12		

Vordruck Ausgabe

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

SPACE FOR SKETCH

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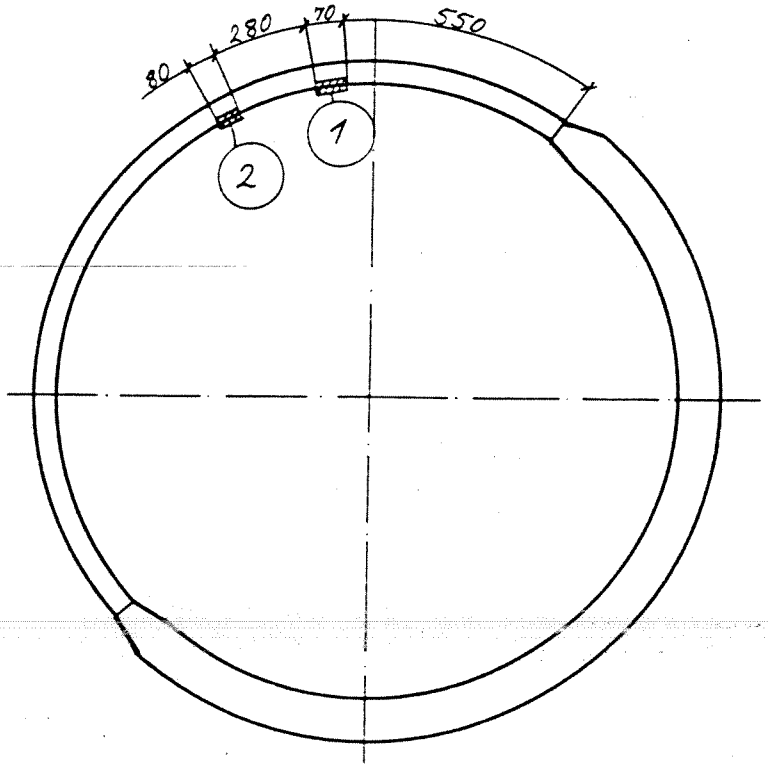
Job No. 18-9790-999

SS NORWAY

Component

Upper Drum Boiler 21



Defective position, upper drum, boiler 21, front circumferential seam seen from the back.

NCL-139410

Erection division	Date	Signature	Date	Signature
	19.2.88	DEUTSCHE BABCOCK WERKE AG G ZACHAU		

Vordruck Ausgabe

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

SPACE FOR SKETCH

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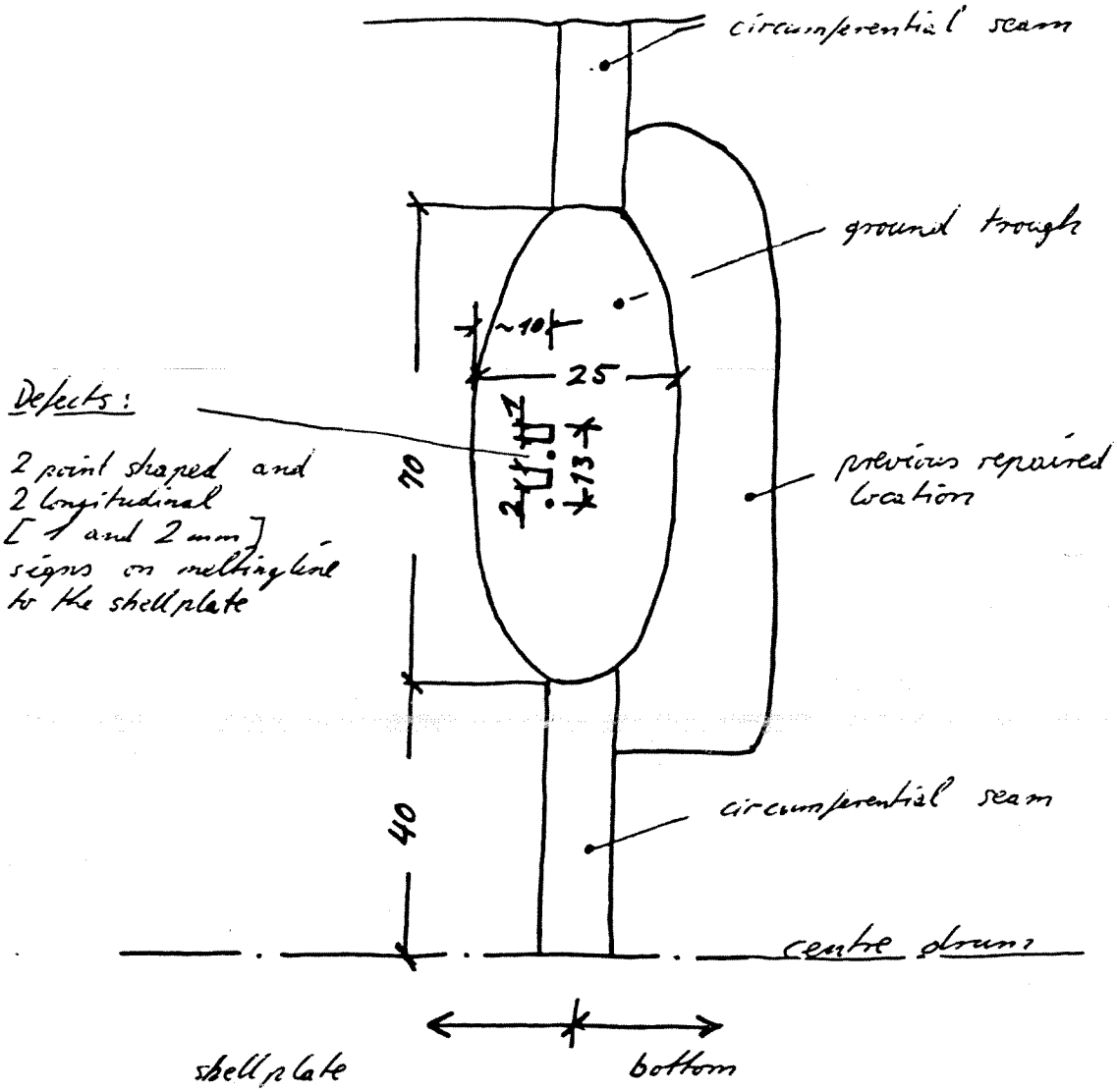
Job No. 18-9790-999

SS NORWAY

Component Upper Drum Boiler 21

Defective position 1:

ground trough and defective position:



NCL-139411

Erection division	Date 19.2.88	Signature BABCOCK WERKE AG G. ZACHAU 12	Date	Signature

Vordruck Ausgabe

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

SPACE FOR SKETCH

Appendix: 8.1

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Job No. 18-9790-999

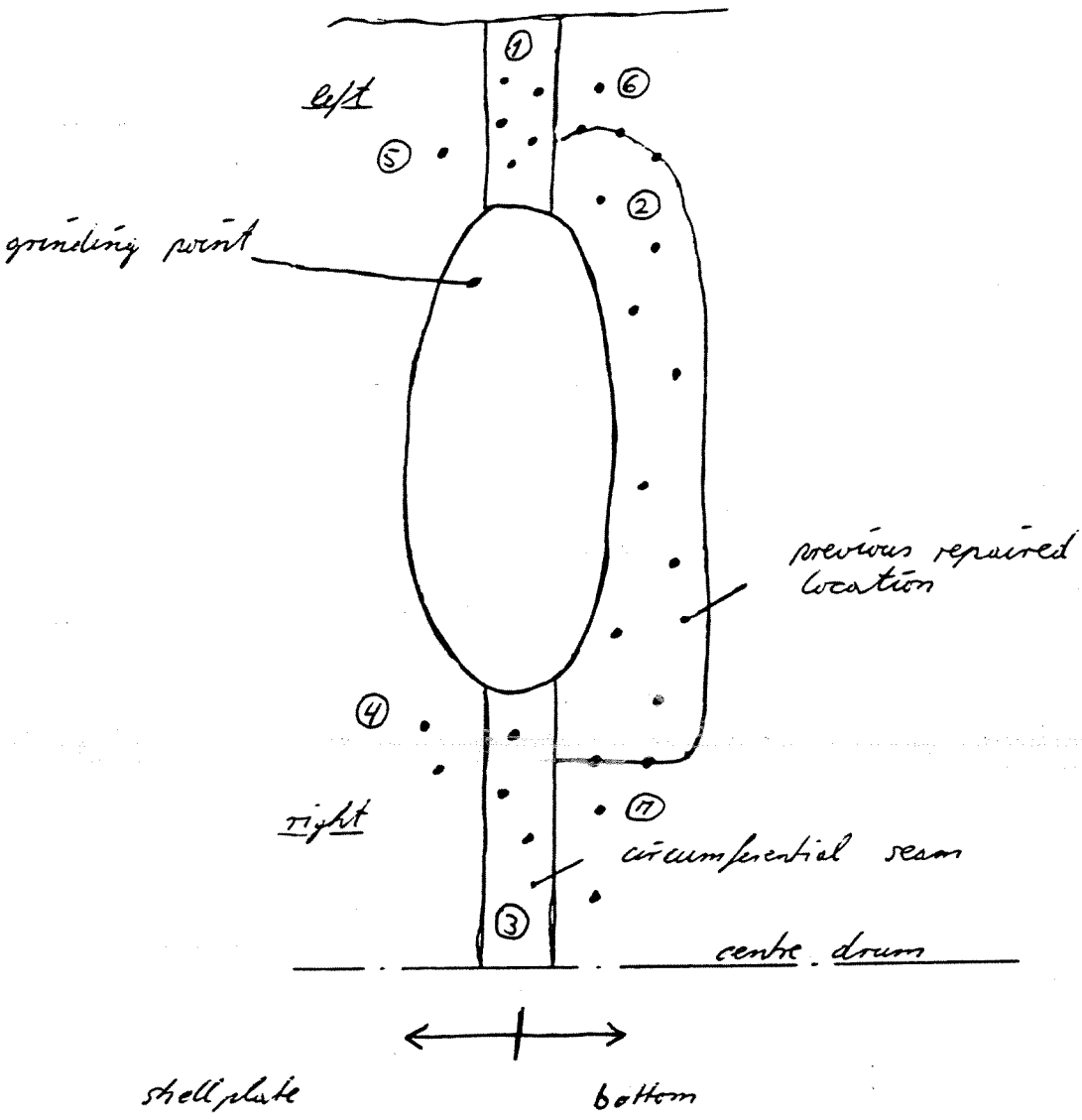
SS NORWAY

Component

Upper Drum Boiler 21

Defective position 1i

Position of the measuring points prior to welding



NCL-139412

Vordruck / Ausgabe	Erection division	Date 19.2.88	Signature DEUTSCHE BABCOCK WERKE AG G. ZACHAU 12	Date	Signature

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

HARDNESS TEST

Appendix : 8.2

Code

Job No. 18-9790-999

SS NORWAY

Component Upper Drum Boiler 2

Hardness test of the defective location 1 prior to welding:

Position	Hgem.	correction	Hist	HV
1	395	27	368	119
|	404	25	379	127
|	385	27	358	112
|	400	27	373	122
1	396	27	369	120
2	505	22	483	214
|	513	22	491	221
|	489	24	465	197
|	506	22	484	215
|	502	22	480	211
|	483	24	459	192
|	510	22	488	218
2	498	24	474	205
3	404	25	379	127
1	412	25	387	132
3	418	25	393	137
HE2	434	25	409	149
|	419	25	394	137
|	409	25	384	130
|	467	24	443	177
HE2	461	24	437	172
4	427	25	402	143
4	441	25	416	155
5	413	25	388	133
6	446	25	421	159
7	448	25	423	160
7	437	25	412	151

NCL-139413

Erection division	Date		Date	Signature
	17.2.88	DEUTSCHE BABCOCK WERKE AG G. ZACHAU 12		

Vordruck Ausgabe

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

SPACE FOR SKETCH

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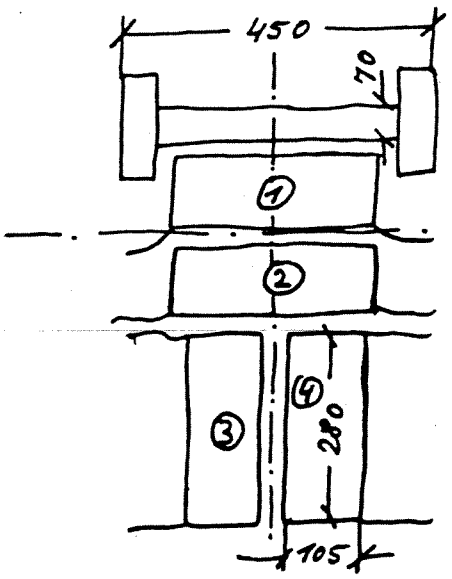
SS NORWAY

Component

Upper Drum Boiler 21

Position of the Pre-Heater Elements :



O No of the annealing pad

Centre of the drum

Pads 1+2 and 3+4 arranged in series.

Pads fixed and insulated on the drum from outside.

The temperature was measured from inside.

NCL-139414

Erection division	Date 19.2.88	Signature	Date	Signature

DEUTSCHE BABCOCK WERKE AG G. ZACHAU 12

Vordruck Ausgabe

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

SPACE FOR SKETCH

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Job No. 18-9790-999

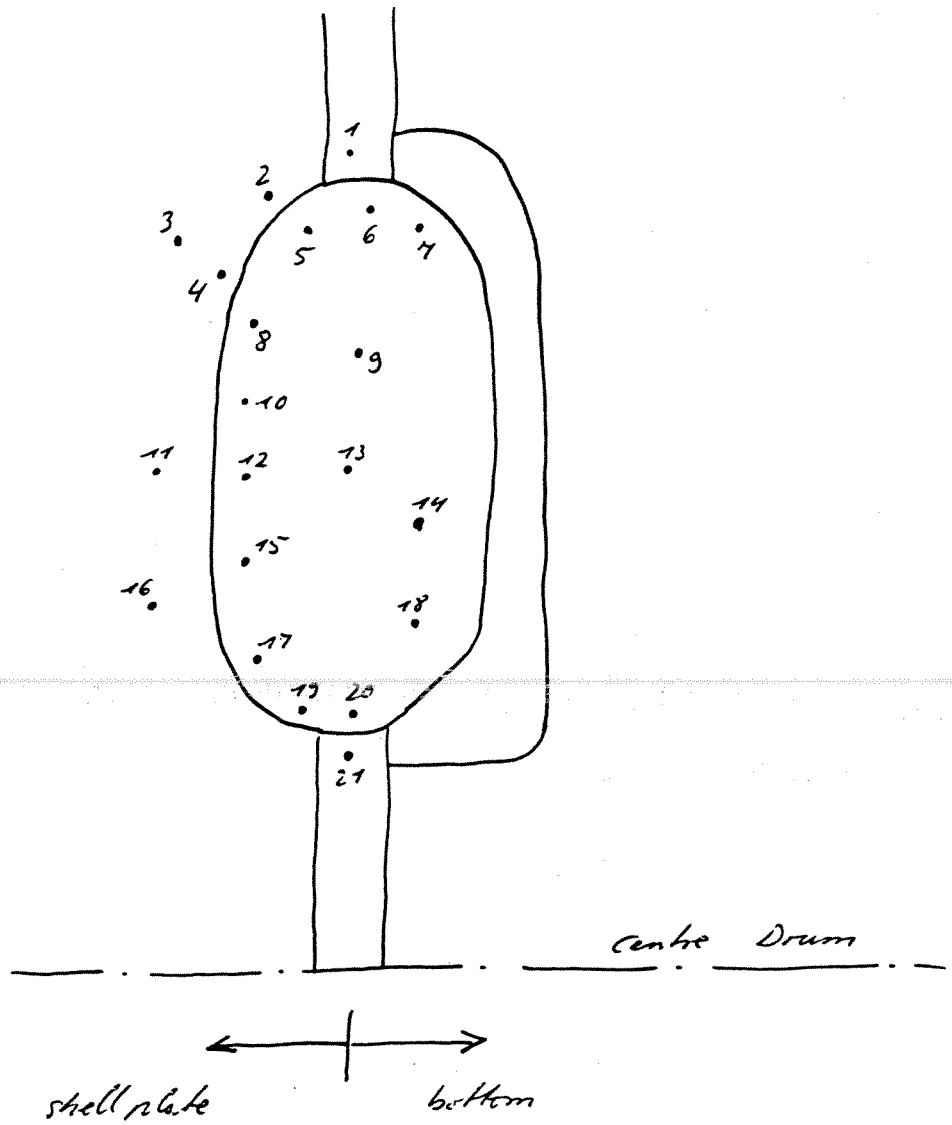
SS NORWAY

Component

Upper Drum Boiler 21

Defective location 1:

Position of the measuring points, completed repair point



NCL-139415

Vordruck Ausgabe	Erection division	Date 19.2.88	Signature DEUTSCHE BABCOCK WERKE AG G. ZACHAU 12	Date	Signature

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

HARDNESS TEST

Appendix: 10.2

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Job No. 18-9790-999

SS NORWAY

Component: Upper Drum Boiler 21

Hardness test of the completed repair point 1:

Measuring point	HD	correction	HD.st	HV
1	375	27	348	106
2	395	27	368	119
3	392	27	365	117
4	405	25	380	127
5	490	24	466	198
6	445	25	420	158
7	437	25	412	151
8	489	24	465	197
9	459	24	435	170
10	460	24	436	171
11	400	25	375	124
12	485	24	461	193
13	471	24	447	181
14	458	24	434	170
15	460	24	436	171
16	401	25	376	124
17	545	22	523	251
18	437	25	412	151
19	517	22	495	225
20	456	24	432	168
21	491	24	467	199

NCL-139416

Vordruck Ausgabe

Erection division	Date	Signature	Date	Signature
	19.2.88	DEUTSCHE BABCOCK WERKE AG G. ZACHAU 12		

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

SPACE FOR SKETCH

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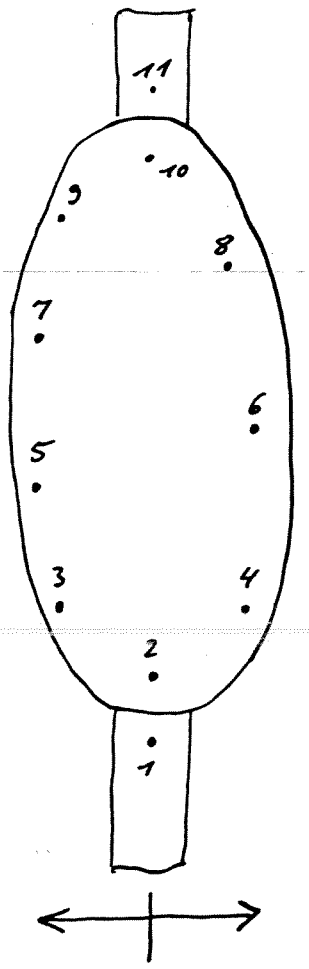
SS NORWAY

Component

Upper Drum Boiler 21

Defective location 2:

Position of the measuring points, completed repair point



NCL-139417

Erection division	Date	Signature	Date	Signature
	19.2.88	G. ZACHAU 12		

Vordruck Ausgabe

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

HARDNESS TEST

Appendix: 10.4

Code

Job No. 18-9790-999

SS NORWAY

Component: Upper Drum Boiler 21

Hardness test of the completed repair point 2:

Measuring point	LD	correction	LD.ist	HV
1	444	18	426	163
2	447	18	429	165
3	494	17	477	208
4	455	17	438	173
5	491	17	474	205
6	451	17	434	170
7	467	17	450	183
8	420	18	402	143
9	470	17	453	186
10	484	17	467	199
11	443	18	425	162

NCL-139418

Erection division	Date		Date	Signature
	23.2.88	DEUTSCHE BABCOCK WERKE AG G. ZACHAU 12		

BABCOCK
DEUTSCHE BABCOCK WERKE AKTIENGESELLSCHAFT

DIMENSIONAL REPORT

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Code

Job No. 18-9790-999

SS NORWAY

Component: Upper Drum Boiler 21

Wall thickness of the defective points after welding:

Defective location 2:

Filler metal	:	52.3 - 53.1 mm
Basic material front	:	54,4
rear	:	55,2
left	:	53.1
right	:	53.7

Defective location 1:

Filler metal	:	55.5 - 56.1 mm
Basic material front	:	55.6
rear	:	57.3
left	:	55.5
right	:	55.8

NCL-139419

Vordruck / Ausgabe		Date		Date	Signature
	Erection division	27.2.88	DEUTSCHE BABCOCK WERKE AG G. ZACHAU 12		

BABCOCK

OBERFLÄCHENRISSPRÜFUNG
SURFACE CRACK TEST

Besch.-Nr.: Anlage: 12
Certif.-No.: Appendix:
Blatt: # von
Sheet: # 45 of

Kennwort / Code word: 55 NORWAY

AK-Nr. / Plant identification No.:

Kom. / Job.: 18-9790-999 Blatt / Sheet: 1 Pos. / Item:

System / System:

Gegenstand / Subject: Boiler No. 21

Fabr.-Nr. / Fabrication No.:

Bauteil / Component: Upper Drum

Abmessung / Dimension:

KE-Nr.:

Zeichn.-Nr. / Drawg.-No.:

Schweißverfahren / Welding process: E

Bgr.: TE:
Ass: Term unit:

Prüfflächenzustand / Nahtoberfläche
Surface condition of test area / Surface of seam: grind

Prüfung nach / Test according to: HP 513

Wärmebehandlung / Heat treatment: vor / before ○ nach / after ○ keine / no ⊗

Beurteilung durch / Evaluation by:

Prüfung an / Test on: Grundwerkstoff / Base material ○ Schweißkante / Weld edge ○ Schweißnaht / Weld seam ⊗

MAGNETPULVERPRÜFUNG nach / MAGNETIC particel test acc. to: DIN 54130

Testkörper / Testbody: Berthold

Prüfgerät / Test equipment: Deutroplus 3443.042

Stromstärke / Current intensity:

Prüfmittel / Medium for testing: AP 315 Fa. Peter

Magnetisierungsart / Kind of magnetization: IEW

naß / ~~trocken~~
wet / ~~dry~~

Kontrastmittel / Medium of contrast:

fluoreszierend / fluorescent: ~~ja~~ / yes nein / ~~no~~

Tangentialfeldstärke / Tangential field intensity: 2.0 - 6.5 KA/m

Pos. / Item or Nahl-Nr. / Weld-No.	Gesamtstückzahl / Total Quantity	Prüfumfang % / Testvolume %	geprüfte Stückzahl / tested quantity	Abmessung / Dimension [mm]	Werkstoff / Material	Beurteilung / evaluation: erfüllt / satisfactory: anzeigenfrei / no indication	erfüllt / satisfactory: keine unzul. Anzeigen / no indic. to be recorded	nicht erfüllt / not satisfactory
P1	1	100	1	~ 30 x 85	~ 19 Mn 5	x		
P2	1	100	1	~ 40 x 85	"	x		

Bemerkungen / Remarks:

Ort / Place: 55 Norway

den / dated: 19.11.87

Sachverständiger / Expert:

Prüfer / Operator:

DEUTSCHE BABCOCK WERKE AG G ZACHAU D2 Abteilung Schweißtechnik

Prüfaufsicht / Test Supervision:

NCL-139420

91-2572 5.87