AUTHORITY TO DRILL A WELL

FORM

E.A. # 175
D.A. #1314

Canada Oil and Gas Lands Administration
Administration du pétrole et du gaz des terres du Canada

Nova Scotia	☐	West Coast	☐	Exploratory	☒
Newfoundland	☐	Northern	☐	Development	☐
Gulf of St. Lawrence	☐	Hudson Bay	☐	Delineation	☐
				Service	☐

AUTHORITY TO DRILL A WELL

APPLICATION

This application is submitted with Section 82 of the Canada Oil and Gas Drilling Regulations. When approved under Section 83 of the Regulations, it is the requisite authority for the commencement of drilling operations.

Well Name in Full: NSM et al ARROWHEAD D-50
Operator: NSM Resources Ltd. Drilling Program No.: N/A
Contractor: Spartan Drilling Permit or Lease No.: E.A. 175
Drilling Rig or Unit: Rig #7 Estimated Well Cost: 3,199,200
Location-Unit: D Section: 50 Grid Area: 60-30-122-45
Coordinates: Lat.: 60° 29' 15" N Long.: 122° 54' 13" W
Area: N.W.T. Field/Pool: Exploratory
Elevation-RT/KB: 490 m (estimated) (ASL) Ground: 486 m (approx.)
Approx. Spud Date: 86-02-5 Estimated Days on Location: 50
Anticipated Total Depth: 2900m KB Target Horizon(s): Slave Point
UWI: 300D506030122450

EVALUATION PROGRAM

Ten-metre sample intervals: None
Five-metre sample intervals: 20mKB to T.D.
Canned sample intervals: All
Conventional cores at: At Geologist's descretion (possibly in the Slave Point or Keg River)
Logs and Tests: DLL-SP, BHCS-GRC, CNL-FDC, Velocity Survey (Surf. to T.D.)

CASING AND CEMENTING PROGRAM

O.D	Weight:	Grade:	Setting Depth (m KB) Below Conductor:	Cementing Program (Volumes):
339.7	81.1 Kg/m	J-55,ST&C	300m	51 t Class G to surface
244.5	53.6 Kg/m	J-55,ST&C	800m	30 t Class G ~100m into surf. csg.
177.8	38.7 Kg/m	L80, LT&C	2590	To be determined after logging
114.3	17.3 Kg/m	L80, LT&C	T.D. to 50m inside 177.8mm csg.	

BOP Equipment: 1 annular, 2 single gate, 21 M.P.A.

Other Information:
Interval 300m to 800m will be air or mist drilled
Interval 800m to 2550m will be air or mud drilled

Signed: F. T. Nadi Title: Vice President, Drilling & Production
Date: January 28, 1986 Company: NSM Resources Ltd.

APPROVAL

An approved copy of this notice is to be posted at each wellsite.

ADEQUATE
REVIEWED BY Ken
DATE 86 02 07

Signed: [signature]
Engineering Branch
Date: 7 Feb 86
File: 9211-N9-4-1

Department of Energy, Mines and Resources
Ministère de l'Énergie, des Mines et des Ressources
Department of Indian Affairs and Northern Development
Ministère des Affaires indiennes et du Nord Canadien

Canada

WELL TERMINATION RECORD

D.A. 1314

Canada Oil and Gas Lands Administration / Administration du pétrole et du gaz des terres du Canada

				Well Status	
Nova Scotia	☐	West Coast	☐	Suspended	☐
Newfoundland	☐	Northern	☒	Completed	☐
Gulf of St. Lawrence	☐	Hudson Bay	☐	Abandoned	☒

WELL TERMINATION RECORD

This record is submitted in triplicate in compliance with Section 184 of the Canada Oil and Gas Drilling Regulations.

WELL DATA

Well Name: NSM et al Arrowhead D-50 Area: FT. LIARD

Grid Area: 60-30-122-45 Field/Pool: Exploratory

Permit or Lease No.: E.A. 175 Final Coordinates: Lat.: 60°29'02.20"N. Long: 122°54'12.91"W

Drilling Unit: Spartan Rig # 7E Elevations: KB: 481.15 m GL: 476.2 m

Spud Date: 86-02-08 @1700hrs Rig Released: 86-04-02 @0800hrs Total Depth: 2901m KB

CASING AND CEMENTING

O.D.:	Weight:	Grade:	Depth Set:	Cement and Additives:
340mm	81.27 kg/m	K55	305.5 m	51 tonnes "G" + 2% $CaCl_2$
244.5mm	53.6 kg/m	K55	801 m	23.12 tonnes "G"
177.8mm	38.69 kg/m	L80	2602 m	24 tonnes 0.5% HR4, 1.25% CFR2
114.3mm	17.26 kg/m	N8	2569-2901 m	7.5 tonnes "G" + .75% CFR2, .3% HR12 .3% Halad 22A

PLUGGING PROGRAM

Approval of the following program was obtained by (person) ROBERT G. LOCK from (person) KEM SINGH of the Canada Oil and Gas Lands Administration by means of TELEPHONE on MARCH 31 19 86

Type of Plug:	Interval:	Felt:	Cement and Additives:
Did not drill out liner			
"G" Cement	30m. - 0		

Lost Circulation/Overpressure Zones: NIL

Equipment left on Seafloor (Describe):

Provision for Re-entry (Describe and attach sketch):

Cores: Type: Intervals: NIL

Other Downhole Completion/Suspension Equipment:

CERTIFICATION

I certify on the basis of personal knowledge of operations undertaken at the above named well that the above information is accurate.

Signed: F. T. Nadir P. Eng. Title: Consulting Engineer

Name: F. T. Nadir Date: February 11, 1987

Acknowledged by: Engineering Branch

Date: 3 Mar 87

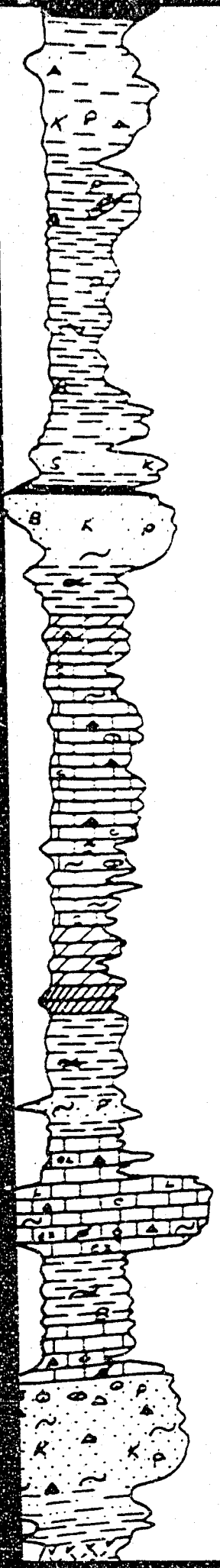
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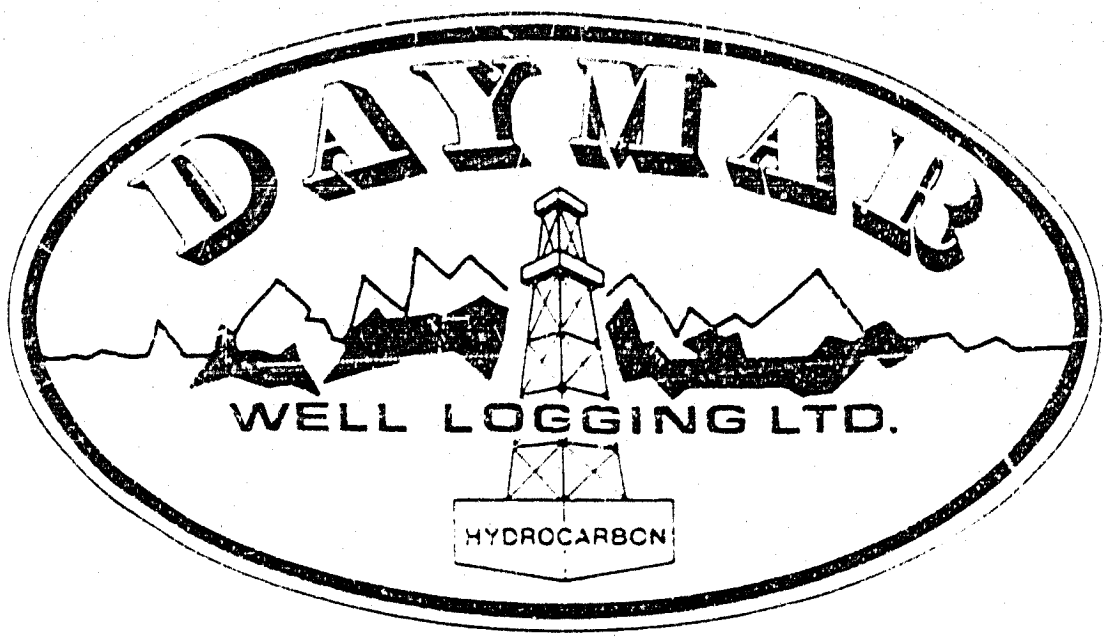
Department of Energy, Mines and Resources / Ministère de l'Énergie, des Mines et des Ressources

Department of Indian Affairs and Northern Development / Ministère des Affaires indiennes et du Nord canadien

Canada

DAYMAR REPORT





NSM ET AL ARROWHEAD

D-60

Northwest Territories, Canada

NSM RESOURCES LTD.

OTTAWA COPY

CALGARY, ALBERTA

9011-N9-4-1

NSM RESOURCES LTD.

NSM ET AL ARROWHEAD

D-50

CANADA OIL AND GAS LANDS
ADMINISTRATION
SEP 2 1986
ENGINEERING AND CONTROL
BRANCH
TECHNIQUE ET DU CONTRÔLE

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GEOLOGICAL REPORT

on

NSM ET AL ARROWHEAD

D-50

Northwest Territories

for

NSM RESOURCES LTD.

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February 1986

Joe Olstad
Geological Technologist
250-9189

WELL DATA SUMMARY

Well Name:	NSM ET AL ARROWHEAD
Location:	D-50
Operator:	NSM RESOURCES
Contractor:	Spartan Drilling Ltd. #7
Province:	Northwest Territories
Area:	Fort Liard
Coordinates:	60° 29' 15" N 122° 54' 13" W
Elevations:	Ground Level 475.60 m Kelly Bushing 480.55 m
Surface Hole:	444 mm - 306 m
Top Hole:	311 mm - 802 m
Casing:	244 mm - 802 m
Main Hole:	222 mm - 2600 m
Casing:	178 mm - 2602 m
Bottom Hole:	159 mm - 2902 m
Final Total Depth:	Driller's 2901.8 m Logger's 2901.4 m
Surface Casing:	339 mm - 305 m
Production Casing:	Ran 114 mm liner to 2901 m, cemented with 7 1/2 tonnes class G, .75% CFR-2, .3% HR12, .3% Holad 22A, rig released 08:00 hrs, April 2, 1986
Driller's Fluid:	0 - 306 Gel Caustic 306 - 794 Air 794 - 802 Gel Chem 802 - 2500 Air 2500 - 2902 Gel Chem
Logs Run:	Run 1 - cancelled Run 2 - DIL-BHCS-CNL/FDT,VS
Company:	Computalog Gearhart Ltd.

Well Data Summary

Geologist:	Joe Olstad - Daymar Well Logging Ltd. 250-9189
Engineer:	Pat Beauchamp
Toolpusher:	Brian Dewalt - Spartan Drilling Ltd.

NSM ET AL ARROWHEAD D-50

FORMATION TOPS

Formation	Sample	E-Log	Subsea
Banff	566.0	565.0	- 84.45
Exshaw	1378.0	1374.0	- 893.45
Kotcho	1390.0	1387.5	- 906.95
Tetcho	1765.0	--	--
Trout River	--	1801.0	-1320.45
Kakisa	1872.0	1884.0	-1403.45
Fort Simpson	1915.0	1912.0	-1431.45
Muskwa (Hay River)	2550.0	2548.0	-2067.45
Slave Point	2598.0	2604.3	-2123.75
Sulphur Point	2718.0	2717.2	-2236.65
Pine Point	2729.0	2730.0	-2249.45
Keg River	2833.0	2833.0	-2352.45
Lower Keg River	2865.0	--	--
Total Depth	2901.8	2902.7	-2422.15

DEVIATION SURVEYS

25 m	1/2°
53 m	1/4°
70 m	1/2°
96 m	1/4°
116 m	1/2°
132 m	1/2°
152 m	1/4°
173 m	1/4°
191 m	0°
209 m	0°
250 m	1/2°
269 m	1/4°
287 m	1°
460 m	3/4°
597 m	2°
607 m	2 1/4°
616 m	2 1/2°
625 m	2 1/2°
634 m	2 1/4°
653 m	2°
690 m	1 3/4°
727 m	2 1/8°
747 m	2°
775 m	2 3/4°
823 m	3°
870 m	3 1/2°
927 m	4 1/2°
955 m	4°
1012 m	4 1/2°
1040 m	5°

Deviation Surveys

1069 m	5°
1097 m	5 1/2°
1125 m	6°
1154 m	6 1/4°
1183 m	6 1/2°
1210 m	6 1/2°
1238 m	6 1/4°
1295 m	5 3/4°
1323 m	6°
1352 m	5°
1409 m	5 3/4°
1465 m	5 1/2°
1522 m	7°
1560 m	7°
1616 m	7 1/8°
1673 m	6 3/4°
1728 m	8 1/8°
1757 m	8°
1823 m	7°
1879 m	6 3/4°
1936 m	7 1/8°
1992 m	7 3/4°
2058 m	6 1/2°
2106 m	6 7/8°
2210 m	8 1/2°
2343 m	5 1/2°
2493 m	3 7/8°
2600 m	2 5/8°
2755 m	1°
2900 m	1 1/8°

Metric

B I T R E C O R D

Province North West Territories	Field	LSD	Section	Twnshp	Range	Operator	KB Elev.
					W	NSM RESOURCES	480.55 m

Location	Contractor	Rig No.	Tool Pusher
D-50	Spartan Drilling Ltd.	7	Brian Dewalt

No.	Size	Make	Type	Jets	Depth Out	Metres Drilled	Hours	Dull Cond T	B	G	No of DC	Wt. on Bit.	RPM	Vert Dev	Pump Pres
1A	444	STC	SDT		236	236	27	7	5	I					
2A	444	STC	SDT		306	70	8	2	1	I					
1B	311	STC	FDT		476	170	11 1/2	cracked shank							
2B	311	STC	FDT		625	149	11	8	5	0					
3B	311	STC	SDGH		794	169	33 1/2	8	2	0					
4B	311	STC	SDGH		802	8	1/2	1	1	I					
1	222	STC	F-27		1635	833	34 3/4	1	1	I					
2	222	STC	F-4		2058	423	23 3/4	dropped survey barrel							
RR1	222	STC	F-27		2256	198	12 1/2	1	5	I					
3	222	STC	F-27		2408	152	11 1/2	1	8	I					
RR1	222	STC	F-27		2500	92									
4	222	STC	SDGH		2600	100									
5	222	STC	V2J		2600	clean	52								
6	159	STC	SDGH		2604	approx. 2	2								

Metric

BIT RECORD

Province North West Territories	Field	LSD	Section	Twnshp	Range	Operator	KB Elev.
					W	NSM RESOURCES	480.55 m

Location	Contractor	Rig No.	Tool Pusher
D-50	Spartan Drilling Ltd.	7	Brain Dewalt

No.	Size	Make	Type	Jets	Depth Out	Metres Drilled	Hours	Dull Cond T	Dull Cond B	Dull Cond G	No of DC	Wt. on Bit.	RPM	Vert Dev	Pump Pres
7	159	STC	F4		2792	188	67	5	2	I					
8	159	STC	F4		2902	110	35 1/2	1	1	I					

DRILL STEM TESTS

DST #1 KEG RIVER 2810 - 2902 m

Bottom Hole Conventional

Misrun, no seat

IH	28914 kPa
FH	28630 kPa

Recovered 500 m water cushion
200 m mud

DST #2 KEG RIVER 2810 - 2850 m

Inflate Stradole

20/60/partial misrun

PF: 6 bubbles
VO: Lost packer seat

IH	29570 kPa
FH	29527 kPa
PF	4492 kPa
FF	4492 kPa
ISI	28464 kPa

Recovered 400 m water cushion
500 m mud

LITHOLOGY AND FORMATION EVALUATION

TERTIARY 13 - approx. 235 m

The Tertiary consists of unconsolidated arkosic sandstone grading to conglomerate in part. There is probably good porosity.

Conclusion: Although there appears to be good porosity in this formation, there were extremely low gas readings. This is a zone of little interest.

CRETACEOUS 235 - 566 m

From 235-305 m there is sandstone, with some siltstone and shale. The sandstone is light to medium gray, very fine grained, silty, argillaceous in part. There is bentonitic and calcareous cementing, traces of glauconite, poor porosity to tite. From 305-420 m there is shale, with some siltstone and minor sandstone. From 420-430 m there is light gray, very fine to fine grained sandstone, it is silty, bentonitic, with scattered argillaceous grains and glauconite. Gas and water were encountered starting at 425 m. Hole surging problems made sampling difficult to impossible until casing was set at 802 m. There were no samples from 430-485 m. From 485-515 m was shale, with minor siltstone. There were no samples from 515-565 m.

Conclusion: Although there was gas to surface while air drilling, it appeared to be low volume and mixed with water. Zone of little interest.

MISSISSIPPIAN (BANFF) 566 - 1378 m

The upper section 566-711 m consists of cherty fragmental limestone, with occasional shale. There were good traces of crinoids, ostracods and bryozoans. There did not appear to be any porosity. From 711 - 802 m there was shale, with occasional tite, silty, slightly argillaceous limestone. There were traces of crinoids, bryozoans and brachiopods. There were no cuttings to surface from 802-835 m. From 835-935 m there was limestone and shale. The limestone was micro crystalline to fine fragmental, tite, with traces of crinoids, ostracods, pellets and pyrite. From 935-1055 m there was shale, with occasional limestone. The limestone was tite, with traces of crinoids, ostracods and pyrite. The lower Banff section 1055-1378 m consists of shale, with minor limestone, good traces of pyrite.

Conclusion: There was some gas and water to surface (probably from Cretaceous) until casing was set at 802 m, which made sampling difficult. Gas readings were predominantly low after casing with minor formation gas readings at 950 m and occasional connection gas readings. The Mississippian is of little interest.

Lithology and Formation Evaluation

EXSHAW 1378 - 1390 m

The Exshaw consists of dark gray to black carbonaceous shale.

Conclusion: The Exshaw is of little interest.

KOTCHO 1390 - 1765 m

From 1390-1560 m the Kotcho formation consists of shale and siltstone. The siltstone is light to medium gray, quartzose, slightly argillaceous to argillaceous, calcareous and dolomitic. From 1560-1765 m was predominantly shale, with occasional stringers of fossiliferous limestone.

Conclusion: There was no porosity in this formation and gas readings were very low. The Kotcho is of little interest.

TETCHO 1765 - 1803 m

The Tetcho consists of argillaceous limestone interbedded with partly carbonaceous shale. There was some earthy limestone, with dead oil staining near the bottom of this formation.

Conclusion: There did not appear to be any porosity. Gas to surface was encountered while air drilling at 1772 m which lasted for approximately 10 minutes. The Tetcho is of slight interest.

TROUT RIVER 1803 - 1883 m

The Trout River consists of siltstone, minor limestone, with interbedded shales. The siltstone was light to medium gray to brown, quartzose, argillaceous in part, sandy in part, calcareous and dolomitic. There was some dead oil staining in the upper part of this formation (1803-1840 m).

Conclusion: There did not appear to be any reservoir development. Gas to surface was encountered while air drilling at 1813, 1820 and 1858 m, which appeared to be low pressure, low volume. There was also gas to surface on connections. The Trout River is of slight interest.

KAKISA 1883 - 1915 m

The Kakisa consists of crypto to very fine crystalline limestone, with good traces of fossils and interbedded shales.

Conclusion: There was no reservoir development of formation gas in this zone. There was gas on connections. The Kakisa is of little interest.

FORT SIMPSON 1915 - 2551 m

The Fort Simpson consists of predominantly gray,calcareous and dolomitic shales, with occasional siltstone and minor limestone stringers.

Conclusion: There was no reservoir development in the Fort Simpson. There was gas to surface on most connections until mud up at 2500 m. The Fort Simpson is of little interest.

HAY RIVER (OR MUSKWA) 2551 - 2604 m

The Hay River consists of partly carbonaceous shale, with occasional gray, argillaceous, fossiliferous limestone stringers.

Conclusion: There was no porosity evident. There was minor formation gas from carbonaceous shale. The Hay River is of little interest.

SLAVE POINT 2604 - 2707 m

The Slave Point consists of tite, bituminous limestone, partly fragmental, with abundant indistinct fossils and pellets. There was no visible porosity in the Slave Point. There was minor formation gas at 2626 m and a good formation gas kick at 2789 m, with some connection gas afterward.

Conclusion: The Slave Point is probably tite, but is of possible interest.

WATT MOUNTAIN 2707 - 2719 m

The Watt Mountain consists of limestone, predominantly as above, with two thin beds of waxy shale. There was no porosity or formation gas in this interval.

Conclusion: The Watt Mountain is of little interest except as a marker of the E-logs.

SULPHUR POINT 2719 - 2729 m

The Sulphur Point consists of clean, white to buff, micro to fine crystalline, lime-

stone. There was no visible porosity and no formation gas in this interval.

Conclusion: The Sulphur Point is of little interest.

PINE POINT 2729 - 2833 m

The Pine Point consists of dark, crypto to very fine crystalline limestone, some fragmental, partly bituminous, partly argillaceous. There was some dolomitic limestone and minor dolomite in the bottom of the Pine Point. There was no visible porosity in the sample. There was some formation gas from a dolomite stringer at 2817-2819 m.

Conclusion: The Pine Point is predominantly tite, but is of possible interest.

KEG RIVER 2833 - 2867 m

The Keg River consists of mostly limestone, with two thin dolomite sections. The dolomite is white, predominantly coarse crystalline, with good trace pyrobitumen. There appeared to be some fair intercrystalline porosity. The limestone was dark colored, crypto crystalline to fine fragmental, dolomitic in part, bituminous in part and tite. There was interesting formation gas in the dolomite at 2834-2837 m and 2863-2865 m.

Conclusion: The Keg River is the most interesting zone in the hole. It should be evaluated further with Drill Stem Tests.

LOWER KEG RIVER 2867 - 2092 m

The Lower Keg consists predominantly of dense, partly argillaceous limestone. There was no porosity indicated nor was there any formation gas in this section.

Conclusion: The Lower Keg River is of little interest.

SAMPLE DESCRIPTIONS

20 m — Sandstone, 100%, clear, white, reddish-orange, fine to medium grained, quartz, loose, feldspar, trace black mica, carbonaceous shale, hematite, unconsolidated, probably good porosity

25 m — Sandstone, 80%, as above, some clear angular quartz, trace black chert grains, Siltstone, 20%, white, gray, brown, calcareous, argillaceous in part

30 m — Sandstone, 60%, as above, Conglomerate, 20%, Siltstone, 10%, as above, Shale, 10%, medium gray, firm, subfissile, trace silty

35 m — Conglomerate, 70%, multi-colored pebbles, quartz, feldspar, dense, loose, calcareous siltstone, trace hematite, unconsolidated, probably good porosity, Sandstone, 30%, as above

40 m — Sandstone, 100%, clear, white, some red-orange, fine grained, quartz, occasional feldspar, loose, trace black mica, glauconite, unconsolidated, probably good porosity, minor conglomerate

45 m — Sandstone, 100%, as above

50 m — Sandstone, 100%, clear, white, red-orange, very fine to fine grained, quartz, loose, occasional feldspar, trace black mica, unconsolidated, probably good porosity

55 m — Sandstone, 100%, clear, white, some red-orange, very fine to medium grained, quartz, occasional feldspar, loose, trace glauconite, micaceous, unconsolidated, probably fair to good porosity

60 m — Sandstone, 100%, clear, white, some red-orange, fine to medium grained, quartz, occasional loose feldspar grains, good trace black mica, minor black carbonaceous shale, unconsolidated, probably good porosity

65 m — Sandstone, 100%, as above

70 m — Sandstone, 100%, clear to frosted, white, red-orange, fine to coarse grained, quartz, loose, feldspar grains, some granular, trace glauconite, black mica, unconsolidated, probably good porosity

75 m — Sandstone, 100%, reddish-orange, white, clear, fine to very coarse grained, some granular, quartz, feldspar, loose grains, occasional black chert grains, black mica, pyrite, unconsolidated, probably good porosity

80 m — Sandstone, 100%, white, clear, some reddish-orange, some black, fine to medium grained, quartz, feldspar, loose grains, carbonaceous fragments,

Sample Descriptions

trace black mica, unconsolidated, probably good porosity

85 m — Sandstone, 70%, as above, Conglomerate, 30%, multi-colored pebbles, quartz, feldspar, granite, siltstone, loose, unconsolidated, probably good porosity

90 m — Sandstone, 90%, white to clear, reddish-orange, medium to very coarse grained, granular, quartz, loose, feldspar, occasional black chert, carbonaceous fragments, trace black mica, unconsolidated, probably good porosity, Conglomerate, 10%, as above

95 m — Sandstone, 100%, white to clear, reddish-orange, medium to coarse grained, quartz, feldspar, siltstone, loose grains, occasional carbonaceous fragments, black chert grains, unconsolidated, probably good porosity

100 m — Sandstone, 100%, clear, white, some reddish-orange, some black, very fine to fine grained, quartz, loose, occasional feldspar, carbonaceous fragments, trace hematite, unconsolidated, trace bentonitic, probably good porosity

105 m — Sandstone, 90%, clear, white, some reddish-orange, fine to coarse grained, quartz, occasional loose, feldspar, black chert, micaceous, unconsolidated, probably good porosity, Conglomerate, 10%, vari-colored

110 m — Sandstone, 80%, as above, medium to very coarse grained, unconsolidated, Conglomerate, 20%, multi-colored, granular and pebbles, quartz, feldspar, granite, loose, unconsolidated

115 m — Sandstone, 80%, as above, Conglomerate, 20%, as above

120 m — Sandstone, 70%, white to clear, reddish-orange, trace black, coarse to very coarse grained, grading to conglomerate, quartz, occasional feldspar, loose, black chert, unconsolidated, good porosity, Conglomerate, 30%, multi-colored pebbles and granular, quartz, feldspar, loose, siltstone, black chert, granite, unconsolidated

125 m — Sandstone, 70%, as above, Conglomerate, 30%, as above

130 m — Conglomerate, 70%, multi-colored pebbles, dense, limestone, siltstone, quartz, feldspar, granite, trace black chert, unconsolidated, good porosity ?, Sandstone, 30%, as above

135 m — Conglomerate, 70%, as above, Sandstone, 30%, as above, partly unconsolidated, partly bentonitic, gummy

140 m — Conglomerate, 80%, multi-colored pebbles and granules, dense, limestone, quartz, feldspar, granite, occasional chert, trace hematite, bentonitic, gummy, unconsolidated, poor to good porosity, Sandstone, 20%, as above

145 m — Conglomerate, 60%, as above, bentonitic, Sandstone, 40%, multi-colored, coarse grained, quartz, feldspar, loose grains, unconsolidated in part,

partly bentonitic, gummy, poor to good porosity

150 m — Conglomerate, 50%, multi-colored pebbles and granules, abundant feldspar, granite, quartz, dense, limestone, hematite, coarse sandstone matrix, unconsolidated, some bentonitic, Sandstone, 20%, partly coarse grained, as above, predominantly light gray-brown, very fine grained, quartz, well cemented, bentonitic, tite to poor porosity, Shale, 30%, dark gray, firm, subfissile, bentonitic, slightly carbonaceous

155 m — No samples

160 m — No samples

165 m — Sandstone, 90%, white to clear, occasional reddish-orange, fine to medium grained, quartz, occasional feldspar, loose, trace black chert, micaceous, unconsolidated, trace bentonitic, probably good porosity, minor conglomerate, Siltstone, 10%, light to medium gray, argillaceous, calcareous

170 m — Sandstone, 80%, as above, some light gray, very fine grained, silty, slightly argillaceous, calcareous, tite, Siltstone, 20%, as above, sandy, grading to very fine grained sandstone, some bentonitic

175 m — Sandstone, 80%, 50% light gray, very fine grained, silty, quartz, well cemented, calcareous, slightly argillaceous in part, poor porosity to tite, 30% as above, Conglomerate, 10%, as above, Siltstone, 10%, as above

180 m — Sandstone, 70%, as above, minor siltstone, Conglomerate, 30%, multi-colored pebbles, quartz, feldspar, loose, unconsolidated, some bentonitic

185 m — Conglomerate, 50%, as above, some loose fragments, Sandstone, 50%, predominantly clear, white, reddish-orange, medium to very coarse grained, grading to conglomerate, quartz, feldspar, loose grains, unconsolidated, sandstone, some light gray, very fine grained, silty, calcareous

190 m — Sandstone, 70%, partly light gray, very fine grained, silty, calcareous, slightly argillaceous, tite to poor porosity, sandstone, partly white, clear, orange, fine to coarse grained, quartz, occasional feldspar, loose grains, unconsolidated, some bentonitic, Conglomerate, 30%, as above

195 m — Conglomerate, 10%, as above, Sandstone, 90%, 60% clear, white, reddish-orange, medium to coarse grained, quartz, occasional feldspar, loose chert grains, unconsolidated, trace bentonitic, probably good porosity, 30% light gray, very fine grained, silty, calcareous, bentonitic, slightly argillaceous, tite

200 m — Sandstone, 80%, 50% vari-colored, coarse to very coarse grained, quartz, occasional loose, feldspar, black chert, unconsolidated, 30% very fine grained, as above, Conglomerate, 20%, multi-colored, quartz, feldspar, granite, loose, trace black mica, unconsolidated

Sample Descriptions

205 m — Sandstone, 90%, 50% medium to coarse grained, vari-colored, quartz, feldspar, loose, black chert, argillaceous grains, unconsolidated, 40% white to light gray, very fine grained, silty, well cemented, calcareous, some bentonitic, predominantly tite, some poor porosity, Conglomerate, 10%, as above

210 m — Sandstone, 100%, 70% medium to coarse grained, as above, 30% very fine grained, as above, minor conglomerate

215 m — Sandstone, 80%, 60% white to clear, reddish-orange, medium to very coarse grained, quartz, loose, feldspar, some chert, argillaceous grains, unconsolidated, probably good porosity, 20% light gray, very fine grained, silty, calcareous, bentonitic, poor porosity to tite, Conglomerate, 20%, vari-colored pebbles, loose, feldspar, quartz, granite, unconsolidated

220 m — Sandstone, 90%, as above, Conglomerate, 10%, as above

225 m — Sandstone, 60%, 30% medium to coarse grained, as above, 30% very fine grained, as above, Conglomerate, 40%, multi-colored pebbles, loose, granite, quartz, feldspar, trace micaceous, unconsolidated

230 m — No samples - trip

235 m — No samples - trip

240 m — Sandstone, 70%, 50% light to medium gray, very fine grained, silty, bentonitic, some calcareous, argillaceous in part, trace glauconite, tite, 30% white to clear, reddish-orange, medium to coarse grained, quartz, occasional feldspar, loose, unconsolidated, Conglomerate, 20%, multi-colored, as above, Shale, 10%, dark gray, firm, subfissile, some silty

245 m — Sandstone, 60%, predominantly light to medium gray, very fine grained, silty, argillaceous, bentonitic in part, some calcareous, trace glauconite, tite, 10% coarse grained, as above, Conglomerate, 20%, reddish-orange,white, clear, feldspar, quartz, loose, unconsolidated, Shale, 10%, as above, Siltstone, 10%, medium gray, argillaceous, sandy, grading to very fine sandstone

250 m — Sandstone, 80%, predominantly light gray, very fine grained, silty, well cemented, bentonitic, some calcareous, slightly argillaceous, trace glauconite, tite to poor porosity, 10% coarse grained, unconsolidated sandstone, as above, Conglomerate, 10%, as above, Shale, 10%, as above, minor siltstone

255 m — Sandstone, 70%, 50% light gray, very fine grained sandstone, as above, 20% white to clear, orange, coarse grained, unconsolidated, quartz, loose, feldspar, Conglomerate, 10%, as above, Siltstone, 10%, medium to dark gray, argillaceous, sandy in part, trace glauconite, Shale, 10%, dark gray, firm, subfissile, slightly carbonaceous, some silty

260 m — Sandstone, 70%, 50% light to medium gray, very fine grained, silty, argil-

Sample Descriptions

laceous in part, bentonitic, some calcareous, tite, some poor porosity, trace glauconite, 20% coarse grained, as above, minor conglomerate, Shale, 20%, dark gray, soft to firm, subfissile, part silty, Siltstone, 10%, light to medium gray, argillaceous in part, sandy, grading to sandstone

265 m — Sandstone, 70%, as above, Conglomerate, 10%, as above, Shale, 10%, as above, Siltstone, 10%, as above

270 m — Shale, 60%, dark gray, firm, blocky to subfissile, silty, Siltstone, 20%, medium to dark gray, argillaceous, some sandy, trace glauconite, Sandstone, 20%, light to medium gray, very fine grained, silty, bentonitic, some calcareous, argillaceous in part, tite, some unconsolidated sand grains, minor conglomerate

275 m — Sandstone, 40%, predominantly light gray, very fine grained, silty, calcareous, bentonitic, slightly argillaceous, trace glauconite, tite, Shale, 30%, as above, Siltstone, 20%, as above, Conglomerate, 10%, quartz, feldspar, loose pebbles and granules, some coarse grained sandstone

280 m — Sandstone, 50%, light gray, very fine to fine grained, quartz, silty in part, well cemented, calcareous, bentonitic, poor porosity to tite, Siltstone, 20%, light to medium gray, argillaceous, bentonitic in part, sandy in part, trace glauconite, Shale, 30%, dark gray, firm, blocky to subfissile, silty, minor conglomerate and coarse sand grains

285 m — Sandstone, 70%, light gray, very fine to fine grained, quartz, silty, calcareous and bentonitic cement, slightly argillaceous, tite, some poor porosity, Shale, 20%, as above, Siltstone, 10%, as above, minor conglomerate and coarse sandstone

290 m — Sandstone, 40%, as above, more silty, Siltstone, 30%, light to medium gray, argillaceous, bentonitic in part, sandy in part, trace calcareous, Shale, 30%, as above, minor conglomerate

295 m — Shale, 40%, dark gray, soft to firm, blocky to subfissile, silty in part, Sandstone, 40%, light to medium gray, very fine grained, some fine grained, silty, argillaceous in part, calcareous and bentonitic cement, predominantly tite, Siltstone, 20%, medium gray, argillaceous, sandy in part, trace glauconite, minor conglomerate and coarse unconsolidated sandstone

300 m — Sandstone, 70%, white to gray, very fine to fine grained, quartz, silty, calcareous and bentonitic cement, some argillaceous, trace glauconite, tite to poor porosity, Shale, 20%, as above, Siltstone, 10%, as above, minor conglomerate and coarse sandstone

305 m — Sandstone, 60%, as above, Siltstone, 20%, medium gray, argillaceous, sandy, grading to sandstone, trace glauconite, Shale, 20%, dark gray, firm, blocky to subfissile, silty

Sample Descriptions

Set surface casing at 306 m - DRILL WITH AIR

310 m — Shale, 80%, dark gray, firm, subfissile, silty, bentonitic, Siltstone, 20%, medium gray, argillaceous, bentonitic

315 m — Shale, 70%, as above, Siltstone, 30%, light to medium gray, bentonitic, argillaceous, some sandy, trace glauconite

320 m — Shale, 60%, dark gray, firm, blocky to subfissile, silty, micro micaceous, Siltstone, 20%, as above, Sandstone, 20%, white to light gray, very fine grained, silty, calcareous, some bentonitic, trace glauconite, tite

325 m — Shale, 50%, as above, Siltstone, 40%, light to medium gray, argillaceous, bentonitic, calcareous in part, sandy in part, trace glauconite, Sandstone, 10%, as above, grading to siltstone

330 m — Shale, 60%, dark gray, firm, blocky to subfissile, silty, micro micaceous, Siltstone, 40%, light to medium gray, sandy, bentonitic, argillaceous in part, calcareous in part, trace glauconite, minor very fine grained sandstone

335 m — Shale, 60%, as above, Siltstone, 20%, as above, Sandstone, 20%, white to light gray, very fine grained, silty, calcareous and bentonitic cement, tite

340 m — No sample

345 m — No sample

350 m — Shale, 90%, medium to dark gray, firm, blocky to subfissile, micro micaceous, silty in part, Siltstone, 10%, medium gray, argillaceous, some sandy, trace glauconite

355 m — Shale, 80%, dark gray, firm, subfissile, bentonitic to silty in part, Siltstone, 20%, medium gray, bentonitic, argillaceous

360 m — Shale, 80%, as above, Siltstone, 20%, as above

365 m — Shale, 70%, medium to dark gray, firm, blocky to subfissile, silty, micro micaceous, some bentonitic, Siltstone, 30%, light to medium gray, bentonitic, argillaceous, trace calcareous, some sandy, trace glauconite

370 m — Shale, 90%, dark gray, soft to firm, fissile to subfissile, slightly carbonaceous, occasional silty, trace bentonitic, Siltstone, 10%, as above

375 m — Shale, 80%, medium to dark gray, soft to firm, blocky to fissile, micro micaceous in part, silty in part, slightly carbonaceous in part, Siltstone, 20%, medium gray, argillaceous, calcareous in part, trace glauconite, some bentonitic

380 m — Shale, 80%, as above, more silty, Siltstone, 20%, medium gray, argilla-

ceous, bentonitic, some calcareous

385 m — Shale, 90%, dark gray, soft to firm, fissile to subfissile, slightly carbonaceous in part, micro micaceous in part, some silty, trace ironstone, Siltstone, 10%, as above

390 m — Shale, 90%, as above, Siltstone, 10%, light to medium gray, argillaceous, calcareous, some bentonitic, trace glauconite

395 m — Shale, 90%, medium to dark gray, soft to firm, blocky to fissile, micro micaceous in part, slightly carbonaceous in part, some silty, trace pyrite, glauconite, Siltstone, 10%, medium gray, argillaceous, bentonitic, some calcareous, trace glauconite

400 m — Shale, 60%, as above, Siltstone, 40%, light to medium gray, some sandy, bentonitic, some calcareous, argillaceous in part, slight trace glauconite

405 m — Shale, 90%, dark gray, black, firm, fissile to subfissile, carbonaceous, some silty, trace ironstone, Siltstone, 10%, medium gray, bentonitic, argillaceous

410 m — Shale, 90%, as above, more carbonaceous, trace pyrite, ironstone, Siltstone, 10%, as above

415 m — Shale, 70%, partly as above, partly dark gray, firm, blocky, silty, micro micaceous, Siltstone, 30%, medium gray, argillaceous, bentonitic

420 m — Siltstone, 50%, medium gray, bentonitic, argillaceous, sandy in part, trace glauconite, Sandstone, 20%, medium gray, very fine grained, silty, bentonitic, argillaceous, trace glauconite, tite, Shale, 30%, as above

425 m — Shale, 40%, dark gray, black, firm, fissile to subfissile, argillaceous in part, silty in part, trace ironstone, Siltstone, 30%, as above, Sandstone, 30%, light to medium gray, very fine grained, silty, bentonitic and calcareous, argillaceous in part, occasional argillaceous grains, glauconite, tite, some poor porosity

430 m — Sandstone, 70%, light gray, very fine to fine grai[illegible], silty, bentonitic cement, scattered argillaceous grains, glauco[illegible] poor porosity, Siltstone, 20%, medium to dark gray, hard, siliceou[illegible]eous, Shale, 10%, medium to dark gray, firm, blocky to subfissile, silty

435 m - 485 m - No samples - gas to surface, water surges, plu[illegible]

490 m — Shale, 90%, dark gray, firm, blocky to subfissile, micro micaceous, silty in part, trace ironstone, pyrite, Siltstone, 10%, dark gray-brown, argillaceous, sideritic

495 m — Shale, 90%, medium to dark gray, firm, blocky, silty, micro micaceous, trace ironstone, trace pyrite, Siltstone, 10%, predominantly medium gray, argillaceous, calcareous in part, siltstone, some medium to dark gray-

brown, sideritic

500 m — Shale, 90%, medium to dark gray, soft to firm, fissile to subfissile, micro micaceous, occasional silty, good trace ironstone, Siltstone, 10%, as above, trace pyrite

505 m — Shale, 100%, as above, minor siltstone

510 m — Shale, 100%, dark gray, firm, blocky to fissile, micro micaceous, silty in part, good trace ironstone, trace pyrite, minor siltstone

515 m — Shale, 90%, dark gray, some black, firm, fissile to blocky, micro micaceous in part, slightly carbonaceous in part, some silty, trace ironstone, Siltstone, 10%, medium gray-brown, argillaceous, sideritic in part, trace pyrite

520 m - 565 m - No samples - hole surging badly

Banff - 566 m

570 m — Limestone, 40%, white to light brown, tan, micro crystalline, cherty in part, some leached, minor bluish-green claystone, trace crinoids, tite, Chert, 20%, tan, gray, opaque, trace fossils, Shale, 40%, dark gray, some black, firm, blocky to fissile, micro micaceous in part, carbonaceous in part, some silty, trace pyrite

575 m — Limestone, 70%, white to tan, light brown, micro to fine crystalline, fragmental, good trace crinoids, trace chert, trace claystone, tite, Shale, 30%, predominantly as above, some medium gray, calcareous

580 m — No sample - plugging problems

585 m — Limestone, 60%, buff to tan, light gray, micro to fine crystalline, fragmental in part, good trace crinoids, trace bryozoa, ostracods, some argillaceous, tite throughout, Shale, 40%, medium to dark gray, firm, fissile, calcareous in part, trace fossils

590 m — Limestone, 80%, buff to tan, micro to fine crystalline, fragmental in part, some chalky, good trace crinoids, trace brachiopods, some chert replacement, tite, Chert, 10%, tan, brown, opaque, trace fossils, Shale, 10%, as above

595 m — No sample - plugging problems

600 m — Limestone, 50%, buff to tan, some gray, micro crystalline to medium fragments, abundant fossils, crinoids, bryozoa, ostracods, trace chert, tite, Shale, 50%, medium gray, firm, blocky to subfissile, silty, calcareous in part, trace pyrite

605 m — Shale, 60%, medium to dark gray, firm, blocky to subfissile, some silty, calcareous in part, trace pyrite, ostracods, Limestone, 40%, as above

Sample Descriptions

610 m — Limestone, 70%, buff to tan, some gray, micro crystalline to medium fragments, trace ostracods, crinoids, minor chert, tite, Marlstone, 20%, light gray-green, medium hard, calcareous, Shale, 10%, as above

615 m — Limestone, 100%, buff to tan, some gray, fine to medium fragments, good trace crinoids, trace ostracods, some cherty, tite, minor chert, minor shale, marlstone

620 m — Limestone, 80%, partly as above, partly medium to dark gray, crypto to micro crystalline, argillaceous, trace pelletal, crinoids, chert, silty in part, tite, Shale, 20%, dark gray, black, firm, fissile to subfissile, carbonaceous in part

625 m — Limestone, 80%, buff to gray, some tan, micro crystalline to fine fragments, trace crinoids, pelletal, argillaceous in part, cherty in part, tite, Chert, 20%, dark gray, white, mottled, trace fossils, minor black carbonaceous shale

630 m — Trip Sample - Shale, 70%, dark gray, black, firm, fissile to subfissile, carbonaceous, trace ironstone, (probably cavings), some medium gray soft calcareous shale, Limestone, 20%, as above, Chert, 10%, as above

635 m — Limestone, 80%, light gray-brown, buff, micro crystalline, some fragments, cherty in part, slightly argillaceous in part, trace crinoids, tite, Chert, 10%, dark gray, white, mottled, trace fossils, Shale, 10%, as above

640 m — Limestone, 80%, buff to gray, gray-brown, micro crystalline to fine fragments, cherty, slightly argillaceous in part, trace crinoids, tite, Chert, 20%, gray, white, mottled, fossils, crinoids

645 m — Limestone, 70%, buff to light gray-brown, micro crystalline to fine fragments, slightly argillaceous in part, trace fossils, crinoids, ostracods, tite, Chert, 10%, as above, Shale, 20%, dark gray, black, firm, fissile, carbonaceous in part

650 m — Shale, 60%, dark gray, waxy, fissile, platy, trace ostracods, trace pelletal, trace pyrite, Limestone, 40%, as above, good trace fossils, ostracods, crinoids, bryozoa, minor chert

655 m — Limestone, 60%, buff to gray-brown, micro crystalline, some fragments, trace crinoids, trace chert, tite, Shale, 40%, as above

660 m — Limestone, 70%, buff to gray, micro crystalline, some fragments, partly argillaceous, good trace ostracods, bryozoa, trace brachicpods, crinoids, occasional chert replacement, tite, Shale, 30%, medium to dark gray, black, waxy in part, fissile

665 m — Limestone, 90%, buff to gray, micro crystalline, some fragments, argillaceous in part, good trace crinoids, trace ostracods, tite, Shale, 10%, as above

Sample Descriptions

670 m — Limestone, 80%, buff to gray, micro crystalline, argillaceous in part, trace crinoids, brachiopods, tite, Shale, 20%, medium gray, fissile, calcareous

675 m — Limestone, 100%, buff to light gray, micro crystalline, some fragments, slightly argillaceous, trace crinoids, trace chert, tite, minor shale

680 m — Limestone, 90%, as above, Shale, 10%, black, waxy, platy, carbonaceous, trace calcareous

685 m — Limestone, 90%, buff to gray, micro to very fine crystalline, some fragments, partly argillaceous, trace ostracods, bryozoa, crinoids, tite, Shale, 10%, medium gray, soft to firm, fissile, calcareous

690 m — Limestone, 70%, as above, trace ostracods, crinoids, pyrite, Shale, 30%, medium to dark gray, soft to firm, fissile, calcareous in part, carbonaceous in part

695 m — Shale, 70%, medium gray, subwaxy, soft to firm, fissile, platy, calcareous, trace bryozoa, trace pelletal, Limestone, 30%, buff to gray, micro crystalline, partly argillaceous, trace ostracods, crinoids, tite

700 m — Limestone, 50%, buff to gray, micro crystalline, argillaceous in part, some fragments, trace crinoids, sponge, ostracods, tite, Shale, 50%, as above, trace bryozoa

705 m — Limestone, 70%, buff to light gray, micro to very fine crystalline, trace fragments, slightly argillaceous, good trace crinoids, trace brachiopods, tite, Shale, 30%, medium gray, soft to firm, fissile, calcareous, trace pelletal, pyrite

710 m — Limestone, 70%, as above, Shale, 30%, as above

715 m — Limestone, 70%, buff to light gray, micro crystalline, trace fragments, slightly argillaceous, good trace crinoids, trace ostracods, pelletal, tite, Shale, 30%, as above

720 m — Shale, 50%, medium gray, subwaxy, soft to firm, fissile, platy, calcareous in part, trace bryozoa, Limestone, 50%, buff to gray, micro crystalline, argillaceous in part, good trace crinoids, trace bryozoa, ostracods, tite

725 m — Shale, 70%, medium gray, subwaxy in part, platy, fissile, calcareous, trace bryozoa, Limestone, 30%, as above

730 m — Shale, 70%, medium gray, firm, blocky to platy, calcareous, trace pyrite, ostracods, bryozoa, Limestone, 30%, light to medium gray, argillaceous, trace brachiopods, ostracods, bryozoa

735 m — Shale, 90%, medium gray, some dark gray, soft to firm, platy, fissile, calcareous, Limestone, 10%, as above, trace bryozoa, crinoids

Sample Descriptions

740 m — Shale, 90%, medium gray, firm, blocky to platy, calcareous, trace bryozoa, trace pelletal, Limestone, 10%, as above, trace ostracods

745 m — Shale, 90%, medium to dark gray, subwaxy in part, fissile, platy, some blocky, calcareous, good trace pyrite, trace brachiopods, Limestone, 10%, as above

750 m — Shale, 100%, dark gray, subwaxy, soft to firm, platy, calcareous, marly, trace crinoids

755 m — Shale, 100%, medium gray, fissile, platy, calcareous, trace pyrite, crinoids, minor limestone

760 m — Shale, 100%, as above, minor limestone, good trace crinoids, trace pyrite

765 m — Shale, 90%, medium gray, some dark gray, platy, some blocky, calcareous, trace pelletal, crinoids, Limestone, 10%, as above

770 m — Shale, 100%, medium gray, some dark gray, fissile to blocky, platy, calcareous, some silty, trace brachiopods

775 m — Shale, 100%, medium gray, soft to firm, fissile, platy, some blocky, calcareous, good trace pyrite, trace pelletal, minor argillaceous limestone

780 m — Shale, 100%, medium gray, some dark gray, fissile, platy, calcareous, trace pyrite, bryozoa, minor argillaceous limestone

785 m — Shale, 100%, as above, some blocky

790 m — Shale, 100%, medium gray, some dark gray, firm, blocky, platy, calcareous, trace crinoids, bryozoa

795 m — Shale, 100%, medium gray, firm, blocky to fissile, platy, calcareous, trace bryozoa, minor limestone

800 m — Shale, 90%, as above, trace pyrite, crinoids, Limestone, 10%, light to medium gray, micro crystalline, argillaceous, good trace crinoids

805 m - 835 m - No samples

840 m — Limestone, 80%, tan to brown, gray-brown, micro crystalline to fine fragments, good trace crinoids, trace ostracods, bryozoa, pelletal, tite, Shale, 20%, dark gray, black, fissile, carbonaceous, calcareous in part

845 m — Limestone, 90%, tan to brown, gray-brown, fine fragments, some micro crystalline, good trace crinoids, ostracods, pelletal, trace bryozoa, tite, Shale, 10%, as above

850 m — Limestone, 90%, as above, Shale, 10%, as above

855 m — Limestone, 60%, predominantly tan to light brown, micro crystalline to

fine fragments, good trace crinoids, ostracods, pelletal, tite, limestone, some medium gray, micro crystalline, argillaceous, silty in part, Shale, 40%, dark gray, firm, subfissile, calcareous

860 m — Limestone, 70%, as above, Shale, 30%, dark gray, soft to firm, fissile, calcareous

865 m — Limestone, 60%, tan to gray-brown, micro crystalline to fine fragments, good trace pelletal, crinoids, tite, Shale, 40%, dark gray, fissile to subfissile, firm, calcareous, some black carbonaceous shale

870 m — Limestone, 50%, tan to light gray-brown, micro crystalline to fine fragments, good trace crinoids, pelletal, trace silty, tite, Shale, 50%, dark gray, soft to firm, fissile, calcareous, trace pyrite, some black carbonaceous shale

875 m — Shale, 40%, as above, Siltstone, 30%, light gray-brown, argillaceous, calcareous in part, Limestone, 30%, as above, more silty

880 m — Limestone, 50%, tan to light gray-brown, micro crystalline to fine fragments, some silty, good trace pelletal, crinoids, tite, Shale, 30%, as above, Siltstone, 20%, as above

885 m — No sample

890 m — Limestone, 70%, tan to brown, light gray-brown, micro crystalline to fine fragments, good trace pelletal, crinoids, occasional silty, tite, minor siltstone, Shale, 30%, dark gray, some black, soft to firm, calcareous in part, some carbonaceous

895 m — Limestone, 70%, as above, Shale, 30%, as above

900 m — Limestone, 80%, tan to light gray-brown, fine crystalline, fragmental, some micro crystalline, good trace pelletal, crinoids, trace ostracods, tite, Shale, 20%, as above

905 m — Shale, 60%, medium to dark gray, soft to firm, fissile, calcareous, Limestone, 40%, as above

910 m — Shale, 60%, as above, Limestone, 40%, as above

915 m — Shale, 50%, medium to dark gray, soft to firm, fissile, calcareous, trace pyrite, bryozoa, Limestone, 50%, tan to light gray-brown, fine fragments, some micro crystalline, good trace pelletal, crinoids, trace ostracods, bryozoa

920 m — Shale, 90%, dark gray, some black, subwaxy, fissile, carbonaceous, calcareous, trace crinoids, Limestone, 10%, as above

925 m — Shale, 90%, medium to dark gray, subwaxy, fissile, calcareous, Limestone, 10%, as above, trace ostracods, crinoids

Sample Descriptions

930 m — Shale, 60%, as above, Limestone, 40%, tan to gray-brown, micro crystalline to fine fragments, some silty, good trace pelletal, crinoids, trace bryozoa, tite

935 m — Shale, 100%, medium to dark gray, subwaxy, soft, fissile, platy, calcareous, minor limestone, as above

940 m — Shale, 100%, as above, minor limestone

945 m — Shale, 90%, as above, Limestone, 10%, tan to gray-brown, fragmental, good trace pelletal, trace ostracods, crinoids

950 m — Shale, 90%, medium to dark gray, dark brown, subwaxy, soft, fissile, calcareous in part, some carbonaceous, Limestone, 10%, as above, some silty and minor siltstone

955 m — Shale, 80%, medium to dark gray, subwaxy, fissile, calcareous, Limestone, 20%, tan to light gray, fine fragments, some micro crystalline, silty, good trace crinoids, tite

960 m — Shale, 90%, as above, Limestone, 10%, as above

965 m — Shale, 80%, medium to dark gray, subwaxy, fissile, calcareous, Limestone, 20%, light gray, some tan, micro crystalline, silty, argillaceous, some fragmental, tite

970 m — Shale, 70%, as above, Limestone, 30%, light gray, brown, micro crystalline to fine fragments, argillaceous in part, some silty, trace crinoids

975 m — Shale, 70%, medium to dark gray, subwaxy in part, soft, fissile, platy, calcareous, some marly, Limestone, 30%, buff to gray, soft, chalky, argillaceous to marly, trace fragmental limestone, as above

980 m — Shale, 80%, medium to dark gray, subwaxy in part, soft to firm, fissile to subfissile, calcareous, some silty, trace crinoids, Limestone, 20%, light to medium gray, micro crystalline, argillaceous, silty, trace crinoids, tite

985 m — Shale, 70%, medium to dark gray, subway, soft, fissile, calcareous, Limestone, 30%, partly as above, partly white to gray-tan, fragmental, trace ostracods, crinoids, tite throughout, minor siltstone

990 m — Shale, 90%, medium gray, subwaxy, soft to firm, fissile to subfissile, calcareous in part, trace pyrite, Limestone, 10%, light to medium gray, micro crystalline, silty, argillaceous, trace pyrite, crinoids, ostracods

995 m — Shale, 90%, medium gray, subwaxy in part, fissile to blocky, partly calcareous, Limestone, 10%, as above, good trace crinoids

1000 m — Shale, 80%, as above, Limestone, 20%, light to medium gray, micro crystalline, silty, argillaceous, trace crinoids, ostracods

Sample Descriptions

1005 m — Shale, 90%, partly as above, partly dark gray to black, fissile, carbonaceous, Limestone, 10%, as above

1010 m — Shale, 70%, medium to dark gray, some black, fissile to subfissile, calcareous in part, some carbonaceous, trace siderite, Limestone, 30%, light to medium gray, micro crystalline, argillaceous in part, silty in part, trace crinoids, ostracods

1015 m — Shale, 80%, as above, Limestone, 20%, as above, minor siltstone

1020 m — Shale, 90%, medium to dark gray, fissile, partly calcareous, trace silty, Limestone, 10%, as above

1025 m — Shale, 70%, as above, Limestone, 30%, white to gray, micro crystalline, chalky, argillaceous in part, trace ostracods

1030 m — Limestone, 70%, white to light gray, micro to fine crystalline, chalky in part, some silty, some argillaceous, trace pelletal, trace crinoids, tite, Shale, 30%, as above

1035 m — Limestone, 70%, as above, Shale, 30%, as above

1040 m — Shale, 100%, medium gray, firm, blocky to fissile, calcareous in part, good trace crinoids, minor limestone

1045 m — Shale, 80%, as above, Limestone, 20%, white to tan, fine crystalline, some chalky, trace pyrite

1050 m — Shale, 90%, as above, trace pyrite, siderite, Limestone, 10%, as above

1055 m — Shale, 80%, medium to dark gray, subwaxy in part, fissile, partly calcareous, Limestone, 20%, partly as above, partly buff to gray, micro crystalline, silty, argillaceous

1060 m — Shale, 100%, medium gray, subwaxy in part, firm, blocky to fissile, calcareous, trace siderite, trace ostracods

1065 m — Shale, 90%, as above, Limestone, 10%, white, fine crystalline, some chalky

1070 m — Shale, 100%, medium to dark gray, subwaxy, fissile, partly calcareous, some carbonaceous, minor limestone

1075 m — Shale, 90%, as above, Limestone, 10%, white, chalky, some fine crystalline

1080 m — Shale, 90%, as above, some dark gray-black carbonaceous shale, Limestone, 10%, as above

1085 m — Shale, 100%, medium gray, some dark gray, subwaxy, fissile, calcareous, trace limestone

Sample Descriptions

1090 m Shale, 100%, as above, more dark gray shale, slightly carbonaceous, minor limestone

1095 m Shale, 100%, medium to dark gray, dark brown, subwaxy, fissile, partly calcareous, minor chalky limestone

1100 m Shale, 100%, medium gray, subwaxy, blocky to fissile, calcareous, trace chalky limestone, slight trace siderite

1105 m Shale, 90%, as above, some dark gray, fissile, slight carbonaceous shale, Limestone, 10%, white, tan, micro to fine crystalline, partly chalky, trace crinoids

1110 m Shale, 100%, medium gray, soft to firm, blocky to fissile, calcareous, trace white chalky limestone, slight trace pyrite

1115 m Shale, 90%, as above, some dark gray, Limestone, 10%, white, micro crystalline, chalky, trace silty

1120 m Shale, 100%, medium gray, subwaxy, blocky to fissile, calcareous, trace silty, slight trace pyrite

1125 m Shale, 100%, as above

1130 m Shale, 100%, medium gray, subwaxy, blocky to fissile, calcareous, shale, some dark gray, fissile, slightly carbonaceous, trace limestone

1135 m Shale, 100%, medium gray, trace dark gray, subwaxy, fissile, calcareous, trace limestone

1140 m Shale, 100%, medium gray, subwaxy, blocky to fissile, calcareous, trace pyrite

1145 m Shale, 100%, as above

1150 m Shale, 100%, as above

1155 m Shale, 100%, medium to dark gray, subwaxy, fissile to blocky, calcareous, minor limestone, medium gray, micro crystalline, silty, some chalky

1160 m Shale, 100%, medium gray, some dark gray, subwaxy, fissile, calcareous, trace chalky limestone

1165 m Shale, 100%, medium gray, subwaxy, fissile, blocky, calcareous

1170 m Shale, 100%, as above

1175 m Shale, 100%, medium to dark gray, trace black, subwaxy, fissile, calcareous, some carbonaceous, trace limestone

1180 m Shale, 100%, medium gray, some dark gray, subwaxy, fissile, calcareous,

Sample Descriptions

minor white limestone

1185 m — Shale, 100%, as above

1190 m — Shale, 100%, medium gray, subwaxy, fissile, calcareous, trace limestone

1195 m — Shale, 100%, as above, trace pyrite

1200 m — Shale, 100%, medium gray, subwaxy, blocky to fissile, calcareous, good trace pyrite

1205 m — Shale, 100%, as above

1210 m — Shale, 100%, as above

1215 m — Shale, 100%, medium gray, subwaxy, blocky to fissile, calcareous, trace pyrite

1220 m — Shale, 100%, as above

1225 m — Shale, 100%, medium gray, some dark gray, subwaxy, fissile, calcareous, good trace pyrite

1230 m — Shale, 100%, as above, less dark gray

1235 m — Shale, 100%, medium gray, subwaxy, fissile, calcareous, trace pyrite

1240 m — Shale, 100%, as above, minor white limestone

1245 m — Shale, 100%, medium gray, subwaxy, fissile, calcareous, trace pyrite

1250 m — Shale, 100%, as above

1255 m — Shale, 100%, as above

1260 m — Shale, 100%, medium gray, subwaxy, fissile, calcareous, trace pyrite, trace white limestone

1265 m — Shale, 100%, as above, some dark gray

1270 m — Shale, 100%, medium to dark gray, subwaxy, fissile, calcareous in part, slightly carbonaceous in part

1275 m — Shale, 100%, as above, trace pyrite

1280 m — Shale, 100%, medium to dark gray, black, fissile, calcareous in part, carbonaceous in part

1285 m — Shale, 100%, as above, more black carbonaceous shale

1290 m — Shale, 100%, medium to dark gray, black, fissile, carbonaceous in part,

Sample Descriptions

calcareous in part, trace pyrite

1295 m — Shale, 100%, as above

1300 m — Shale, 100%, dark gray, some black, soft to firm, fissile, calcareous in part, some carbonaceous, trace pyrite, limestone

1305 m — Shale, 100%, as above

1310 m — Shale, 100%, dark gray, some black, fissile, carbonaceous in part, some calcareous

1315 m — Shale, 100%, as above

1320 m — Shale, 100%, dark gray, soft, fissile, some calcareous, slightly carbonaceous in part, trace pyrite

1325 m — Shale, 100%, as above

1330 m — No sample

1335 m — Shale, 100%, dark gray, soft, fissile, some calcareous

1340 m — Shale, 100%, as above

1345 m — Shale, 100%, dark gray, black, soft, fissile, carbonaceous in part, trace calcareous

1350 m — Shale, 100%, dark gray, some black, soft, fissile, some carbonaceous, some calcareous, trace pyrite

1355 m — Shale, 100%, dark gray, black, soft, fissile, carbonaceous in part, some calcareous

1360 m — Shale, 100%, as above

1365 m — Shale, 100%, as above, trace pyrite

1370 m — Shale, 100%, dark gray, black, soft, fissile, partly carbonaceous, some calcareous, trace white limestone

1375 m — Shale, 100%, as above

Exshaw - 1378 m

1380 m — Shale, 100%, dark gray to black, soft, fissile, carbonaceous, some calcareous, trace pyrite

1385 m — Shale, 100%, black, dark gray, soft, fissile, carbonaceous, some calcareous, trace pyrite

Sample Descriptions

1390 m — Shale, 100%, black, soft to firm, blocky to fissile, carbonaceous, shale, some dark gray, fissile, trace calcarecus

Kotcho - 1390 m

1395 m — Shale, 80%, predominantly black,as above, some medium gray, waxy, fissile, Siltstone, 20%, light gray, quartzose, dolomitic, slightly argillaceous

1400 m — Shale, 60%, partly black carbonaceous shale, as above, partly medium gray, fissile to subfissile, subwaxy, dolomitic, silty in part, Siltstone, 40%, light to medium gray, quartzose, dolomitic, some calcareous, slightly argillaceous

1405 m — Shale, 70%, predominantly medium gray, subwaxy, fissile to subfissile, dolomitic, some calcareous, silty in part, shale, some black, blocky to subfissile, carbonaceous, Siltstone, 30%, as above

1410 m — Shale, 70%, as above, Siltstone, 30%, as above

1415 m — Shale, 60%, medium gray, subfissile, subwaxy, firm, silty, dolomitic, some calcareous, some black carbonaceous shale, Siltstone, 40%, medium gray, quartzose, dolomitic, calcareous, slightly argillaceous to argillaceous, trace pyrite

1420 m — Shale, 80%, medium gray, subwaxy, fissile to subfissile, dolomitic, calcareous, some silty, trace pyrite, minor black carbonaceous shale, Siltstone, 20%, as above

1425 m — Shale, 80%, as above, less silty, Siltstone, 20%, as above

1430 m — Shale, 80%, medium gray, fissile to subfissile, subwaxy, dolomitic, some calcareous, some silty, trace pyrite, minor black carbonaceous shale, Siltstone, 20%, light to medium gray, quartzose, argillaceous, dolomitic, calcareous

1435 m — Shale, 90%, medium gray, fissile to subfissile, subwaxy, dolomitic, some calcareous, silty in part, shale, abundant medium to dark gray-brown,waxy, platy, fissile, minor black carbonaceous shale, Siltstone, 10%, as above

1440 m — Shale, 90%, medium gray, subwaxy, fissile to subfissile, dolomitic, calcareous, silty, minor black carbonaceous shale, Siltstone, 10%, light to medium gray, quartzose, dolomitic, argillaceous

1445 m — Shale, 90%, as above, Siltstone, 10%, as above

1450 m — Shale, 90%, medium gray, subwaxy, fissile to subfissile, silty in part, dolomitic, calcareous, trace black carbonaceous shale, Siltstone, 10%, medium gray, quartzose, argillaceous, dolomitic

1455 m — Shale, 100%, medium gray, subwaxy, fissile to subfissile, dolomitic, calcareous, silty in part, minor siltstone, minor carbonaceous shale

Sample Descriptions

1460 m — Shale, 90%, as above, Siltstone, 10%, light to medium gray, quartzose, dolomitic, calcareous, argillaceous, trace calcite

1465 m — Shale, 90%, medium gray, subwaxy, fissile to subfissile, dolomitic, calcareous, some silty, minor carbonaceous shale, Siltstone, 10%, as above

1470 m — Shale, 100%, as above, minor siltstone

1475 m — Shale, 100%, medium gray, subwaxy, fissile to subfissile, calcareous, dolomitic, minor limestone, siltstone

1480 m — Shale, 90%, as above, Siltstone, 10%, medium gray, quartzose, argillaceous, dolomitic, calcareous

1485 m — Shale, 70%, as above, Limestone, 20%, light gray, crypto crystalline, dense. some silty, Siltstone, 10%, as above

1490 m — Shale, 80%, medium gray, some dark gray, subwaxy, fissile to subfissile, silty in part, calcareous, dolomitic, Limestone, 10%, as above, Siltstone, 10%, as above

1495 m — Shale, 60%, as above, Siltstone, 30%, light to medium gray, quartzose, calcareous, dolomitic, argillaceous, Limestone, 10%, light gray, crypto crystalline, some silty, slightly argillaceous

1500 m — Shale, 80%, as above, Limestone, 10%, as above, Siltstone, 10%, as above

1505 m — Shale, 80%, partly as above, 20% black, fissile, carbonaceous, Siltstone, 20%, light to medium gray, calcareous, dolomitic, slightly argillaceous to argillaceous, minor limestone

1510 m — Shale, 80%, as above, Siltstone, 20%, as above

1515 m — Shale, 70%, medium gray, subwaxy, fissile to subfissile, calcareous, dolomitic, silty in part, some carbonaceous shale, Siltstone, 30%, light to medium gray, quartzose, calcareous, dolomitic, slightly argillaceous to argillaceous, minor limestone

1520 m — Shale, 80%, as above, Siltstone, 20%, as above

1525 m — Shale, 80%, medium gray, subwaxy, fissile to subfissile, silty, calcareous, dolomitic, minor black carbonaceous shale, Siltstone, 20%, light to medium gray, quartzose, calcareous, dolomitic, minor limestone

1530 m — Shale, 80%, as above, Siltstone, 20%, as above

1535 m — Shale, 80%, as above, Siltstone, 20%, as above

1540 m — Shale, 80%, as above, Siltstone, 20%, as above

1545 m — Shale, 60%, medium gray, subwaxy, fissile to subfissile, silty, calcareous,

dolomitic, some carbonaceous shale, Siltstone, 40%, light to medium gray, quartzose, calcareous, some dolomitic, slightly argillaceous to argillaceous

1550 m Shale, 70%, as above, Siltstone, 30%, as above

1555 m Shale, 70%, as above, Siltstone, 30%, light to medium gray, quartzose, calcareous, argillaceous some dolomitic

1560 m Shale, 60%, medium gray, fissile to subfissile, subwaxy, silty, calcareous, dolomitic, Siltstone, 40%, as above

1565 m Shale, 80%, medium gray, fissile to subfissile, calcareous, dolomitic, silty in part, minor black carbonaceous shale, Siltstone, 20%, as above

1570 m Shale, 90%, medium gray, waxy, fissile, calcareous, dolomitic, silty in part, Siltstone, 10%, light to medium gray, calcareous, some dolomitic, argillaceous, trace white limestone

1575 m Shale, 100%, medium gray, waxy, fissile, calcareous, dolomitic, silty in part, trace pyrite, limestone, siltstone

1580 m Shale, 100%, as above, minor siltstone

1585 m Shale, 100%, medium gray, waxy to subwaxy, fissile, calcareous, some dolomitic, some silty, minor siltstone, limestone

1590 m Shale, 100%, as above

1595 m Shale, 100%, medium gray, subwaxy, fissile, calcareous, dolomitic, trace silty, minor siltstone

1600 m Shale, 100%, as above, minor white chalky limestone

1605 m Shale, 100%, medium gray, waxy to subwaxy, fissile, calcareous, dolomitic, trace silty, minor siltstone, limestone

1610 m Shale, 100%, medium gray, subwaxy, soft, fissile, calcareous, dolomitic, trace siltstone

1615 m Shale, 100%, as above

1620 m Shale, 100%, as above, minor limestone, shale, white, chalky, trace crinoids

1625 m Shale, 100%, medium gray, subwaxy, soft, fissile to subfissile, calcareous, dolomitic, trace siltstone, limestone

1630 m Shale, 100%, as above, some silty, trace chalky limestone

1635 m Shale, 100%, medium gray, subwaxy, soft to firm, fissile to subfissile,

Sample Descriptions

	some silty, calcareous, dolomitic, minor chalky limestone, trace siltstone
1640 m	Shale, 100%, medium gray, subwaxy, fissile, calcareous, dolomitic in part
1645 m	Shale, 100%, medium gray, subwaxy, fissile to blocky, calcareous, dolomitic
1650 m	Shale, 100%, medium gray, subwaxy, fissile, calcareous, some dolomitic, minor argillaceous limestone
1655 m	Shale, 100%, as above
1660 m	Shale, 100%, as above
1665 m	Shale, 100%, medium gray, subwaxy, fissile, platy, calcareous, dolomitic, trace limestone, crinoids
1670 m	Shale, 90%, as above, Limestone, 10%, white to buff, light gray, chalky to crypto crystalline, some argillaceous, trace crinoids
1675 m	Shale, 90%, medium gray, subwaxy, fissile to blocky, calcareous, some dolomitic, Limestone, 10%, as above
1680 m	Shale, 100%, medium gray, subwaxy, soft, fissile, calcareous, dolomitic, minor limestone
1685 m	Shale, 100%, as above
1690 m	Shale, 100%, medium gray, subwaxy, fissile to blocky, calcareous, some dolomitic, minor siltstone, light gray, minor chalky limestone, trace sparry calcite
1695 m	Shale, 100%, medium to dark gray, subwaxy, fissile, calcareous, dolomitic in part, trace limestone
1700 m	Shale, 100%, as above, trace pyrite, limestone
1705 m	Shale, 100%, medium to dark gray, subwaxy, soft, fissile, calcareous, dolomitic in part, trace limestone
1710 m	Shale, 100%, as above, trace pyrite
1715 m	Shale, 100%, dark gray, subwaxy, fissile, some blocky, calcareous, dolomitic, trace carbonaceous, trace limestone
1720 m	Shale, 100%, medium to dark gray, subwaxy, fissile, calcareous, partly dolomitic, slight trace pyrite, trace limestone
1725 m	Shale, 100%, medium gray, some dark gray, subwaxy, fissile, calcareous, partly dolomitic, trace limestone

Sample Descriptions

1730 m — Shale, 100%, medium gray, soft to firm, fissile to blocky, calcareous in part, partly dolomitic, slight trace pyrite

1735 m — Shale, 100%, as above

1740 m — Shale, 80%, medium gray, subwaxy to waxy, fissile, platy, calcareous, some dolomitic, Limestone, 20%, white to buff, soft, chalky, trace crinoids

1745 m — Shale, 90%, medium to dark gray, waxy to subwaxy, fissile, platy, calcareous, dolomitic in part, trace carbonaceous, Limestone, 10%, as above

1750 m — Shale, 90%, as above, Limestone, 10%, as above

1755 m — Shale, 100%, dark gray, subwaxy, fissile to subfissile, calcareous, dolomitic in part, trace limestone

1760 m — Shale, 90%, dark gray, subwaxy, fissile, calcareous, dolomitic in part, Limestone, 10%, white to buff, chalky, some argillaceous

1765 m — Shale, 100%, dark gray, some black, subwaxy, fissile, calcareous, some dolomitic, carbonaceous in part, minor limestone

Tetcho - 1765 m

1770 m — Shale, 80%, dark gray, black, fissile to subfissile, carbonaceous in part, calcareous, some dolomitic, Limestone, 20%, medium gray-brown, crypto crystalline, argillaceous, dense, tite

1775 m — Shale, 60%, as above, Limestone, 40%, buff to gray-brown, crypto crystalline, some micro crystalline, argillaceous, dense, tite

1780 m — Shale, 60%, medium to dark gray, some black, subwaxy, fissile, calcareous, some carbonaceous, Limestone, 40%, as above

1785 m — Limestone, 60%, gray-brown, crypto crystalline, argillaceous, some chalky, tite throughout, Shale, 40%, as above

1790 m — Limestone, 50%, gray-brown, crypto to micro crystalline, argillaceous, some silty, trace pyrite, tite, Shale, 50%, medium gray, subfissile, calcareous, some black carbonaceous shale

1795 m — Shale, 60%, medium to dark gray, subwaxy, fissile, calcareous, some black carbonaceous shale, Limestone, 40%, as above

1800 m — Limestone, 70%, predominantly buff to gray-brown, crypto to micro crystalline, partly argillaceous, tite, limestone, some light brown, soft, earthy, dead oil stain, poor porosity, no fluorescence, poor slow cut, Shale, 30%, as above

1805 m — Limestone, 50%, buff to brown, gray-brown, micro to very fine crystalline, abundant soft to earthy, some silty, some argillaceous, poor porosity in

part, dead oil stain in part, spotty light yellow fluorescence, poor slow cut, Shale, 50%, dark gray, some black, subwaxy, fissile to subfissile, calcareous, carbonaceous in part

Trout River - 1803 m

1810 m Siltstone, 60%, medium to dark gray-brown, quartzose, argillaceous, dolomitic, some calcareous, dead oil stain in part, no fluorescence, slight slow cut, Shale, 30%, as above, Limestone, 10%, as above

1815 m Siltstone, 60%, light to medium gray-brown, quartzose, argillaceous in part, dolomitic in part, calcareous in part, trace dead oil stain, Shale, 30%, as above, Limestone, 10%, buff to brown, gray-brown, crypto crystalline to chalky, silty in part, argillaceous in part

1820 m Siltstone, 50%, as above, Limestone, 20%, as above, Shale, 30%, medium to dark gray, subwaxy in part, soft, fissile, calcareous,partly dolomitic

1825 m Siltstone, 50%, light to dark gray-brown, quartzose, calcareous, some dolomitic, argillaceous, trace dead oil stain, trace bitumen, Shale, 40%, dark gray, subwaxy, soft, fissile, calcareous, Limestone, 10%, as above

1830 m Shale, 60%, dark gray, waxy, soft, fissile, calcareous, Siltstone, 40%, as above, minor limestone

1835 m Siltstone, 50%, light to medium gray, gray-brown, quartzose, argillaceous, calcareous in part, some sandy, trace dead oil stain, trace bitumen, minor limestone, Shale, 50%, medium to dark gray, subwaxy, fissile, calcareous

1840 m Siltstone, 60%, as above, Shale, 40%, as above

1845 m Shale, 50%, medium to dark gray, waxy, fissile, calcareous, Siltstone, 40%, as above, Limestone, 10%, buff, chalky, slightly argillaceous

1850 m Siltstone, 40%, light to medium gray, quartzose, slightly argillaceous, sandy, calcareous in part, dolomitic in part, minor limestone, Sandstone, 30%, light gray, very fine grained, silty, grading to siltstone, dolomitic cement, some calcareous, trace bitumen, poor porosity to tite, Shale, 30%, as above

1855 m Siltstone, 40%, light to medium gray, quartzose, argillaceous, sandy, calcareous in part, dolomitic in part, Sandstone, 10%, as above, Limestone, 10%, buff to gray, soft, chalky, argillaceous in part, Shale, 40%, medium to dark gray, waxy, soft, fissile, calcareous

1860 m Shale, 50%, medium gray, firm, waxy in part, subfissile, calcareous in part, some silty, Limestone, 10%, buff to light gray, micro crystalline to chalky, slightly argillaceous in part, trace ostracods, Siltstone, 40%, as above, some sandy

1865 m Shale, 70%, medium to dark gray, subwaxy, fissile, calcareous in part,

Sample Descriptions

some silty, Siltstone, 20%, as above. Limestone, 10%, white, fine crystalline, sparry calcite, some chalky

1870 m Shale, 70%, as above, Siltstone, 20%, as above, Limestone, 10%, as above

1875 m Shale, 80%, medium to dark gray, subwaxy, soft, fissile, calcareous, occasional silty, Siltstone, 20%, medium gray, argillaceous, calcareous, minor limestone

1880 m Shale, 70%, as above, Siltstone, 30%, as above, minor limestone

1885 m Shale, 60%, as above, Siltstone, 40%, light to medium gray, quartzose, sandy in part, argillaceous, calcareous and dolomitic cement, minor limestone

Kakisa - 1883 m

1890 m Shale, 80%, as above, Siltstone, 10%, as above, Limestone, 10%, buff to brown, micro crystalline, slightly argillaceous, tite

1895 m Shale, 70%, medium to dark gray, occasional black, waxy, soft, fissile, calcareous in part, some carbonaceous, Limestone, 30%, buff, light gray-brown, micro to very fine crystalline, silty in part, chalky in part, slightly argillaceous, trace ostracods, crinoids, tite

1900 m Shale, 70%, medium to dark gray, occasional black, subwaxy, fissile, calcareous in part, some carbonaceous, trace pyrite, Limestone, 30%, brown to tan, crypto to micro crystalline, some chalky, tite throughout, minor siltstone, light gray

1905 m Limestone, 50%, tan to brown, gray-brown, crypto to very fine crystalline, some chalky, some silty, trace ostracods, tite, Shale, 50%, as above

1910 m Shale, 70%, medium to dark gray, waxy, fissile to subfissile, calcareous, some dolomitic, trace carbonaceous, Limestone, 30%, as above

1915 m No sample - trip - drill pipe twisted off

Fort Simpson - 1915 m

1920 m Shale, 90%, medium to dark gray, subwaxy, fissile, platy in part, calcareous, some dolomitic, slight trace pyrite, Limestone, 10%, as above, trace ostracods

1925 m Shale, 100%, medium to dark gray, black, subwaxy in part, subfissile, platy in part, calcareous, some carbonaceous, slight trace pyrite, minor limestone, trace crinoids

1930 m Shale, 100%, as above, more dark gray, minor limestone, siltstone

1935 m Shale, 80%, dark gray, some black, subfissile to fissile, calcareous, some

Sample Descriptions

dolomitic, some carbonaceous, trace pyrite, Siltstone, 20%, medium gray-brown, argillaceous, calcareous, some dolomitic

1940 m Shale, 100%, dark gray, some black, subwaxy, subfissile, platy in part, calcareous, occasional carbonaceous, trace brown waxy blocky shale

1945 m Shale, 100%, dark gray, gray-brown, black, subwaxy, subfissile, platy in part, calcareous, some carbonaceous, trace pyrite

1950 m Shale, 100%, medium to dark gray, gray-brown, trace black, subwaxy, fissile, calcareous in part, occasional carbonaceous, minor chalky limestone, trace brachiopods

1955 m Shale, 90%, medium to dark gray, gray-green, gray-brown, subwaxy, fissile, calcareous in part, some dolomitic, Siltstone, 10%, light gray, quartzose, slightly argillaceous, calcareous in part, dolomitic in part, trace sandy

1960 m Shale, 100%, as above, minor siltstone

1965 m Shale, 100%, medium to dark gray, gray-brown, gray-green, occasional black, calcareous in part, some dolomitic, occasional carbonaceous, minor soft chalky limestone, trace siltstone

1970 m Shale, 100%, as above

1975 m Shale, 100%, as above

1980 m Shale, 90%, medium gray, gray-green, some gray-brown and black, subwaxy, fissile to subfissile, calcareous in part, some dolomitic, trace carbonaceous, occasional silty, trace pyrite, Siltstone, 10%,medium gray, calcareous, argillaceous

1985 m Shale, 90%, as above, Siltstone, 10%, as above

1990 m Shale, 100%, medium to dark gray, gray-green, gray-brown, black, fissile, subwaxy in part, calcareous in part, some dolomitic, some carbonaceous, trace chalky limestone

1995 m Shale, 100%, medium gray, gray-green, some gray-brown, black, subwaxy, fissile, calcareous in part, trace siltstone, limestone

2000 m Shale, 100%, medium to dark gray, gray-green, gray-brown, some black, fissile to subfissile, calcareous, some dolomitic, trace carbonaceous, some silty, minor siltstone

2005 m Shale, 80%, as above, less dark gray, Siltstone, 20%, light to medium gray-brown, quartzose, calcareous, slightly argillaceous

2010 m Shale, 90%, medium to dark gray, gray-brown, trace black, subwaxy in part, calcareous in part, some dolomitic, trace carbonaceous, Siltstone,10%, as

Sample Descriptions

above

2015 m — Shale, 90%, as above, Siltstone, 10%, medium gray, argillaceous, calcareous in part, dolomitic in part, trace sandstone

2020 m — Shale, 100%, medium to dark gray, some gray-brown, black, subwaxy in part, fissile to subfissile, calcareous in part, some carbonaceous, minor siltstone, limestone

2025 m — Shale, 90%, as above, Siltstone, 10%, medium gray, quartzose, calcareous, sandy, slightly argillaceous

2030 m — Shale, 70%, medium to dark gray, gray-brown, some black, fissile to subfissile, calcareous, some carbonaceous, Siltstone, 30%, light to medium gray, quartzose, calcareous, partly argillaceous, some sandy

2035 m — Shale, 90%, dark gray, dark gray-brown, subwaxy in part, calcareous, partly carbonaceous, trace pyrite, crinoids, Siltstone, 10%, as above

2040 m — Shale, 100%, medium to dark gray, gray-brown, black, fissile to subfissile, calcareous, some carbonaceous, minor limestone, siltstone

2045 m — Shale, 80%, as above, trace pyrite, Siltstone, 20%, light to medium gray, slightly argillaceous, calcareous, some sandy

2050 m — Shale, 60%, as above, Siltstone, 40%, light to medium gray, gray-brown, slightly argillaceous, calcareous in part, dolomitic in part, some sandy

2055 m — Shale, 80%, dark gray, black, dark gray-brown, fissile to subfissile, calcareous, some carbonaceous, Siltstone, 20%, as above

2060 m — Shale, 100%, medium to dark gray, trace black, subwaxy in part, calcareous in part, slight trace pyrite, trace limestone, siltstone

2065 m — Shale, 100%, medium to dark gray, some black, subwaxy in part, calcareous in part, occasional carbonaceous, trace siltstone

2070 m — Shale, 90%, medium to dark gray, subwaxy in part, calcareous in part, some dolomitic, trace carbonaceous, Siltstone, 10%, light gray, quartzose, dolomitic, slightly argillaceous, minor limestone, white, chalky, some silty

2075 m — Shale, 100%, medium to dark gray, some gray-brown, gray-green, subwaxy, fissile to subfissile, calcareous in part, some dolomitic, trace black carbonaceous shale

2080 m — Shale, 90%, medium to dark gray, some gray-brown, subwaxy, fissile to subfissile, calcareous in part, some dolomitic, some silty, Siltstone, 10%, light to medium gray, slightly argillaceous, calcareous in part, dolomitic in part, minor limestone

Sample Descriptions

2085 m — Shale, 90%, as above, Siltstone, 10%, as above

2090 m — Shale, 100%, medium to dark gray, some gray-brown, trace black, subwaxy, calcareous in part, dolomitic in part, trace carbonaceous, minor siltstone, as above, minor chalky limestone

2095 m — Shale, 100%, as above, slight trace pyrite, minor chalky limestone

2100 m — Shale, 100%, medium to dark gray, some black, trace brown, subwaxy, fissile, calcareous in part, some dolomitic, some carbonaceous, minor chalky limestone

2105 m — Shale, 100%, medium to dark gray, some black, gray-brown, subwaxy in part, fissile to subfissile, partly calcareous, occasional carbonaceous

2110 m — Shale, 100%, medium to dark gray, subwaxy, fissile, dolomitic, some calcareous

2115 m — Shale, 100%, medium gray, some dark gray, subwaxy, fissile, calcareous in part, dolomitic in part

2120 m — Shale, 100%, medium gray, subwaxy in part, fissile, calcareous in part, dolomitic in part, minor limestone, trace crinoids, ostracods

2125 m — Shale, 90%, medium to dark gray, gray-brown, some black, subwaxy in part, fissile to subfissile, calcareous in part, dolomitic in part, some carbonaceous, trace pyrite, Limestone, 10%, white to tan, micro crystalline, fossils, good trace crinoids, trace ostracods

2130 m — Shale, 100%, medium to dark gray, some gray-brown, some black, fissile to subfissile, subwaxy in part, calcareous, dolomitic, trace carbonaceous, trace pyrite, minor limestone, as above

2135 m — Shale, 100%, medium to dark gray, some gray-brown, trace black, subwaxy, fissile to subfissile, calcareous, dolomitic, trace carbonaceous, minor limestone

2140 m — Shale, 100%, medium gray, gray-brown, trace black, subwaxy, fissile, dolomitic, some calcareous, trace carbonaceous, trace silty

2145 m — Shale, 100%, as above, some blocky, trace limestone

2150 m — Shale, 100%, medium to dark gray, trace black, subwaxy, fissile, platy in part, dolomitic, some calcareous, trace carbonaceous, trace limestone

2155 m — Shale, 100%, dark gray, some black, subwaxy, fissile, platy in part, dolomitic, some calcareous, some carbonaceous, trace limestone

2160 m — Shale, 100%, medium to dark gray, some gray-brown, trace black, subwaxy in part, fissile, dolomitic, some calcareous, trace carbonaceous

Sample Descriptions

2165 m — Shale, 100%, medium to dark gray, trace black, subwaxy, fissile, dolomitic, trace calcareous, trace carbonaceous, trace pyrite, limestone

2170 m — Shale, 100%, medium gray, some dark gray, trace black, subwaxy, fissile, platy, dolomitic, some calcareous, trace carbonaceous

2175 m — Shale, 100%, medium gray, subwaxy, fissile, platy, dolomitic, trace calcareous

2180 m — Shale, 100%, as above

2185 m — Shale, 100%, medium gray, some dark gray, subwaxy, fissile, platy, dolomitic, trace calcareous

2190 m — Shale, 100%, as above, occasional black carbonaceous shale

2195 m — Shale, 100%, medium gray, some dark gray, subwaxy in part, fissile, platy in part, dolomitic, trace calcareous

2200 m — Shale, 100%, as above

2205 m — Shale, 100%, medium to dark gray, trace black, subwaxy, fissile, platy, dolomitic, some calcareous

2210 m — Shale, 100%, medium gray, some dark gray, some black, fissile to subfissile, platy in part, dolomitic, trace calcareous, trace carbonaceous

2215 m — Shale, 100%, as above, minor chalky limestone

2220 m — Shale, 100%, medium to dark gray, trace black, fissile, platy, dolomitic, some calcareous, trace carbonaceous

2225 m — Shale, 100%, as above

2230 m — Shale, 100%, medium gray, subwaxy, fissile, dolomitic, trace calcareous

2235 m — Shale, 100%, as above

2240 m — Shale, 100%, as above, some dark gray, soft, platy

2245 m — Shale, 100%, medium to dark gray, subwaxy, soft, fissile, platy in part, dolomitic, some calcareous

2250 m — Shale, 100%, as above

2255 m — Shale, 100%, medium gray, some dark gray, subwaxy in part, fissile, platy in part, dolomitic, some calcareous, trace siderite, light brown, trace limestone

2260 m — Shale, 100%, medium to dark gray, subwaxy in part, soft, fissile, platy in part, dolomitic, trace calcareous, good trace siderite, light brown

Sample Descriptions

2265 m — Shale, 100%, medium to dark gray, some gray-green, subwaxy in part, soft, fissile, platy in part, dolomitic, some calcareous, trace limestone

2270 m — Shale, 100%, medium to dark gray, subwaxy in part, fissile, platy in part, dolomitic, trace calcareous, trace limestone

2275 m — Shale, 100%, as above

2280 m — Shale, 100%, medium to dark gray, soft, fissile, platy in part, dolomitic, trace calcareous, minor limestone, light gray, slightly argillaceous

2285 m — Shale, 100%, medium to dark gray, subwaxy, fissile, platy in part, dolomitic, some calcareous

2290 m — Shale, 100%, medium gray, some dark gray, subwaxy, fissile, platy in part, dolomitic, some calcareous

2295 m — Shale, 100%, as above

2300 m — Shale, 100%, medium to dark gray, subwaxy in part, fissile to subfissile, dolomitic, some calcareous, trace limestone

2305 m — Shale, 100%, medium gray, some dark gray, subwaxy, fissile to subfissile, dolomitic, some calcareous, minor argillaceous limestone

2310 m — Shale, 100%, as above

2315 m — Shale, 100%, medium to dark gray, subwaxy, fissile to subfissile, dolomitic, some calcareous, minor siltstone, limestone

2320 m — Shale, 100%, medium gray, some dark gray, some gray-brown, subwaxy in part, fissile to subfissile, dolomitic, calcareous, trace silty, minor siltstone

2325 m — Shale, 100%, medium gray, subwaxy in part, fissile to subfissile, dolomitic, some calcareous, trace brachiopods, minor limestone

2330 m — Shale, 100%, medium gray, subwaxy in part, fissile, dolomitic, some calcareous

2335 m — Shale, 100%, medium to dark gray, trace black, subwaxy in part, fissile to subfissile, calcareous, dolomitic, trace carbonaceous

2340 m — Shale, 100%, medium to dark gray, subwaxy in part, subfissile, dolomitic, calcareous, trace limestone

2345 m — Shale, 100%, medium gray, some dark gray, subfissile, dolomitic, calcareous, occasional silty, trace limestone, siltstone

2350 m — Shale, 100%, medium to dark gray, subwaxy in part, fissile to subfissile, dolomitic, some calcareous, trace siderite

Sample Descriptions

2355 m	Shale, 100%, as above, less dark gray, trace siltstone, shale, light gray, dolomitic, slightly argillaceous
2360 m	Shale, 100%, medium to dark gray, subwaxy in part, fissile to subfissile, dolomitic, some calcareous, trace silty, trace siderite, light brown, medium hard
2365 m	Shale, 100%, as above, minor siltstone, light gray, dolomitic
2370 m	Shale, 100%, medium to dark gray, subwaxy in part, fissile to subfissile, platy in part, dolomitic, some calcareous, trace siderite
2375 m	Shale, 100%, as above
2380 m	Shale, 100%, medium to dark gray, subwaxy in part, fissile, platy in part, dolomitic, trace siderite
2385 m	Shale, 100%, medium gray, some dark gray, fissile, platy in part, dolomitic, trace silty, minor siltstone, trace limestone, siderite
2390 m	Shale, 100%, as above, minor siltstone
2395 m	Shale, 100%, medium gray, subwaxy in part, fissile to subfissile, platy in part, dolomitic, trace siderite, limestone
2400 m	Shale, 100%, as above, some silty, minor siltstone
2405 m	Shale, 100%, medium gray, subwaxy in part, fissile to subfissile, platy in part, dolomitic, trace silty, slight trace pyrite
2410 m	Shale, 100%, medium gray, some dark gray, subwaxy in part, subfissile, dolomitic, trace silty
2415 m	Shale, 100%, medium gray, subwaxy, subfissile, dolomitic, trace calcareous, trace silty
2420 m	Shale, 100%, as above
2425 m	Shale, 100%, medium gray, subwaxy in part, subfissile, dolomitic, some calcareous, occasional silty
2430 m	Shale, 100%, as above
2435 m	Shale, 100%, medium to dark gray, subwaxy in part, fissile to subfissile, platy in part, dolomitic, some calcareous, some silty, trace pyrite, trace limestone
2440 m	Shale, 100%, medium gray, some dark gray, subwaxy, fissile to subfissile, dolomitic, trace calcareous, some silty, trace pyrite
2445 m	Shale, 100%, as above

Sample Descriptions

2450 m — Shale, 100%, medium gray, some dark gray, some gray-brown, subwaxy in part, fissile to subfissile, platy in part, dolomitic, trace silty, minor siltstone, trace siderite, limestone

2455 m — Shale, 100%, medium to dark gray, subwaxy in part, fissile to subfissile, platy in part, dolomitic, trace silty

2460 m — Shale, 90%, medium gray, some dark gray, subwaxy in part, fissile to subfissile, platy in part, dolomitic, some silty, Siltstone, 10%, medium gray, dolomitic, argillaceous, trace calcareous

2465 m — Shale, 100%, as above, minor siltstone

2470 m — Shale, 90%, medium gray, subwaxy in part, fissile to subfissile, dolomitic, some silty, Siltstone, 10%, medium gray, argillaceous, dolomitic, some calcareous

2475 m — Shale, 100%, as above, minor siltstone

2480 m — Shale, 100%, medium gray, subwaxy, subfissile, dolomitic, trace silty, minor siltstone

2485 m — Shale, 100%, medium gray, subwaxy in part, fissile to subfissile, platy in part, dolomitic

2490 m — Shale, 100%, as above, minor siltstone

2495 m — Shale, 90%, medium gray, some dark gray, subwaxy in part, fissile to subfissile, platy in part, dolomitic in part, trace silty, Siltstone, 10%, light to medium gray, argillaceous, dolomitic, calcareous

2500 m — Shale, 100%, as above, trace pyrite, minor siltstone

2505 m — Shale, 100%, medium gray, subwaxy in part, fissile to subfissile, dolomitic, some silty, minor siltstone

2510 m — Shale, 90%, medium to dark gray, trace brown, splintery to blocky, dolomitic in part, trace calcareous, some silty, slightly micro micaceous, Siltstone, 10%, light to medium gray, argillaceous, calcareous, some dolomitic

2515 m — Shale, 100%, medium to dark gray, gray-brown, subwaxy in part, splintery, some blocky, dolomitic, trace calcareous, trace silty, trace pyrite, minor siltstone, limestone, trace bryozoa

2520 m — Shale, 100%, medium to dark gray, trace brown, subwaxy in part, splintery, some blocky, dolomitic, some calcareous, some silty, minor siltstone, minor limestone, trace ostracods

2525 m — Shale, 90%, medium to dark gray, subwaxy in part, slightly micro micaceous in part, splintery, some blocky, dolomitic, some calcareous, some silty,

Siltstone, 10%, light to medium gray, calcareous, dolomitic, slightly argillaceous, trace limestone

2530 m — Shale, 90%, as above, trace pyrite, Siltstone, 10%, as above, minor limestone, trace crinoids

2535 m — Shale, 90%, medium to dark gray, subwaxy in part, slightly micro micaceous in part, splintery, platy in part, dolomitic, trace calcareous, some silty, trace pyrite, crinoids, Siltstone, 10%, light gray, calcareous, slightly argillaceous, trace limestone

2540 m — Shale, 100%, medium to dark gray, subwaxy in part, slightly micro micaceous in part, splintery, dolomitic, some calcareous, occasional silty, minor siltstone

2545 m — Shale, 90%, medium to dark gray, subwaxy in part, slightly micro micaceous in part, splintery, some blocky, dolomitic, some calcareous, some silty, Siltstone, 10%, light gray, slightly argillaceous, calcareous, trace limestone

2550 m — Shale, 90%, as above, 5% black, subfissile, carbonaceous, calcareous, Siltstone, 10%, as above, minor limestone, trace crinoids

Hay River - 2551 m

2555 m — Shale, 90%, medium to dark gray, subwaxy, splintery, slightly micro micaceous in part, dolomitic, trace silty, 30% black, subfissile, carbonaceous, calcareous, trace pyrite, Siltstone, 10%, light to medium gray, calcareous, slightly argillaceous, minor limestone, trace crinoids

2560 m — Shale, 80%, as above, 10% black carbonaceous shale, Siltstone, 10%, as above, Limestone, 10%, medium to dark gray, micro crystalline, argillaceous, silty in part, good trace bryozoa, trace ostracods, tite

2565 m — Shale, 90%, medium to dark gray, trace black, subwaxy in part, slightly micro micaceous in part, splintery to blocky, dolomitic, some calcareous, some silty, trace carbonaceous, minor siltstone, as above, Limestone, 10%, dark gray, some medium gray, micro crystalline, argillaceous, silty in part, trace crinoids

2570 m — Shale, 90%, medium to dark gray, subwaxy in part, slightly micro micaceous in part, splintery, dolomitic, some calcareous, some silty, trace black carbonaceous shale, Siltstone, 10%, light gray, calcareous, some dolomitic, minor limestone, as above

2575 m — Shale, 100%, medium to dark gray, some black, slightly micro micaceous in part, fissile, splintery in part, some dolomitic, some calcareous, occasional carbonaceous, trace silty, minor siltstone and limestone

2580 m — Shale, 100%, medium to dark gray, black, some brown, fissile, splintery in part, carbonaceous in part, some dolomitic, some calcareous, trace silty,

Sample Descriptions

trace pyrite, trace limestone

2585 m — Shale, 100%, as above, minor argillaceous limestone

2590 m — Shale, 90%, as above, more black carbonaceous shale, good trace pyrite, Limestone, 10%, light to medium gray, crypto to micro crystalline, argillaceous in part, silty in part, trace crinoids

2595 m — Shale, 100%, medium to dark gray, black, fissile to subfissile, splintery in part, carbonaceous in part, some dolomitic, some calcareous, trace pyrite, minor limestone, as above, trace siltstone

Slave Point - 2598.4 m

2600 m — Shale, 90%, as above, more black, subfissile, carbonaceous, trace calcareous, trace pyrite, Limestone, 10%, buff to brown, micro crystalline, some soft, chalky, trace crinoids, tite, dull yellow fluorescence in part

2605 m — No sample - depth correction

2610 m — Limestone, 100%, buff to brown, dark brown, crypto to micro crystalline, some fragmental, some chalky, occasional bituminous, trace indistinct fossils, tite

2615 m — Limestone, 100%, buff to brown, dark brown to black, micro crystalline to fine fragments, some crypto crystalline, some chalky, occasional bituminous, trace indistinct fossils, tite

2620 m — Limestone, 100%, buff to brown, micro crystalline to fine fragments, chalky in part, indistinct fossils, stromatoporoid ?, trace pellets, limestone, some dark brown to black, bituminous, tite throughout

2625 m — Limestone, 100%, buff to brown, dark brown to black, crypto crystalline to fine fragments, some chalky, bituminous in part, indistinct fossils, pelletal, tite

2630 m — Limestone, 100%, buff to brown, dark gray-brown to black, micro crystalline to fine fragments, some crypto crystalline, some chalky, bituminous in part, indistinct fossils, pelletal, tite

2635 m — Limestone, 100%, buff, dark gray-brown to black, crypto crystalline to fine fragments, bituminous in part, some chalky, indistinct fossils, stromatoporoid ?, pelletal, tite

2640 m — Limestone, 100%, as above, less bituminous

2645 m — Limestone, 100%, buff to brown, some dark gray-brown, micro crystalline to fine fragments, some crypto crystalline, some bituminous, occasional chalky, indistinct fossils, pelletal, tite

2650 m — Limestone, 100%, buff to brown, dark gray-brown to black, micro crystal-

line to fine fragments, some crypto crystalline to bituminous, some chalky, indistinct fossils, pelletal, trace brachiopods, tite

2655 m — Limestone, 100%, buff to brown, micro crystalline to fine fragments, chalky in part, indistinct fossils, pelletal, limestone, some dark gray-brown to black, crypto crystalline, bituminous, tite throughout

2660 m — Limestone, 100%, buff to dark gray-brown, partly crypto crystalline, bituminous, partly micro crystalline to fine fragments, indistinct fossils, some chalky, tite throughout

2665 m — Limestone, 100%, as above

2670 m — Limestone, 100%, buff to dark gray-brown, crypto to fine fragments, bituminous in part, indistinct fossils, pelletal, some chalky, tite

2675 m — Limestone, 100%, as above

2680 m — Limestone, 100%, dark gray-brown to black, some buff, crypto crystalline to fine fragments, abundant pelletal, indistinct fossils, bituminous, tite

2685 m — Limestone, 100%, buff to dark gray-brown, black, crypto crystalline to fine fragments, bituminous in part, some chalky, indistinct fossils, pelletal, abundant white to clear calcite crystals, tite

2690 m — Limestone, 100%, predominantly tan to dark gray-brown, black, crypto crystalline, bituminous in part, limestone, some buff to brown, micro crystalline to fine fragments, indistinct fossils, pelletal, tite throughout

2695 m — Limestone, 100%, dark gray-brown to black, crypto crystalline, dense, bituminous, limestone, some buff to brown, micro crystalline to fine fragments, occasional chalky, indistinct fossils, pelletal, tite throughout

2700 m — Limestone, 100%, buff, dark gray-brown to black, some tan, crypto crystalline, some fragmental, some chalky, bituminous in part, indistinct fossils, tite

2705 m — Limestone, 100%, buff, tan to dark gray-brown, crypto crystalline, some fragmental, some chalky, occasional bituminous, trace calcite crystals, indistinct fossils, pelletal, tite

2710 m — Limestone, 100%, buff, tan to dark gray-brown, black, crypto crystalline to fine fragments, indistinct fossils, pelletal, some bituminous, tite throughout

2715 m — Limestone, 100%, predominantly as above, some white to buff, micro crystalline, chalky, trace shale, light to medium gray, waxy, platy, calcareous in part

Sulphur Point - 2718 m

Sample Descriptions

2720 m — Limestone, 100%, some as above, predominantly white to buff, light tan, micro to fine crystalline, some chalky, trace disseminated pyrite, tite, limestone, trace light gray, crypto crystalline, slightly argillaceous limestone, minor shale, light gray, waxy, platy

2725 m — Limestone, 100%, white to buff, tan, micro crystalline, some fine crystalline, some crypto crystalline, chalky in part, trace bituminous, tite throughout

Pine Point ~ 2729 m

2730 m — Limestone, 100%, as above

2735 m — Limestone, 100%, some as above, predominantly medium to dark gray, some black, micro crystalline, some crypto crystalline, argillaceous in part, bituminous in part, trace fossils, tite

2740 m — Limestone, 100%, medium to dark gray, black, micro to very fine crystalline, some crypto crystalline, argillaceous in part, bituminous in part, trace fossils, tite

2745 m — Limestone, 100%, light to dark gray, occasional black, micro to very fine crystalline, trace crypto crystalline, argillaceous in part, occasional bituminous, trace fossils, tite

2750 m — Limestone, 100%, as above, some white, chalky, trace gray waxy platy shale

2755 m — Limestone, 100%, light to dark gray, some black, micro to very fine crystalline, occasional crypto crystalline, argillaceous in part, bituminous in part, trace fossils, tite, occasional white soft chalky limestone

2760 m — Limestone, 100%, light to medium gray, some dark gray to black, micro to very fine crystalline, occasional crypto crystalline, bituminous in part, some argillaceous, occasional fossils, tite

2765 m — Limestone, 100%, light to dark gray, occasional black, micro to very fine crystalline, occasional crypto crystalline, some argillaceous, some bituminous, good trace fossils, tite

2770 m — Limestone, 100%, light to dark gray, black, micro to very fine crystalline, occasional crypto crystalline, argillaceous in part, bituminous in part, good trace fossils, tite

2775 m — Limestone, 100%, buff to dark gray, occasional black, micro crystalline, some crypto crystalline, argillaceous in part, chalky in part, some bituminous, good trace fossils, tite

2780 m — Limestone, 100%, buff to dark gray, dark gray-brown, micro crystalline, some crypto crystalline, argillaceous in part, trace bituminous, trace fossils, pyrite, tite

Sample Descriptions

2785 m — Limestone, 100%, buff to dark gray, black, crypto to micro crystalline, some fragmental, bituminous in part, some argillaceous, good trace fossils, tite, minor shale, light gray, waxy, platy, trace disseminated pyrite

2790 m — Limestone, 100%, buff to dark gray-brown, black, crypto to micro crystalline, some fine fragments, bituminous in part, some argillaceous, trace calcite crystals, tite, trace shale, as above

2795 m — Limestone, 100%, as above, trace pyritic crinoids

2800 m — Limestone, 100%, buff to gray-brown, black, crypto to micro crystalline, some fragmental, bituminous in part, trace argillaceous, trace fossils, tite

2805 m — Limestone, 100%, buff to gray-brown, dark gray-black, micro to very fine crystalline, some crypto crystalline, some fragmental, bituminous in part, trace argillaceous, trace fossils, tite

2810 m — Limestone, 100%, buff to gray-brown, dark gray-black, micro crystalline predominantly, some crypto crystalline, some very fine crystalline, bituminous in part, occasional argillaceous, trace fossils, tite

2815 m — Limestone, 100%, as above, good trace white calcite

2820 m — Limestone, 80%, buff to gray-brown, dark gray-black, micro to very fine crystalline, some crypto crystalline, occasional fragmental, bituminous in part, some dolomitic, trace fossils, tite, Dolomite, 20%, light to dark gray, gray-brown, micro to very fine crystalline, calcareous, some bituminous, tite,

2825 m — Limestone, 90%, buff to dark gray, gray-brown, some black, crypto to micro crystalline, some fragmental, bituminous in part, some dolomitic, trace fossils, tite, Dolomite, 10%, as above

2830 m — Limestone, 100%, buff to dark gray, black, crypto to micro crystalline, some fragmental, bituminous in part, trace fossils, tite, minor white crystalline dolomite

Keg River - 2833 m

2835 m — Dolomite, 80%, white, fine to coarse crystalline, predominantly coarse crystalline, good trace pyrobitumen, tite to fair intercrystalline porosity, no show, Limestone, 20%, as above

2840 m — Limestone, 90%, dark gray, gray-brown, black, some buff, crypto to micro crystalline, some fragmental, bituminous, some argillaceous, trace dolomite, trace tite, Dolomite, 10%, as above

2845 m — ove, more crypto crystalline, minor dolomite, as

Sample Descriptions

2850 m — Limestone, 100%, dark gray to black, crypto crystalline, bituminous, some argillaceous, limestone, some buff to gray, micro crystalline, occasional fragmental, trace dolomitic, trace fossils, pelletal, tite throughout

2855 m — Limestone, 100%, as above, more fragmental, limestone, buff to gray-brown, very fine to fine grained, some dolomitic, trace pelletal, fossils, tite

2860 m — Limestone, 100%, buff to gray-brown, dark gray-black, crypto crystalline to fine fragments, bituminous in part, dolomitic in part, good trace pelletal, trace fossils, tite

2865 m — Limestone, 60%, as above, Dolomite, 40%, white, coarse crystalline, trace pyrobituminous, fair intercrystalline porosity in part

Lower Keg River - 2865 m

2870 m — Limestone, 90%, dark gray, gray-brown, trace black, crypto crystalline, some argillaceous, trace bituminous, dense, some buff, micro crystalline, trace fragmental, trace fossils, tite throughout, Dolomite, 10%, as above

2875 m — Limestone, 100%, medium to dark gray, gray-brown, some buff, crypto crystalline, dense, argillaceous in part, some micro crystalline, trace chalky, trace pelletal, tite

2880 m — Limestone, 100%, as above

2885 m — Limestone, 100%, buff to gray-brown, crypto crystalline, dense, argillaceous in part, some micro crystalline, trace fragmental, trace pelletal, tite throughout

2890 m — Limestone, 100%, buff to gray-brown, crypto to micro crystalline, trace fragmental, trace chalky, occasional pelletal, partly argillaceous, tite

2895 m — Limestone, 100%, gray-brown, some buff, crypto crystalline, dense, argillaceous in part, some micro crystalline, trace chalky, trace pelletal, tite throughout, trace shale, gray-green, waxy, platy

2900 m — Limestone, 90%, as above, Shale, 10%, gray-green, waxy, platy, trace disseminated pyrite

MARCH 28, 1986

TEMPERATURE IN (Suction)

TEMPERATURE OUT (Shaker)

2873 2880 2882 2884 2887 2890 2893 2896 2899 2902 CIRC PULL OUT TO LOG

°C

55

50

45

40

35

30

25

0 1 2 3 4 5 6 7 8 9 10 11 12

hours

RIG DOWN TEMPERATURE PLOTTER

METRIC

MARCH 27, 1986

TEMPERATURE IN (Suction)

TEMPERATURE OUT (Shaker)

depth →

2804 2807 2810 2813 2817 2820 2823 2827 2829 2832 2835 2838 2841 2844 2847 2850 2853 2855 2858 2862 2865 2869 2872 2875

°C

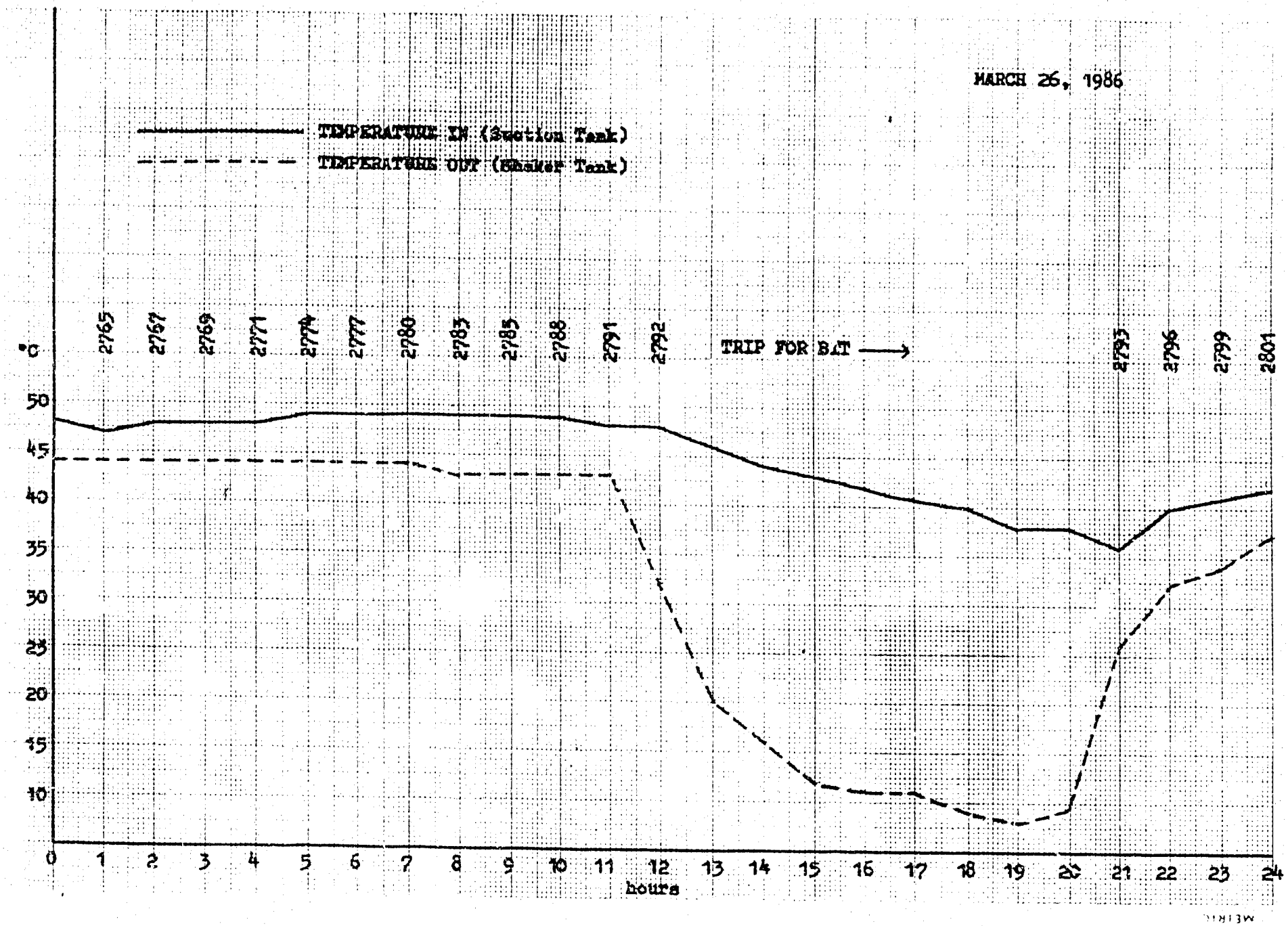
55
50
45
40
35
30
25

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

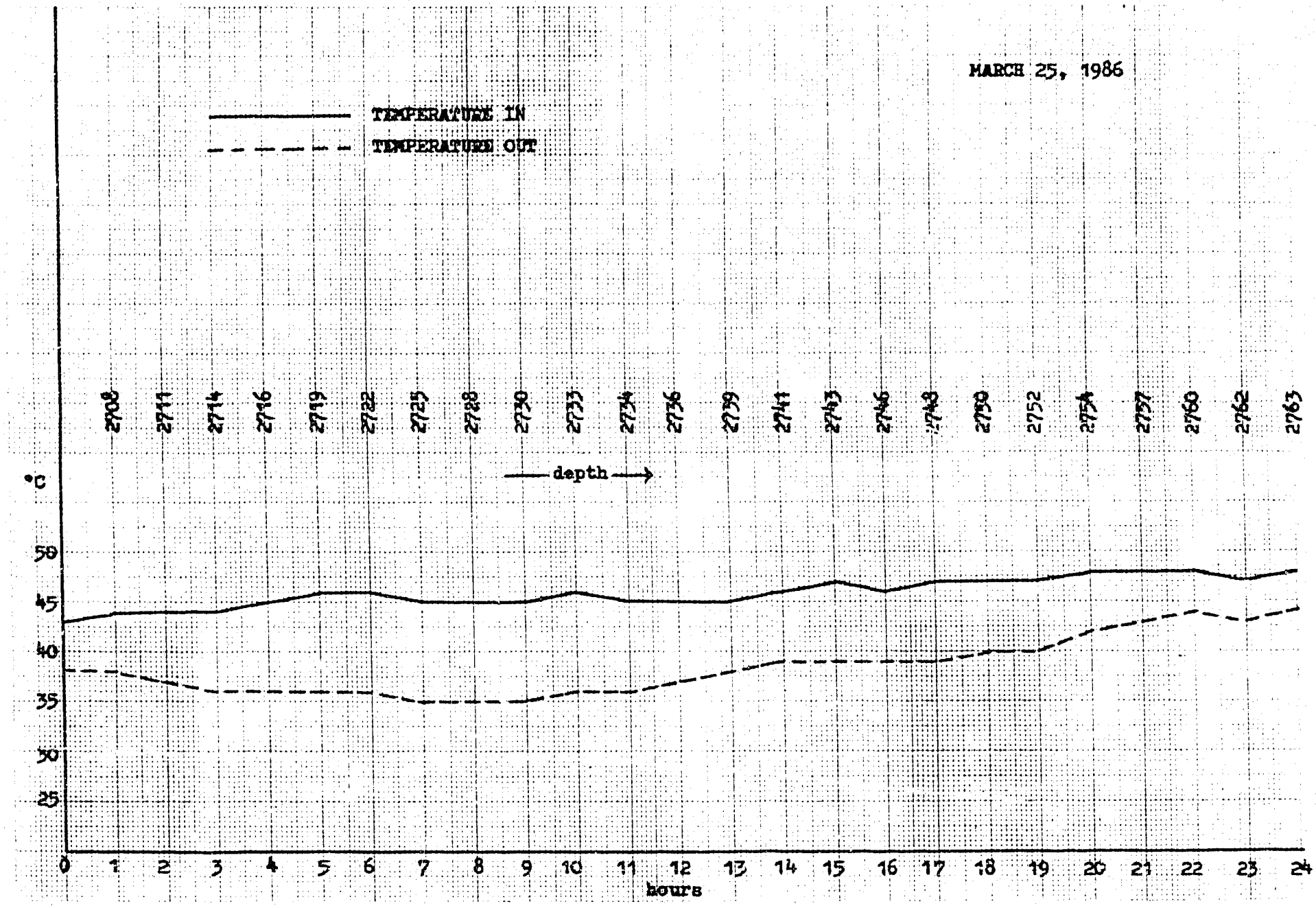
hours

METRIC

MARCH 26, 1986



MARCH 25, 1986



MARCH 24, 1986

TEMPERATURE IN (solution)

TEMPERATURE OUT (annular)

DRILL

°C

50
45
40
35
30
25

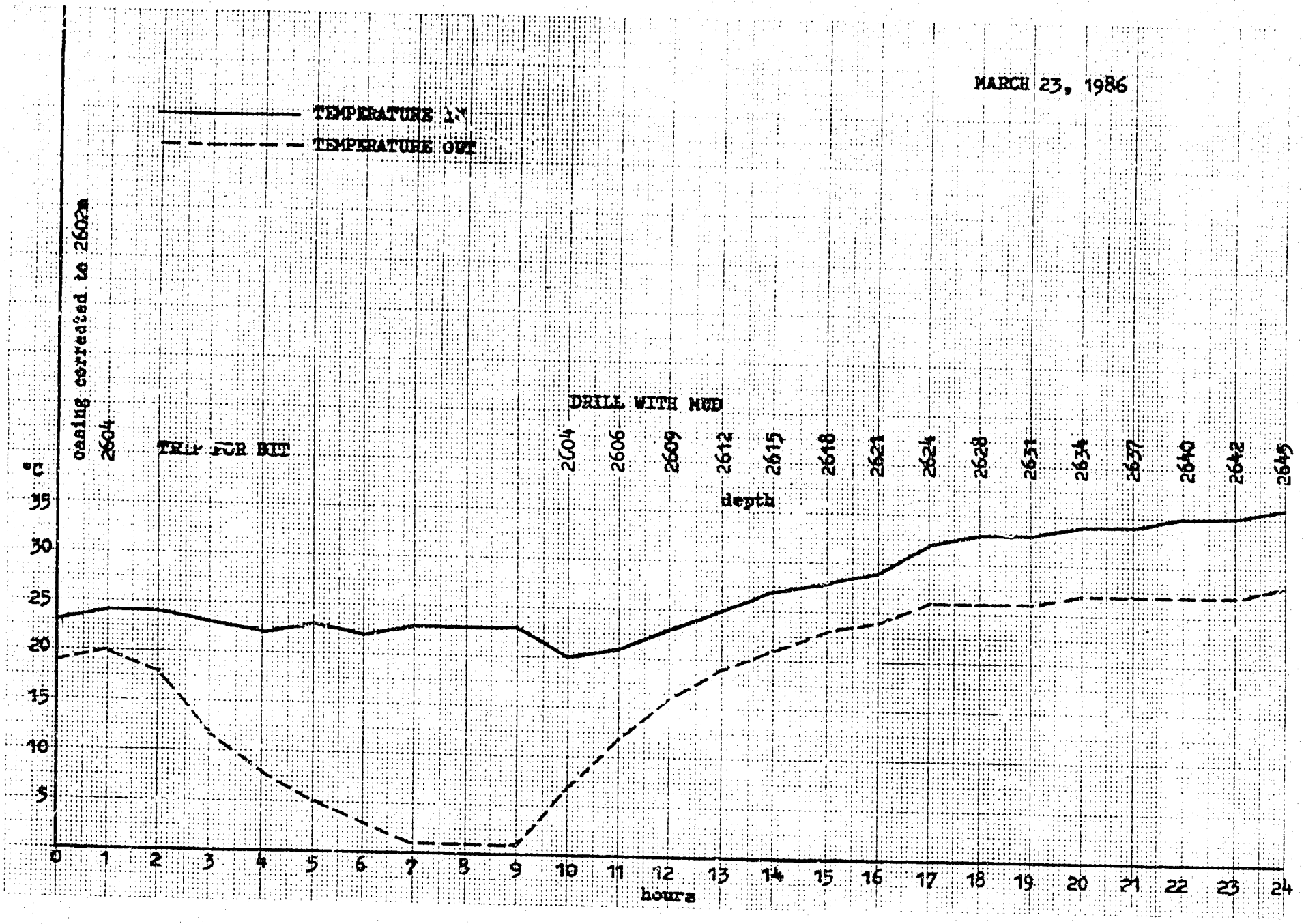
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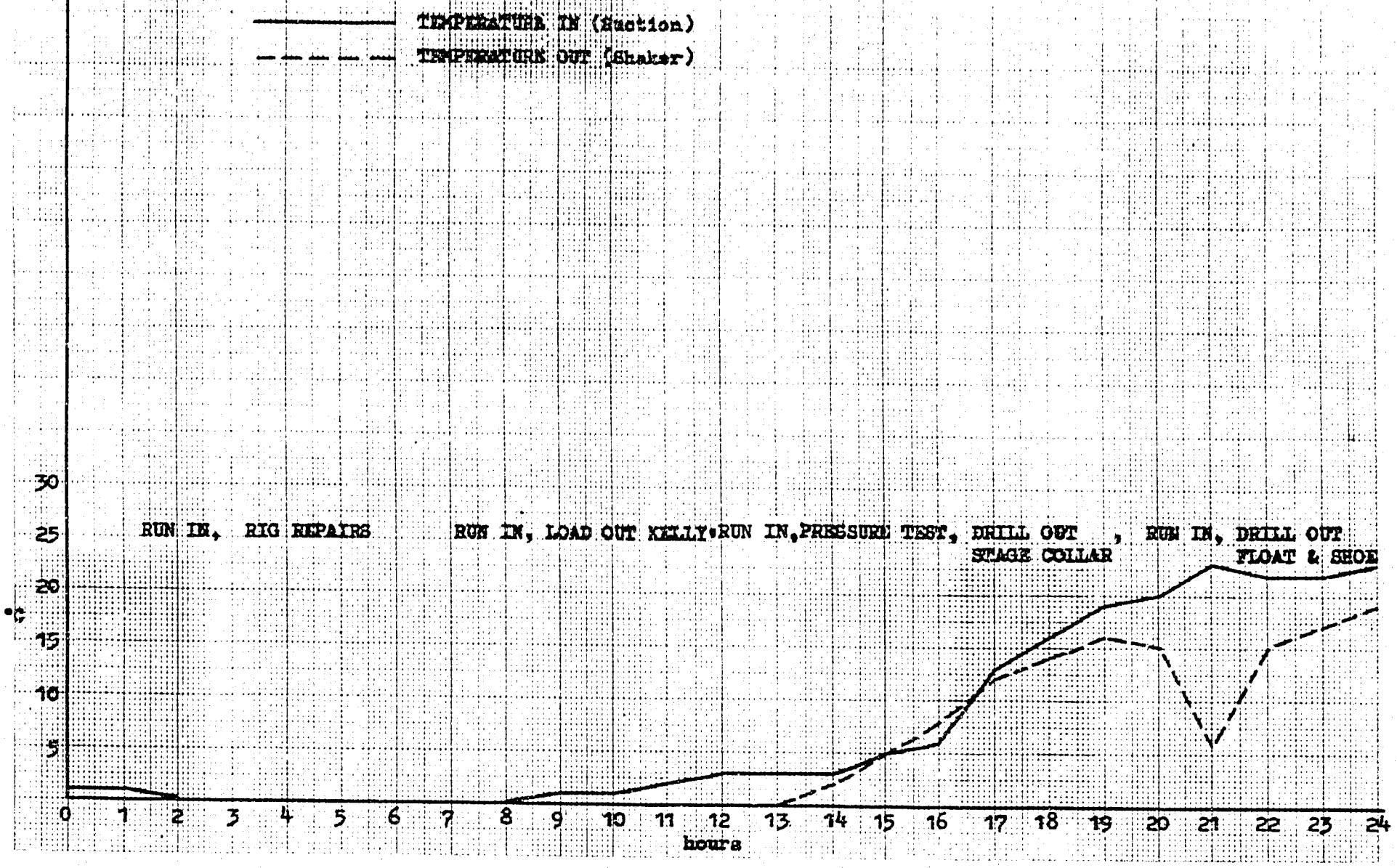
hours

METRIC

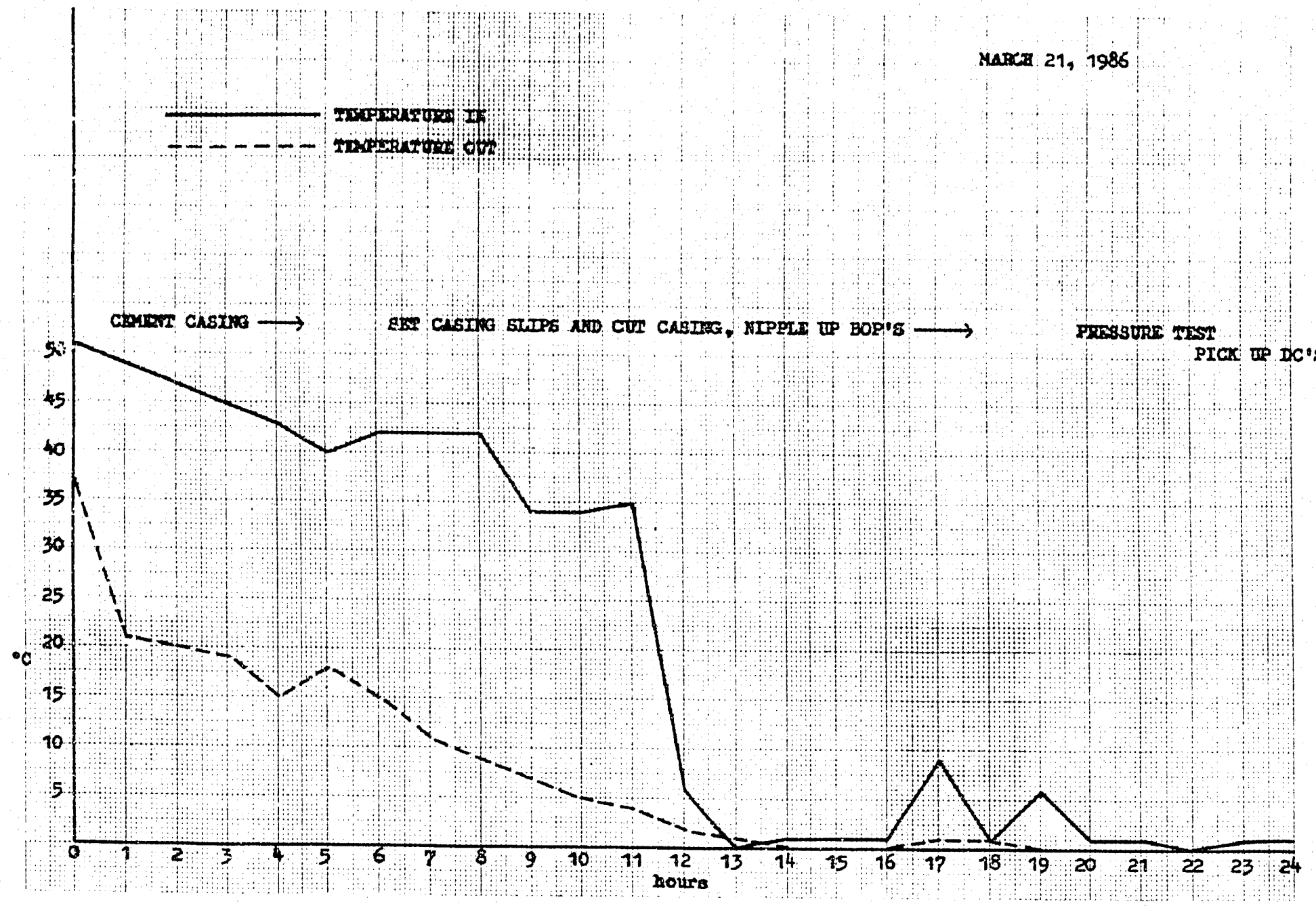
MARCH 23, 1986



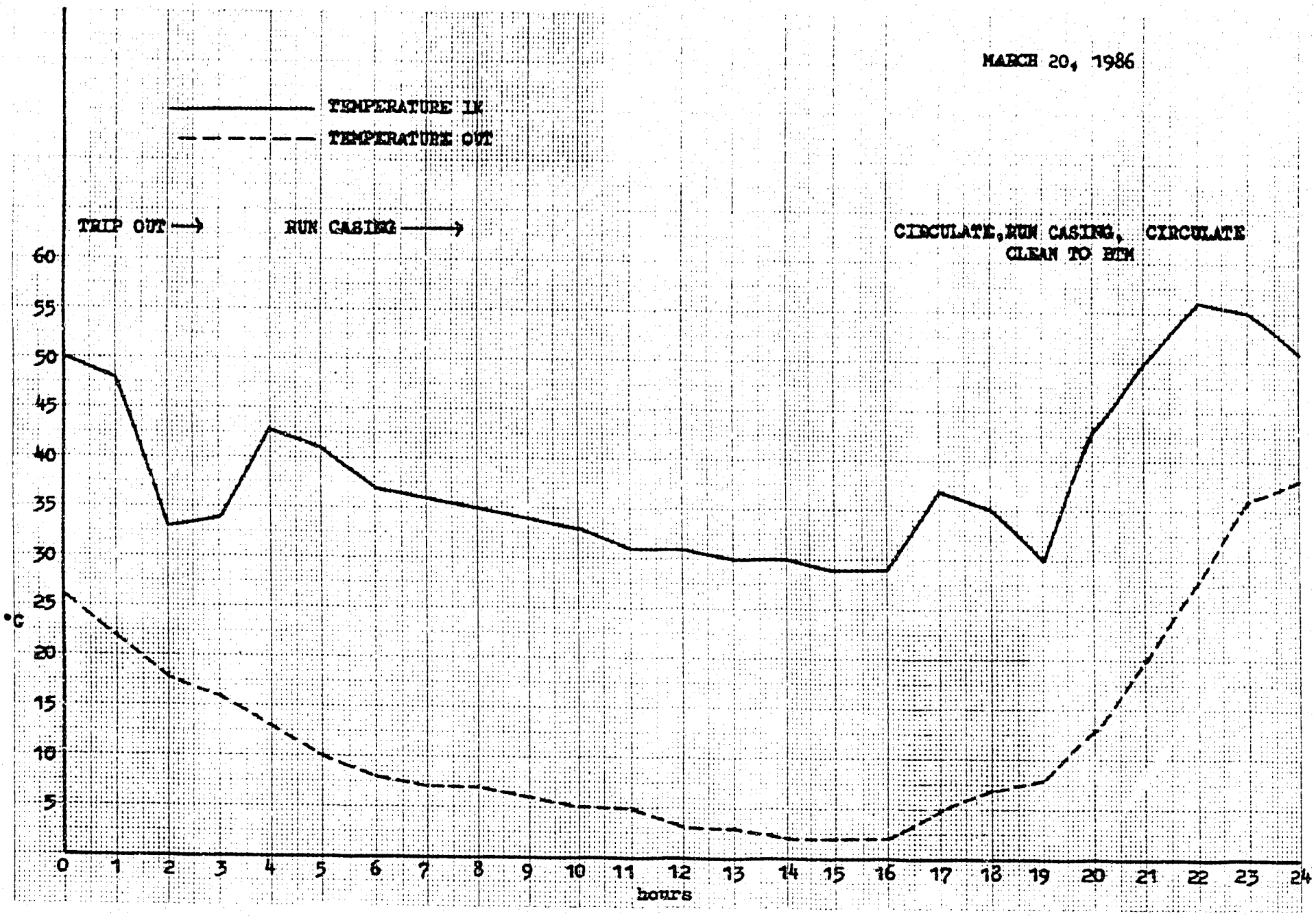
MARCH 22, 1986



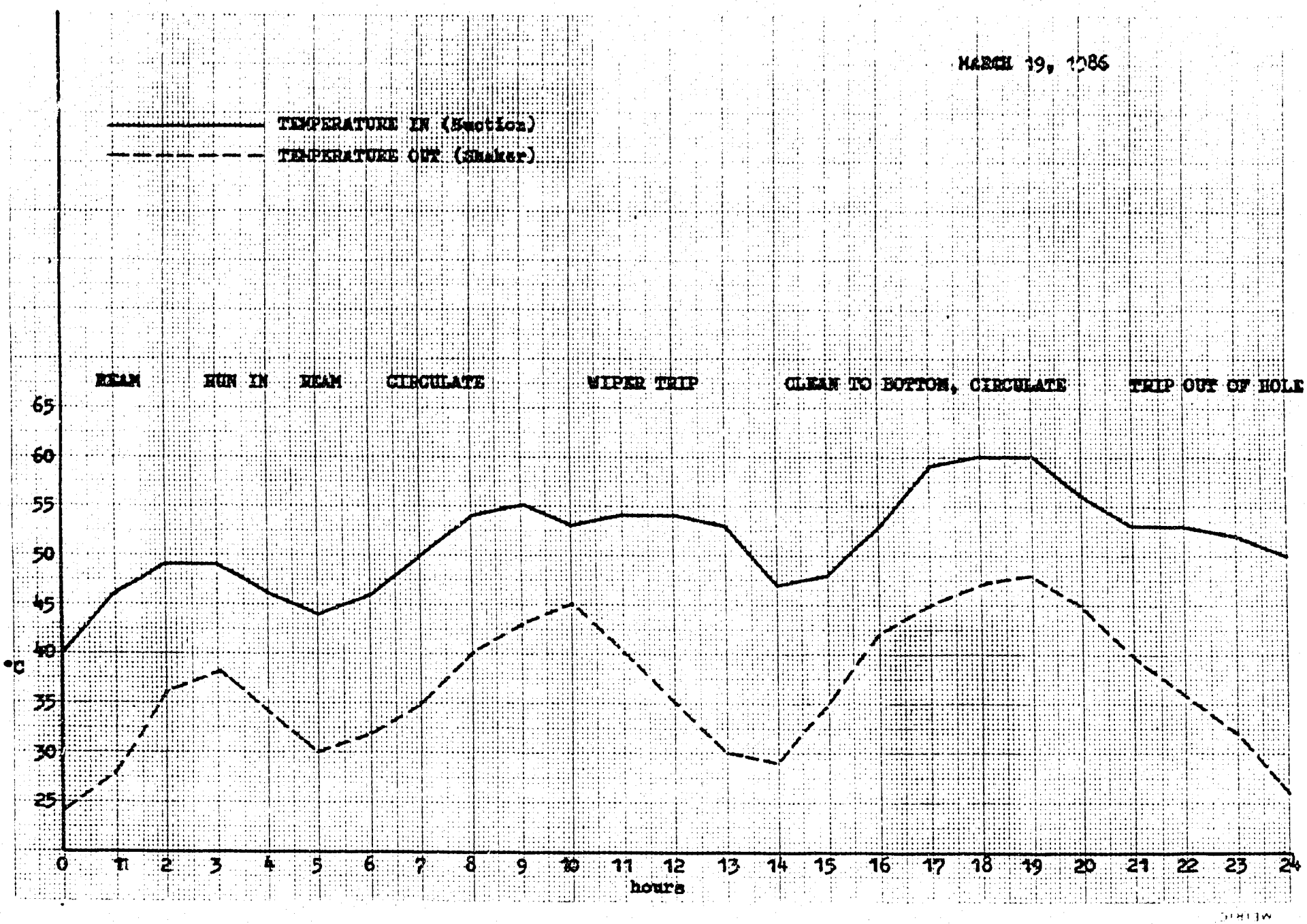
MARCH 21, 1986



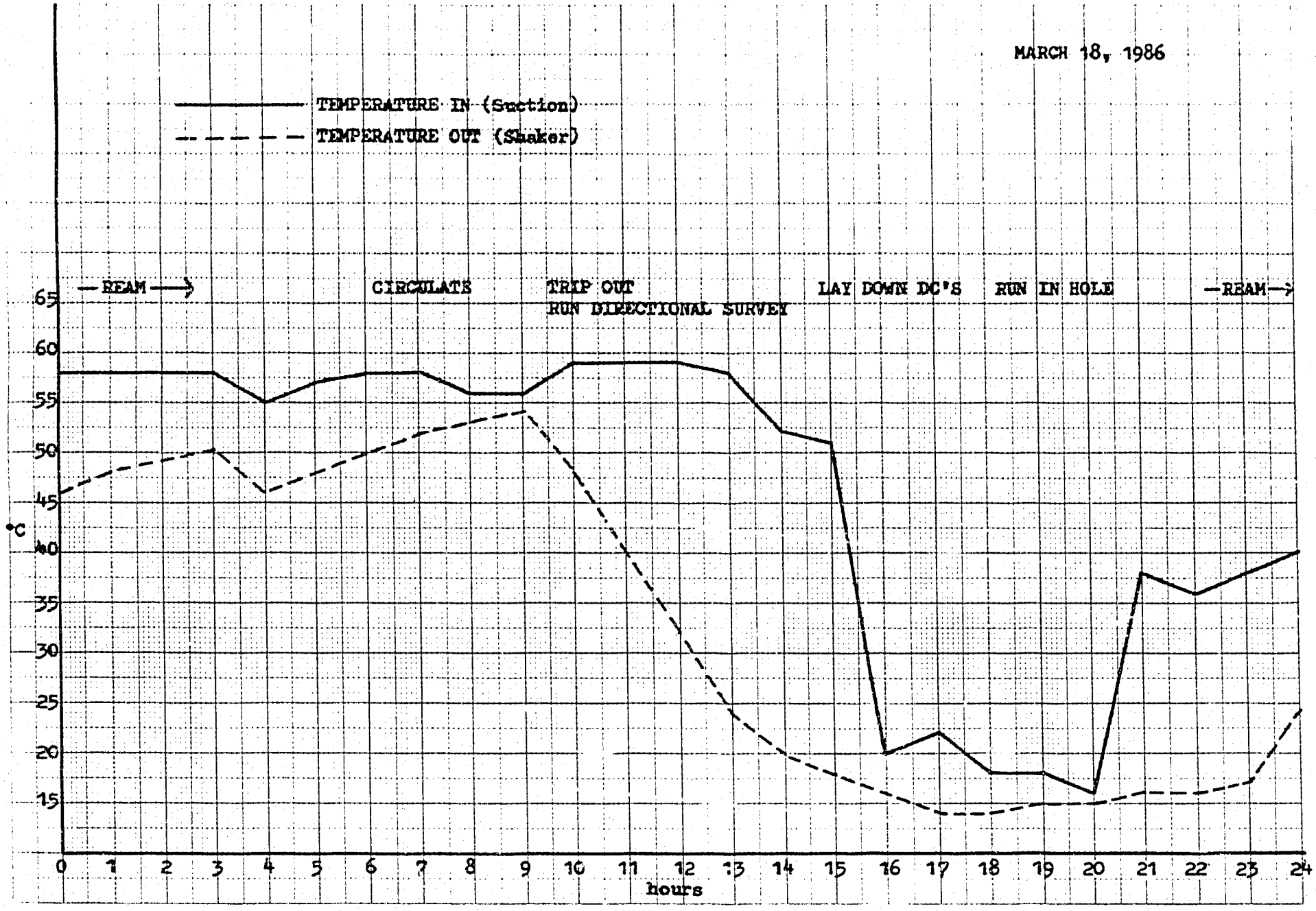
MARCH 20, 1986



MARCH 19, 1986



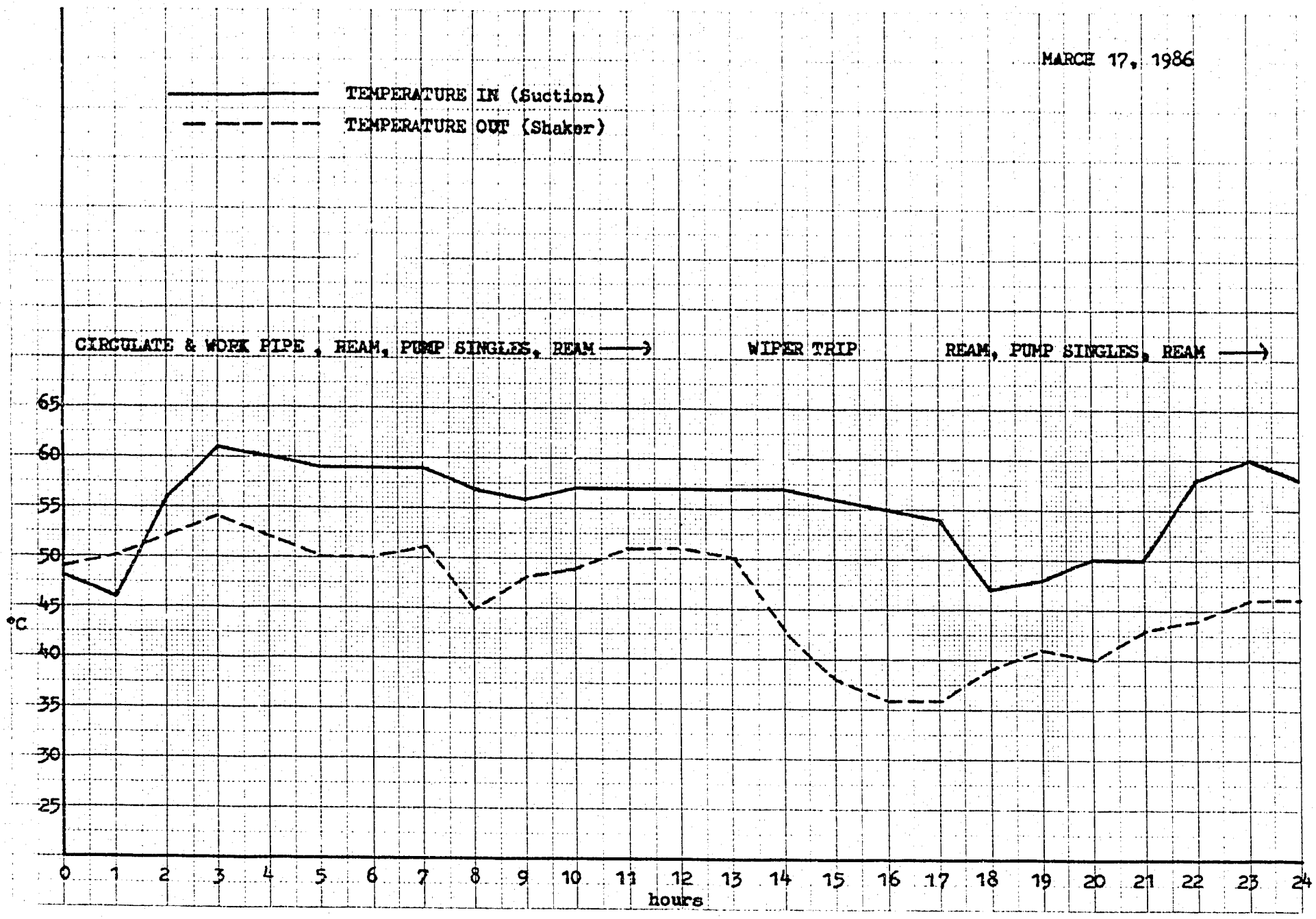
MARCH 18, 1986



46 1510

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

MARCH 17, 1986

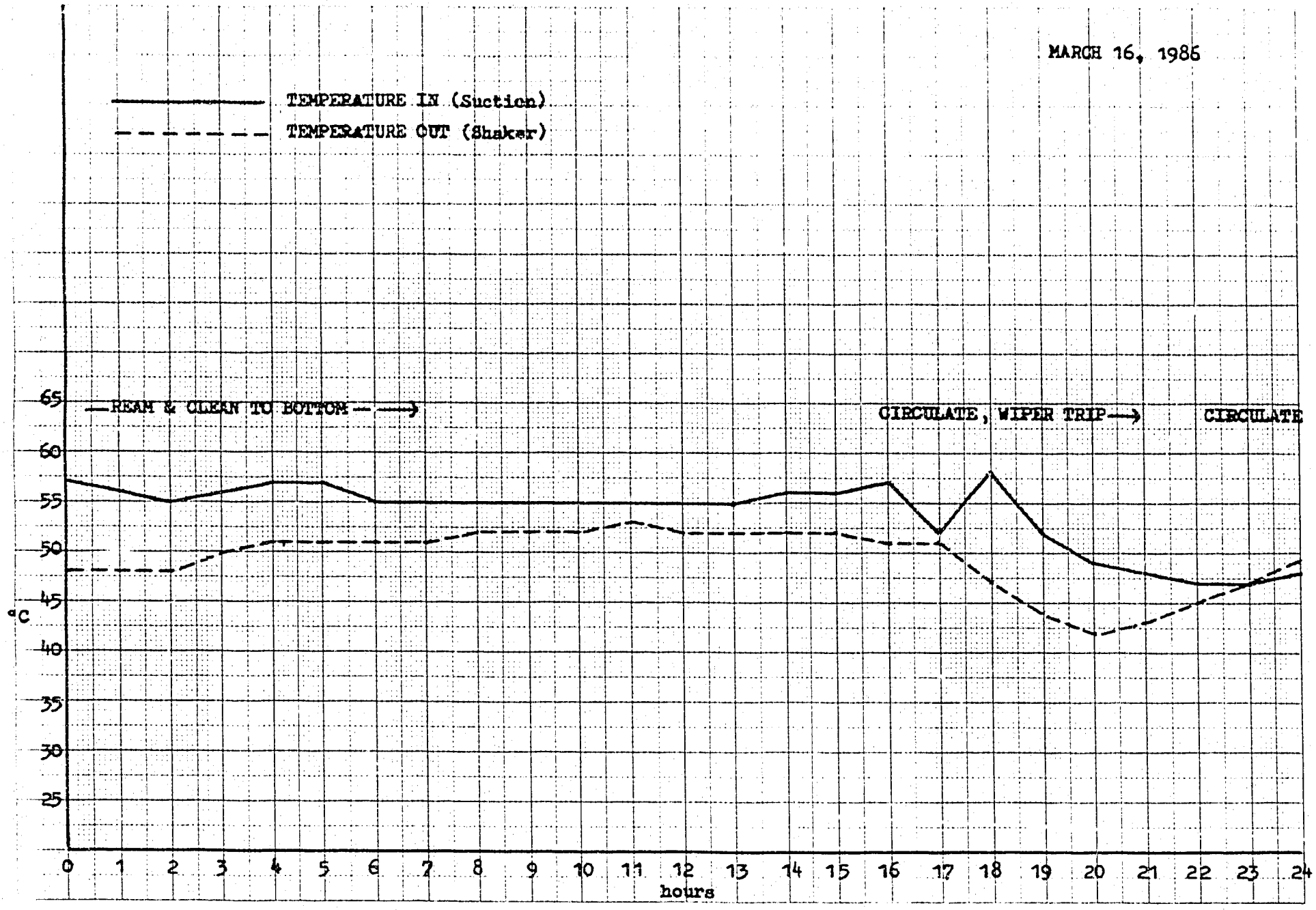


46 1510
K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. MADE IN U.S.A.

MARCH 16, 1986

TEMPERATURE IN (Suction)

TEMPERATURE OUT (Shaker)



46 1510

KEUFFEL & ESSER CO. MADE IN U.S.A.
10 X 10 TO THE CENTIMETER

MARCH 15, 1986

TEMPERATURE IN (Suction)

TEMPERATURE OUT (Shaker)

CLEAN TO BOTTOM, PUMP OUT SINGLES, — TRIP ⟶

CLEAN TO BOTTOM ⟶

°C

60
55
50
45
40
35
30
25
20
15

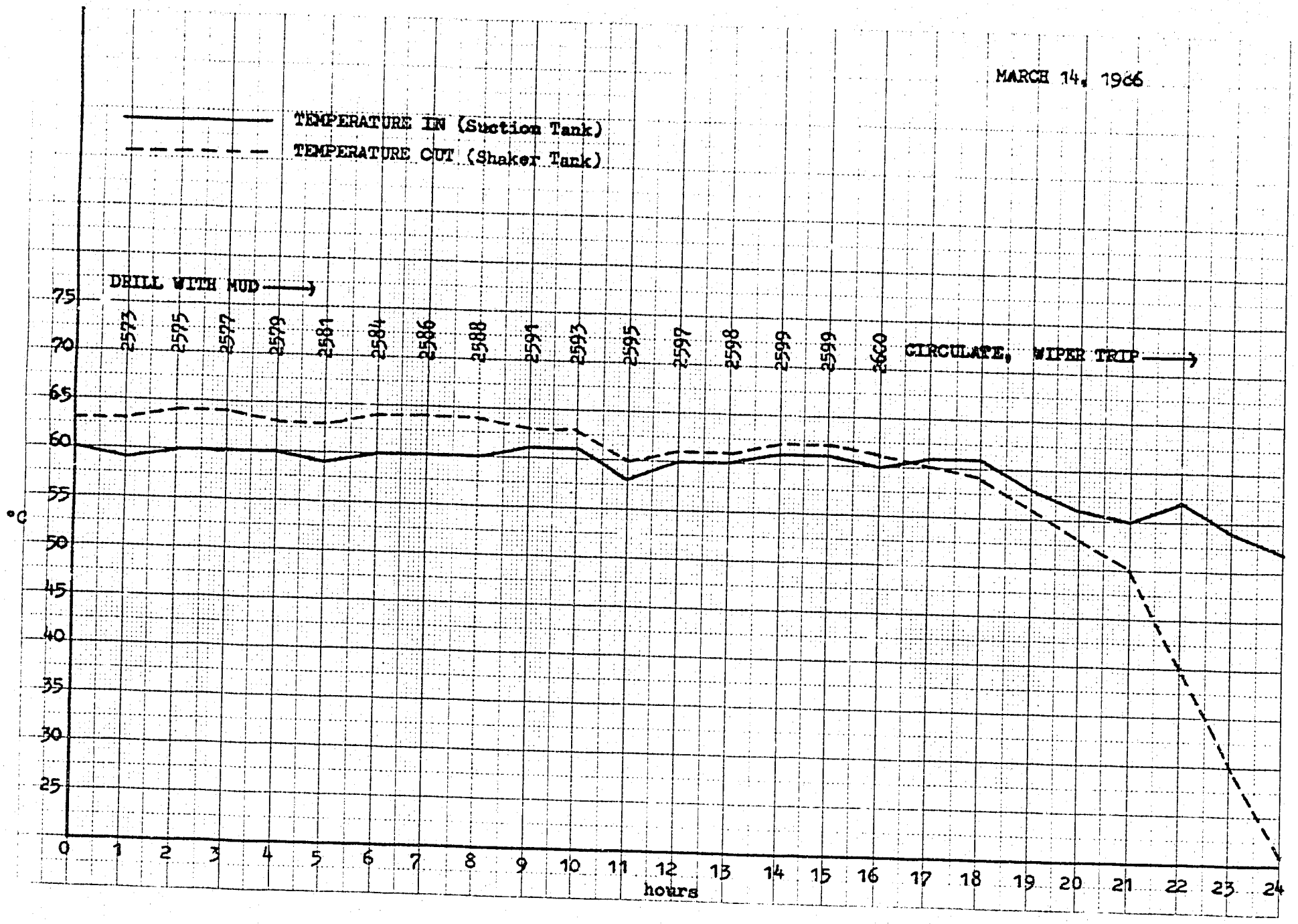
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

hours

46 1510

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. MADE IN U.S.A.

MARCH 14, 1986

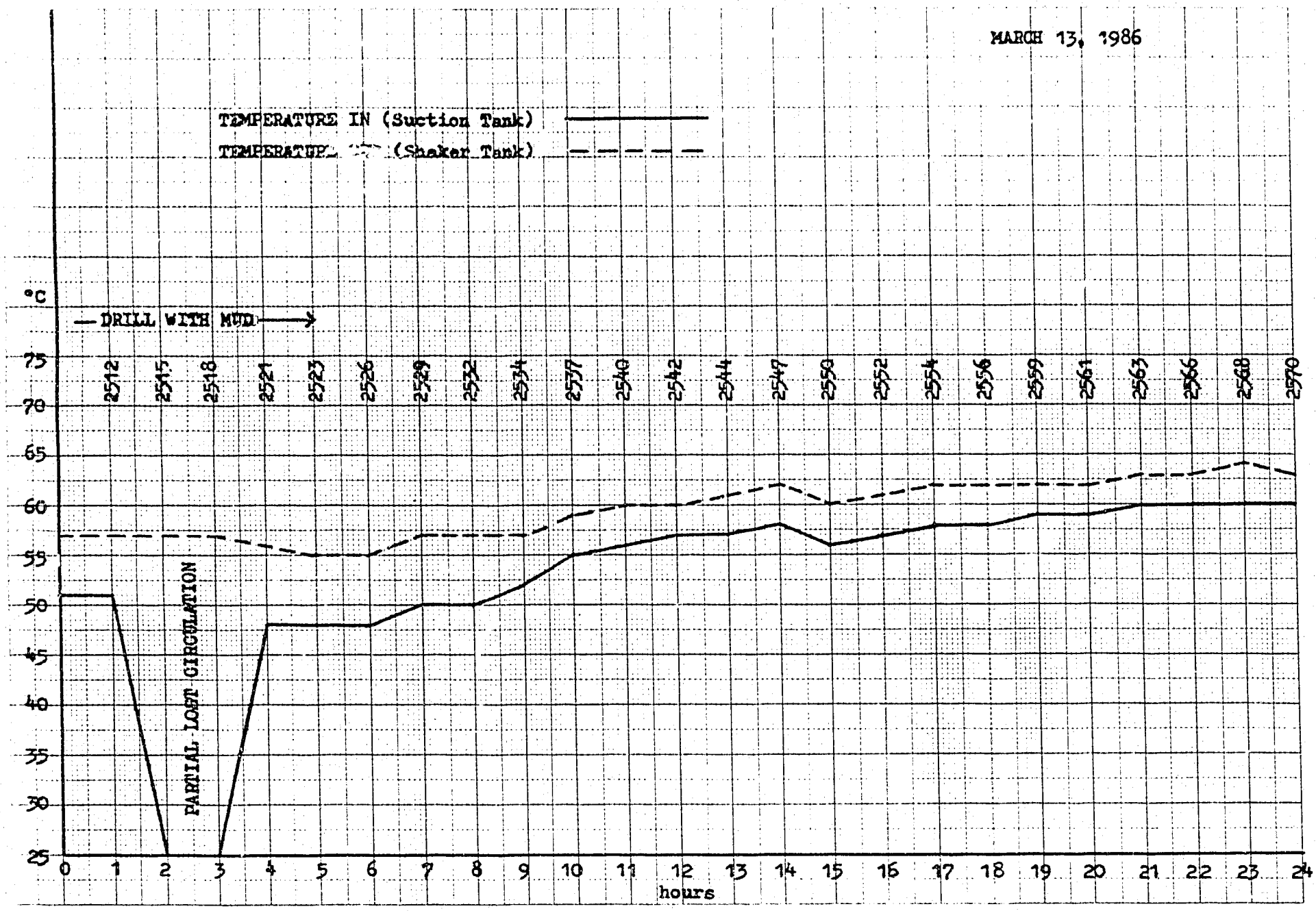


K&E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

MARCH 13, 1986

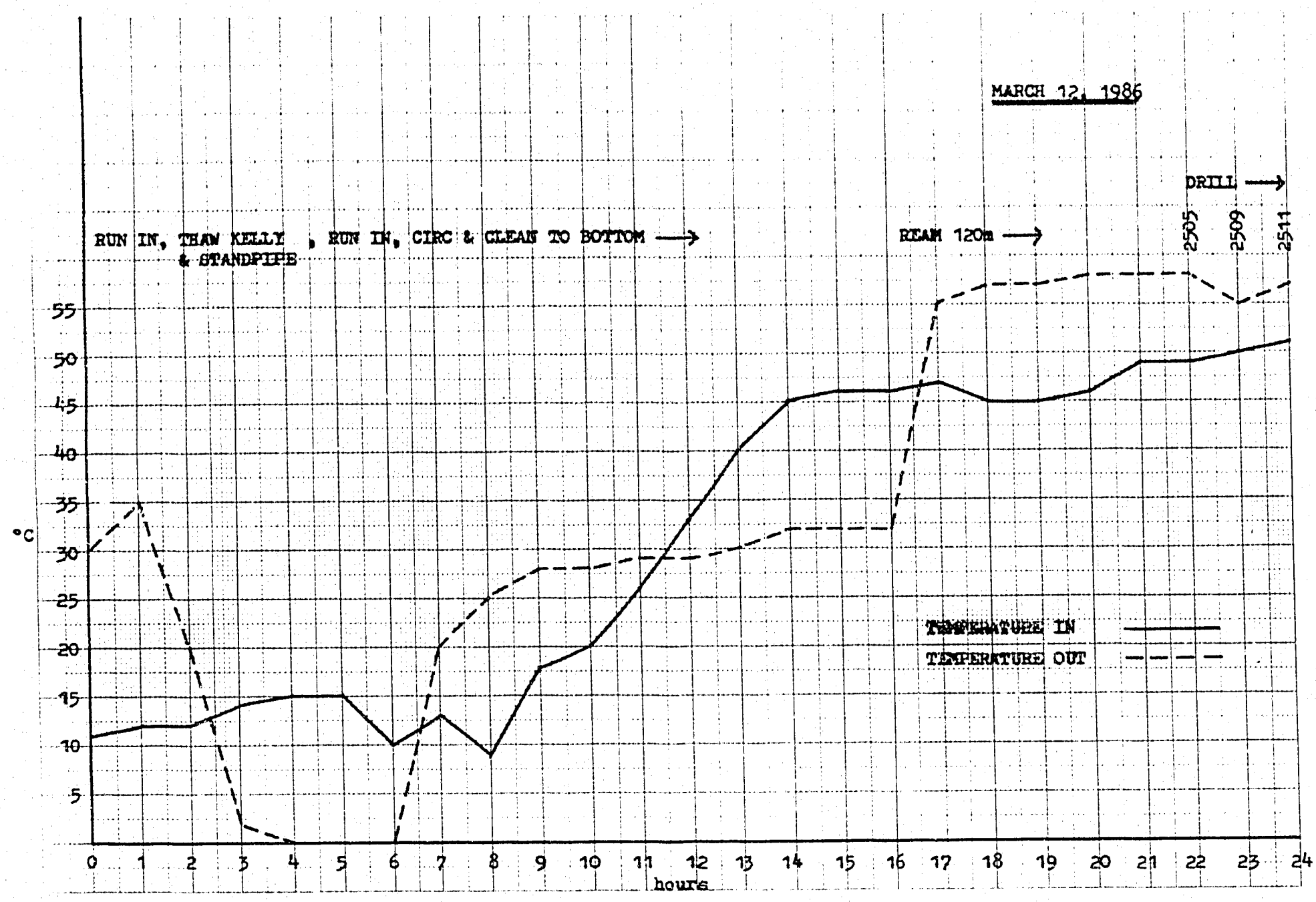
TEMPERATURE IN (Suction Tank) ————————

TEMPERATURE OUT (Shaker Tank) — — — — —



46 1510

KEUFFEL & ESSER CO. MADE IN U.S.A.
10 X 10 TO THE CENTIMETER


MARCH 12, 1986
RUN IN, THAW KELLY & STANDPIPE
RUN IN, CIRC & CLEAN TO BOTTOM
REAM 120m
DRILL
2505
2509
2511
°C
55
50
45
40
35
30
25
20
15
10
5
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
hours
TEMPERATURE IN
TEMPERATURE OUT

46 1510

MARCH 11, 1986

TEMPERATURE IN (Suction Tank)

TEMPERATURE OUT (Shaker Tank)

AIR DRILL

CIRC TO CLEAN HOLE, PULL OUT AND FILL HOLE WITH MUD

RUN IN HOLE

2480 2487 2491 2499 2500

°C

depth

30
25
20
15
10
5

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

hours

46 1510

MARCH 10, 1986

TEMPERATURE IN (Suction Tank)

RUN IN 5½" DRILL PIPE, CIRC HOLE DRY, REAM & CLEAN TO BOTTOM

AIR DRILL →

2414 2423 2433 CIRC 2442 2451 CIRC 2464 2470

depth

°C

25
20
15
10
5

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

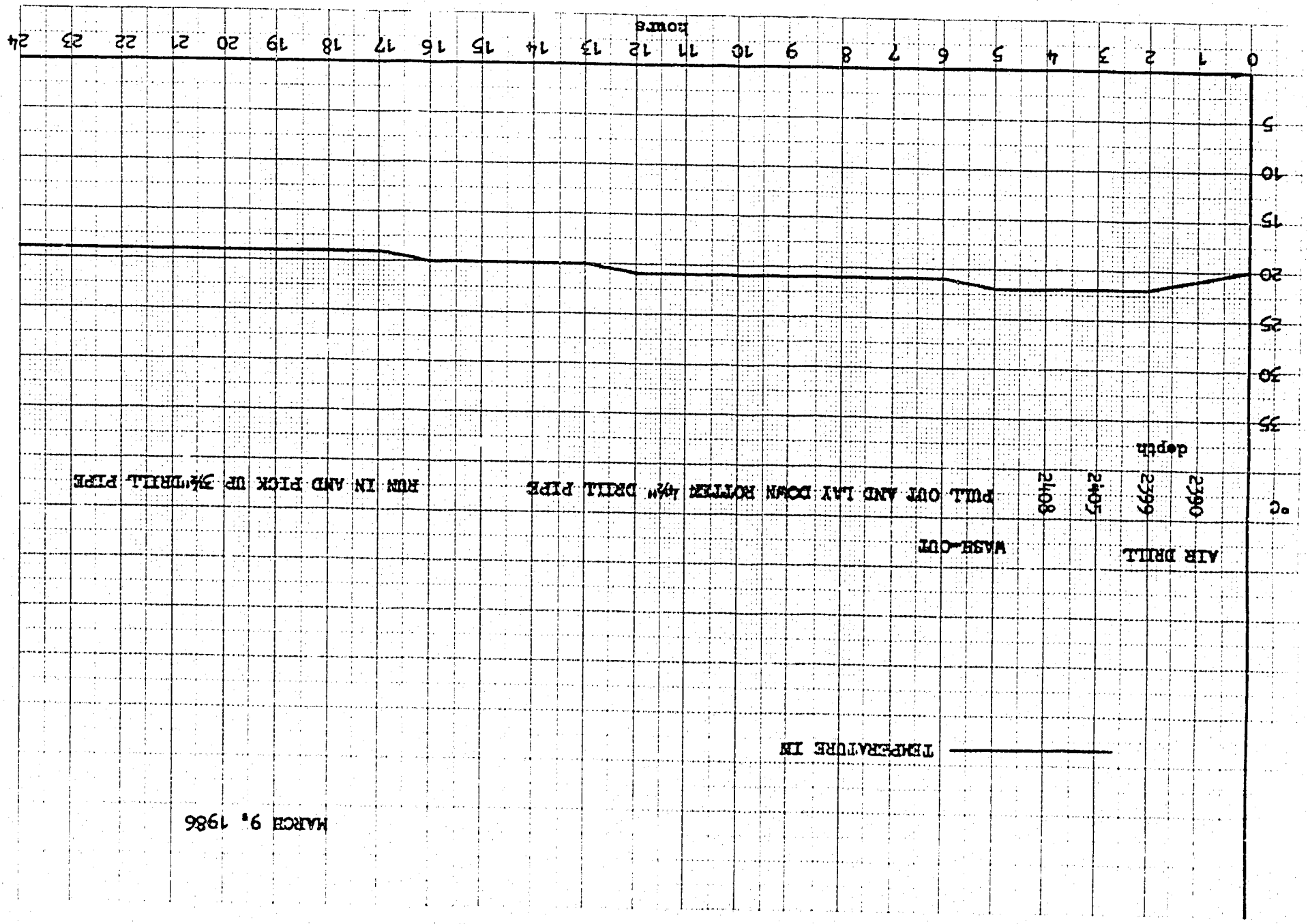
→hours→

46 1510

K&E 10 X 10 TO THE CENTIMETER

K&E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

46 1510



MARCH 9, 1986

MARCH 8, 1985

TEMPERATURE IN

CLEAN TO BOTTOM

DRILL WITH AIR →

2291 2300 2306 2315 2324 2325 2333 CIRC 2345 2347 CIRC 2351 2352 2356 2362 2370 2375 2380 2388

←depth→

°C

25
20
15
10
5

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

←hours→

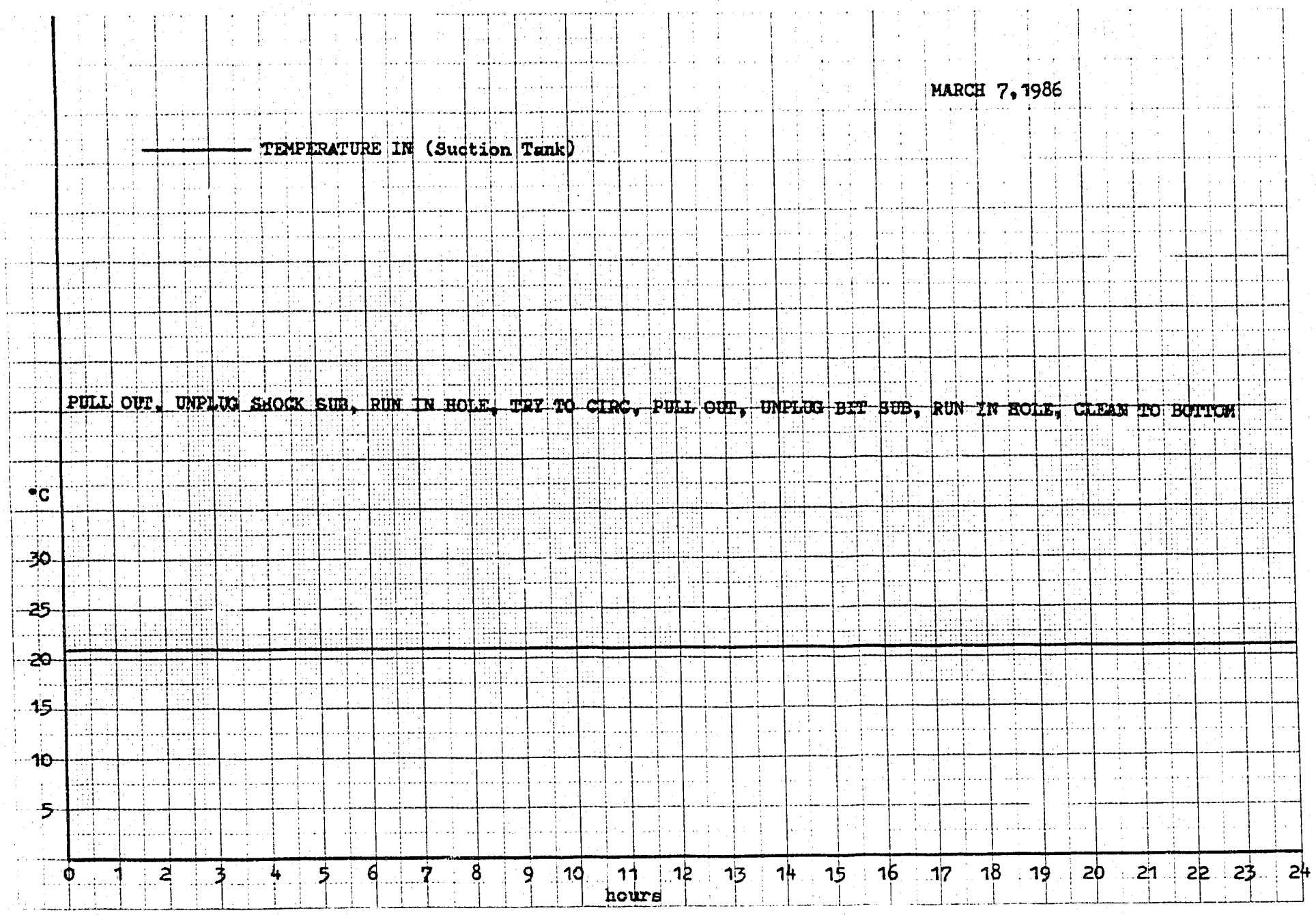
46 1510

KEUFFEL & ESSER CO. MADE IN U.S.A.
10 X 10 TO THE CENTIMETER

MARCH 7, 1986

——— TEMPERATURE IN (Suction Tank)

PULL OUT, UNPLUG SHOCK SUB, RUN IN HOLE, TRY TO CIRC, PULL OUT, UNPLUG BIT SUB, RUN IN HOLE, CLEAN TO BOTTOM



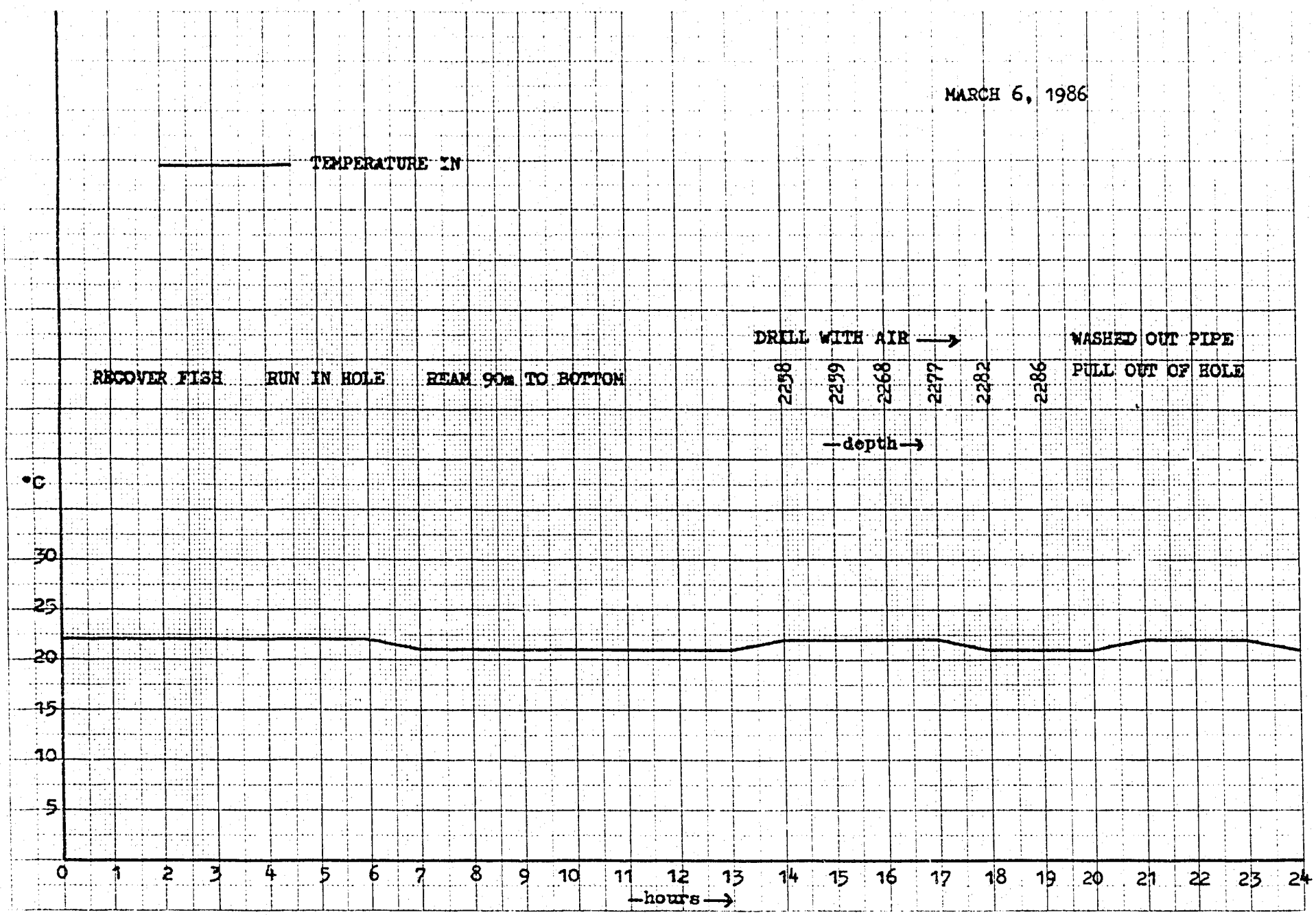
46 1510
KEUFFEL & ESSER CO. 10 X 10 TO THE CENTIMETER

MARCH 6, 1986

TEMPERATURE IN

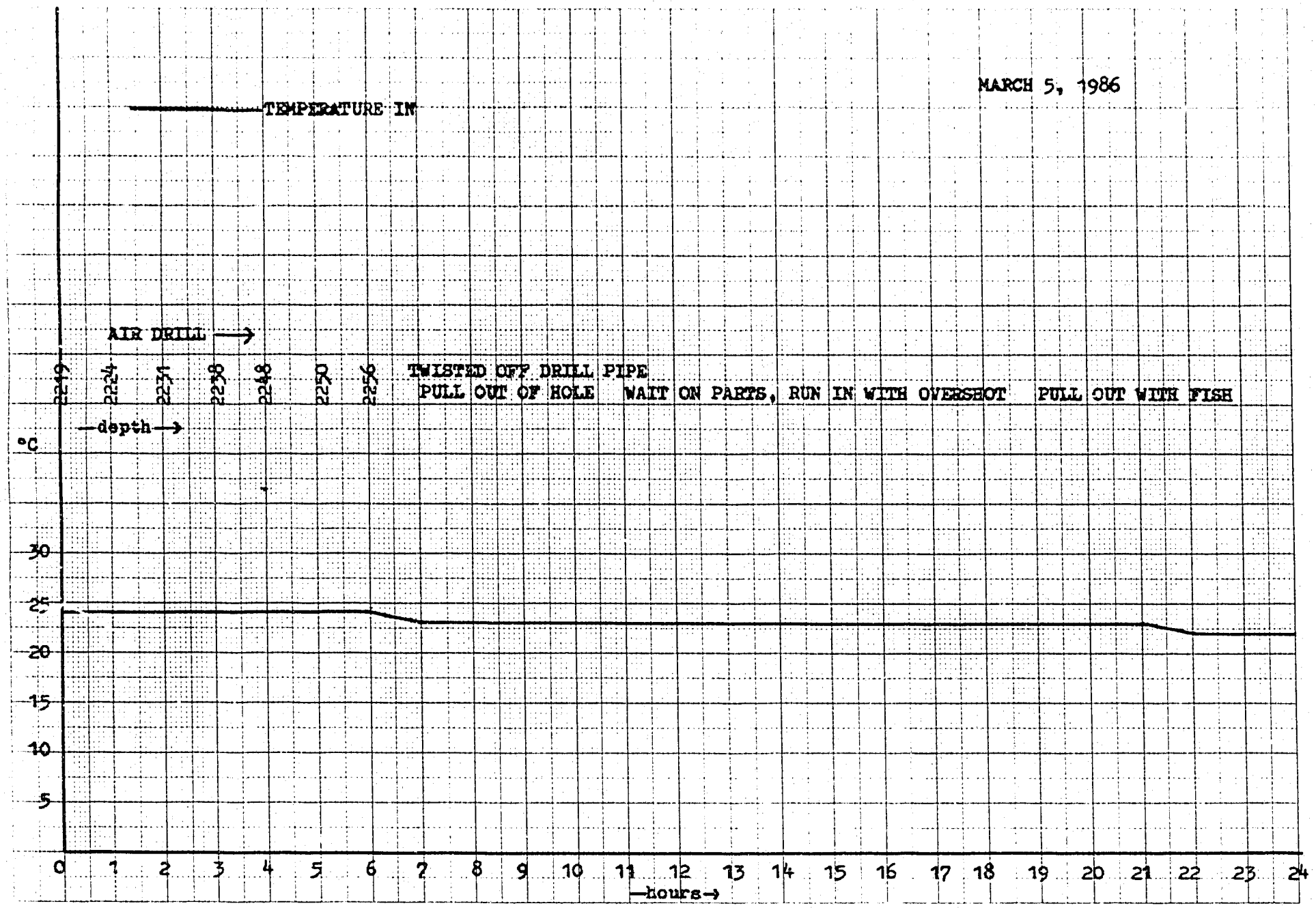
RECOVER FISH RUN IN HOLE REAM 90m TO BOTTOM DRILL WITH AIR → WASHED OUT PIPE

2258 2259 2268 2277 2282 2286 PULL OUT OF HOLE



46 1510
KEUFFEL & ESSER CO. U.S.A.

MARCH 5, 1986



46 1510
K&E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. MADE IN U.S.A.

MARCH 4, 1986

———— TEMPERATURE IN (Suction)

- - - - - - TEMPERATURE OUT (Shaker)

AIR DRILL →

PULL OUT & RECOVER FLEX, RIG REPAIRS, RUN IN, REAM TO BTM

2116 2120 2134 2143 2153 2165 2172 2181 2191 2201 2216 2219

depth →

°C

30
25
20
15
10
5

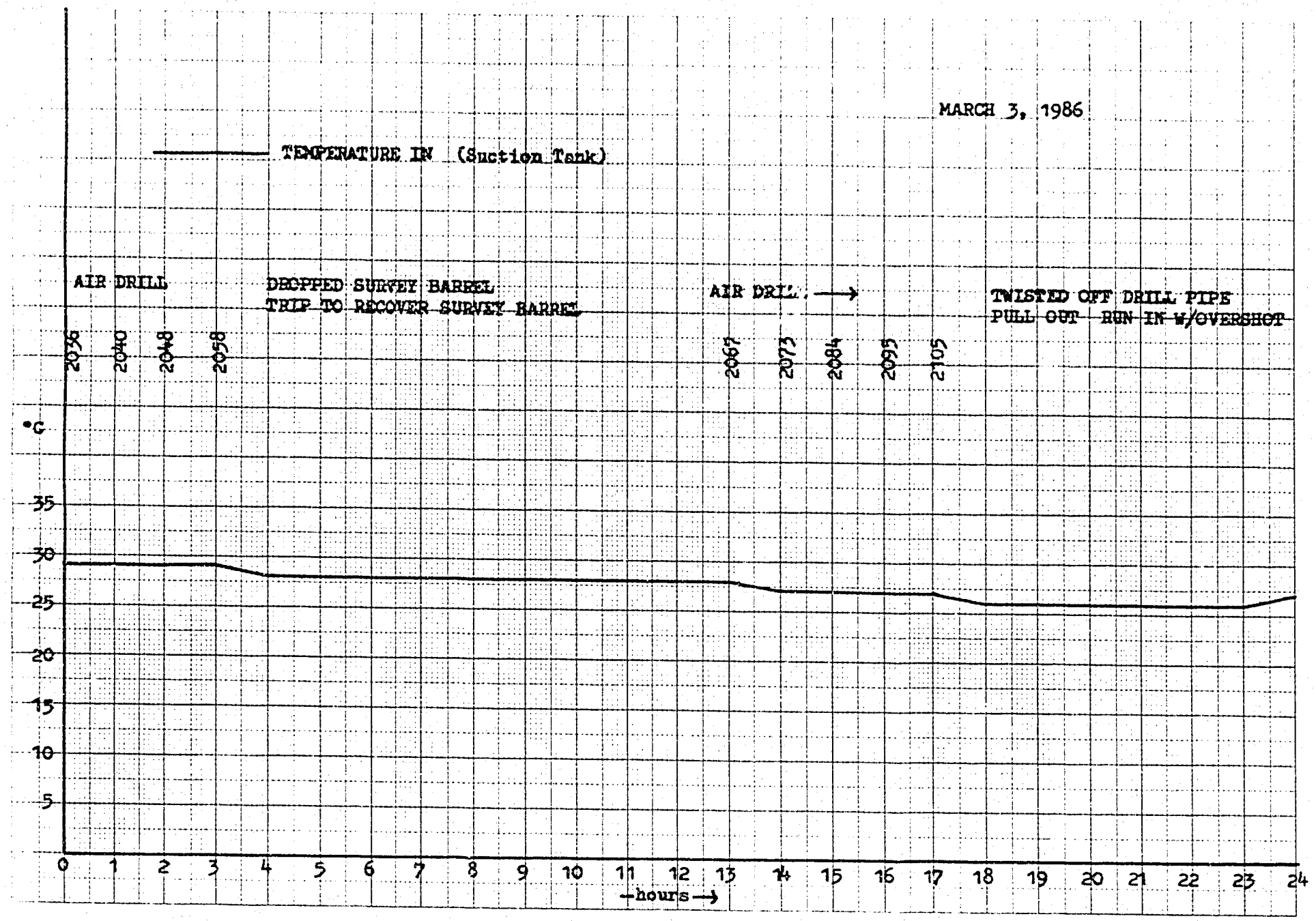
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

hours →

46 1510

KEUFFEL & ESSER CO. 10 X 10 TO THE CENTIMETER

MARCH 3, 1986



46 1510
KEUFFEL & ESSER CO. MADE IN U.S.A.

MARCH 2, 1986

—— TEMPERATURE IN (SUCTION)

AIR DRILL →

TWIST OFF DRILL PIPE-FISH OUT SAME —— AIR DRILL →

1872 1883 1888 1889 1896 1905 1914 1919 1936 1945 1954 1973 1986 1996 2002 2011 2021 2030 2036

°C

—depth→

35
30
25
20
15
10
5

PLOTTER DOWN →

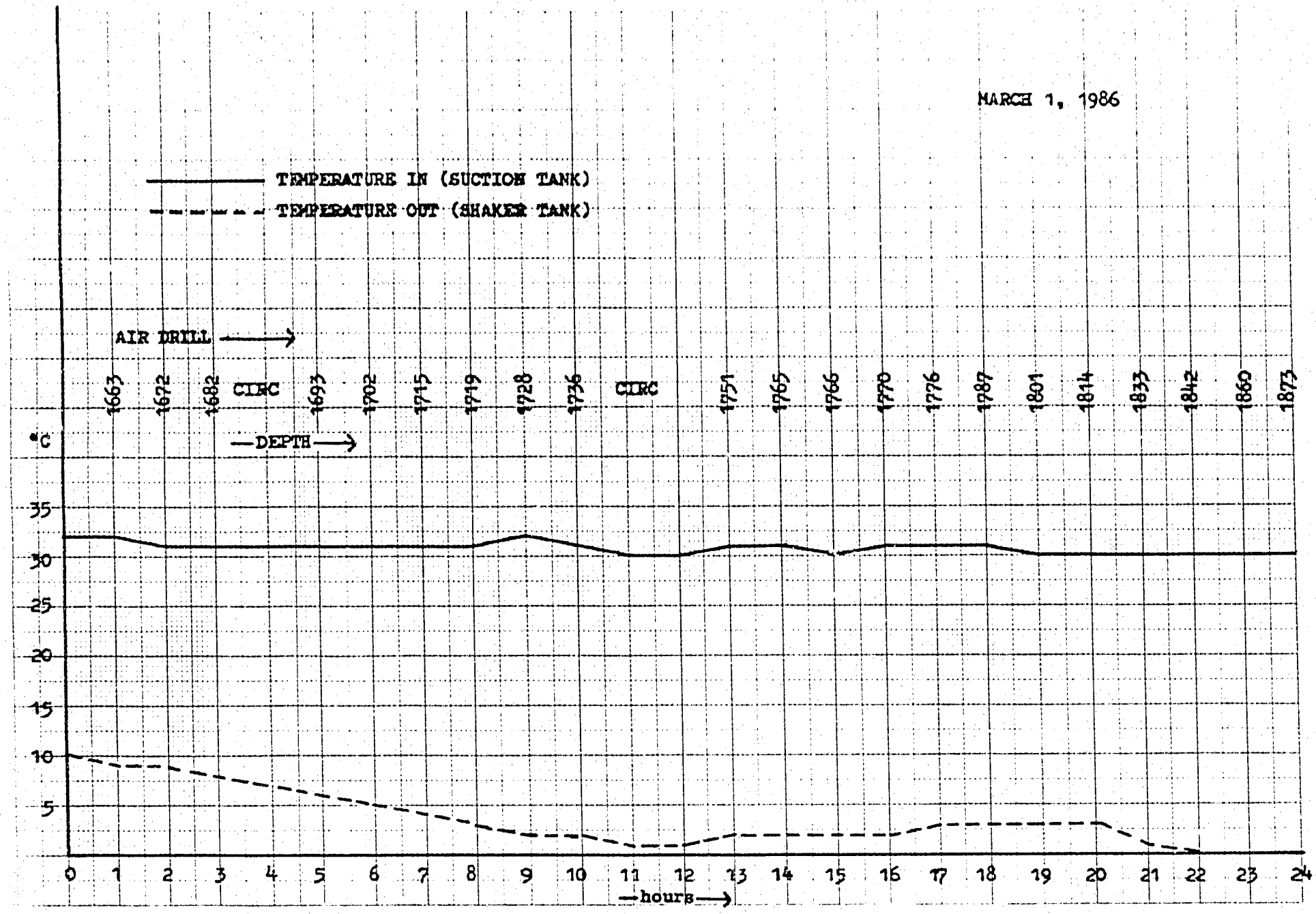
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

—hours→

46 1510

K&E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO.

MARCH 1, 1986



46 1510

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. MADE IN U.S.A.

FEBRUARY 28, 1986

——— TEMPERATURE IN

– – – – – TEMPERATURE OUT

RUN IN W/WASHOVER, FISH FOR DRILL STRING, PULL OUT FISH, RECOVER FISH, RUN IN HOLE, REAM AIR DRILL CIRC

depth

1642
1645
1653

°C

35
30
25
20
15
10
5

(warm day)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

—hours→

46 1510

KEUFFEL & ESSER CO. MADE IN U.S.A.

FEBRUARY 27, 1986

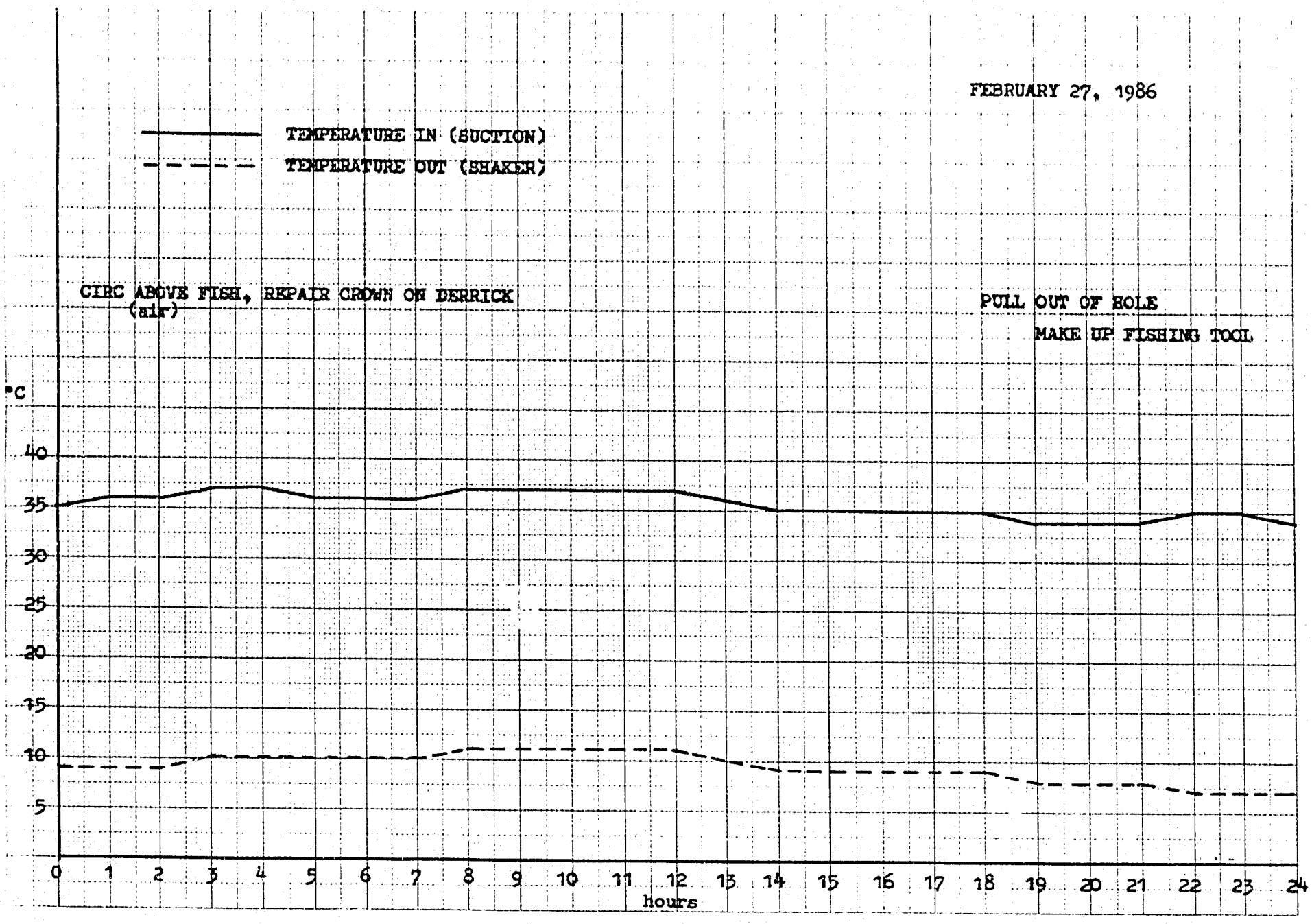
TEMPERATURE IN (SUCTION)

TEMPERATURE OUT (SHAKER)

CIRC ABOVE FISH, REPAIR CROWN ON DERRICK (air)

PULL OUT OF HOLE

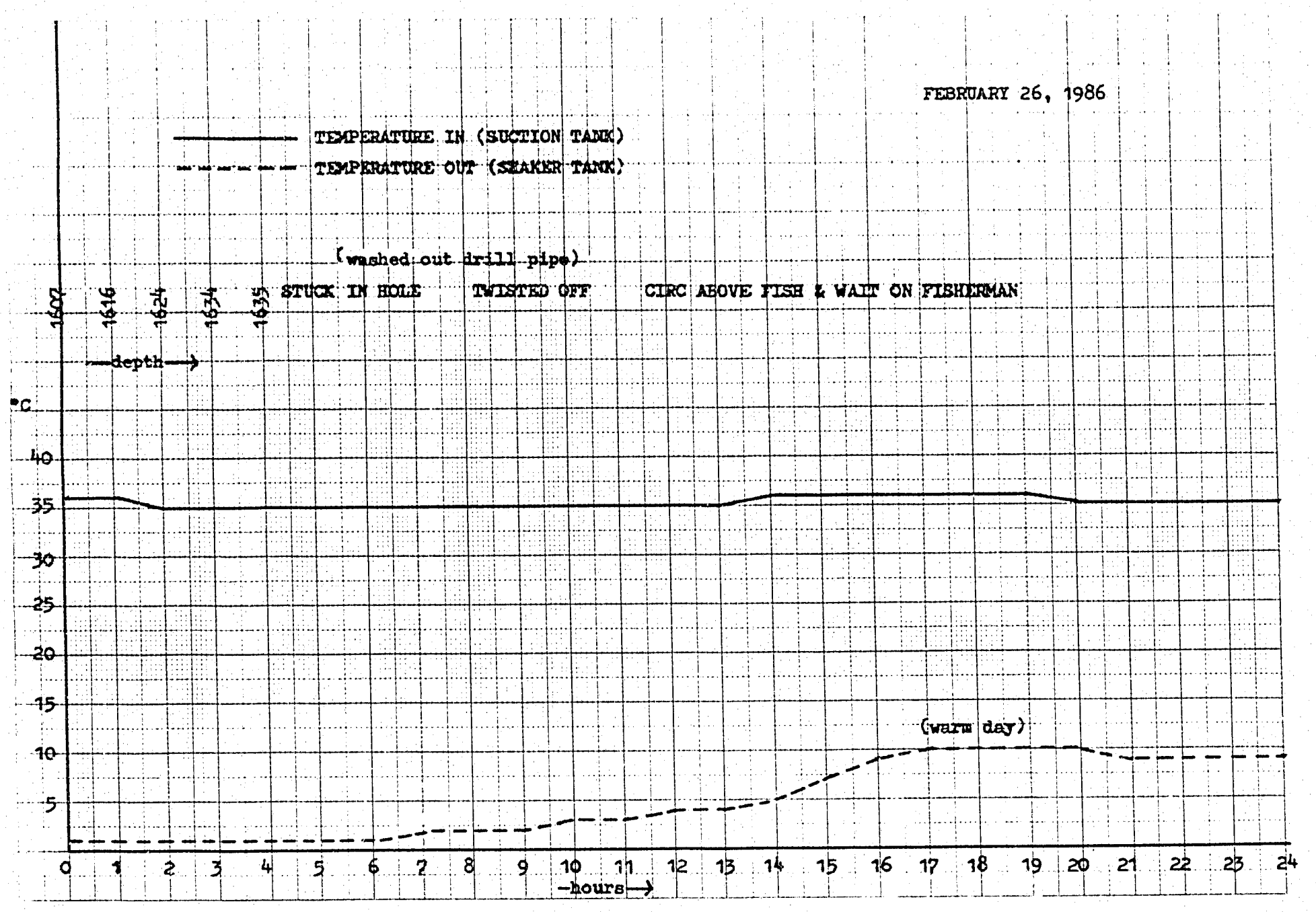
MAKE UP FISHING TOOL



46 1510

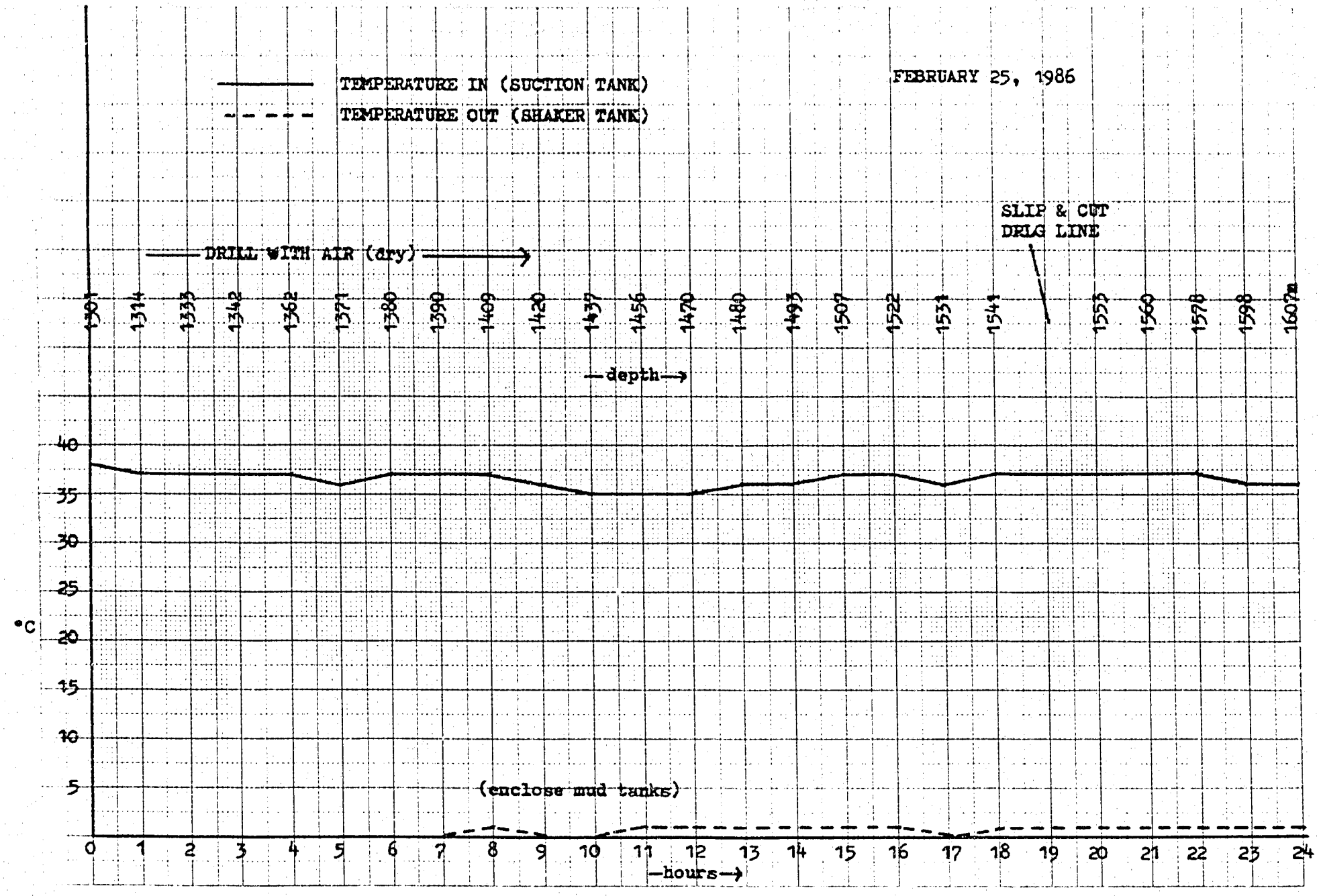
KEUFFEL & ESSER CO. MADE IN U.S.A. 10 X 10 TO THE CENTIMETER

FEBRUARY 26, 1986



46 1510

KEUFFEL & ESSER CO. MADE IN U.S.A. 10 X 10 TO THE CENTIMETER K+E


TEMPERATURE IN (SUCTION TANK)
TEMPERATURE OUT (SHAKER TANK)
FEBRUARY 25, 1986
SLIP & CUT DRLG LINE
DRILL WITH AIR (dry)
1301
1314
1333
1342
1362
1371
1380
1390
1409
1420
1437
1456
1470
1480
1493
1507
1522
1531
1541
1552
1560
1578
1598
1607m
depth
40
35
30
25
20
15
10
5
°C
(enclose mud tanks)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
hours

46 1510

FEBRUARY 24, 1986

TEMPERATURE IN (SUCTION TANK)

DRILL WITH AIR →

993 1006 1021 1028m 1040 1050 1065 1078 1088 1107 1114 1125 1135 1146 1159 1164 1183 1197 1217 1229 1247 1256 1271 1282 1301

← depth →

°C

45 40 35 30 25 20 15 10 5

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

← hours →

46 1510

K&E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. U.S.A.

FEBRUARY 23, 1986

TEMPERATURE IN (SUCTION TANK)

REPLACE WASHED BLOOEY LINE

DRY HOLE — DRILL & WORK PIPE, TRY TO DRY HOLE (NO CUTTINGS) — DRILL WITH AIR (DRY) →

809 813 823 829 832 838 845 861 880 886 898 907 908 916 926 944 955 965 CIRC 974 990 993

°C

—depth→

40 35 30 25 20 15 10 5

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

—hours→

46 1510

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

FEBRUARY 22, 1986

TEMPERATURE IN (SUCTION TANK)

TEMPERATURE OUT (SHAKER TANK)

PRESSURE TEST | UNTHAW RIG | RUN IN HOLE | DRILL FLOAT, CEMENT, SHOE | LEAK-OFF TEST | DRY HOLE | DRILL W/AIR

806 m ←depth→ 809 m

°C

35
30
25
20
15
10
5

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

←hours→

46 1510

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. U.S.A.

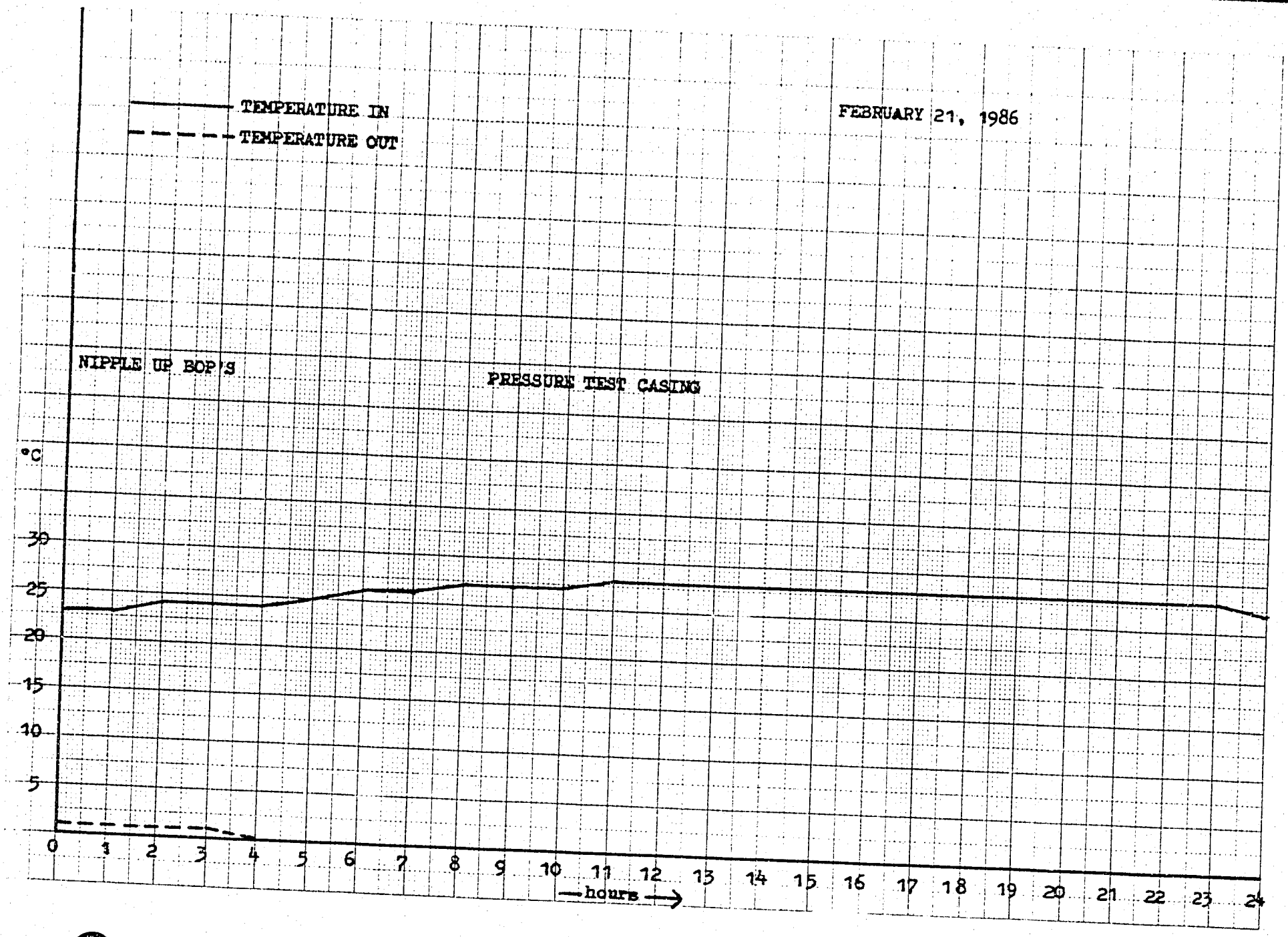
TEMPERATURE IN

TEMPERATURE OUT

FEBRUARY 21, 1986

NIPPLE UP BOP'S

PRESSURE TEST CASING



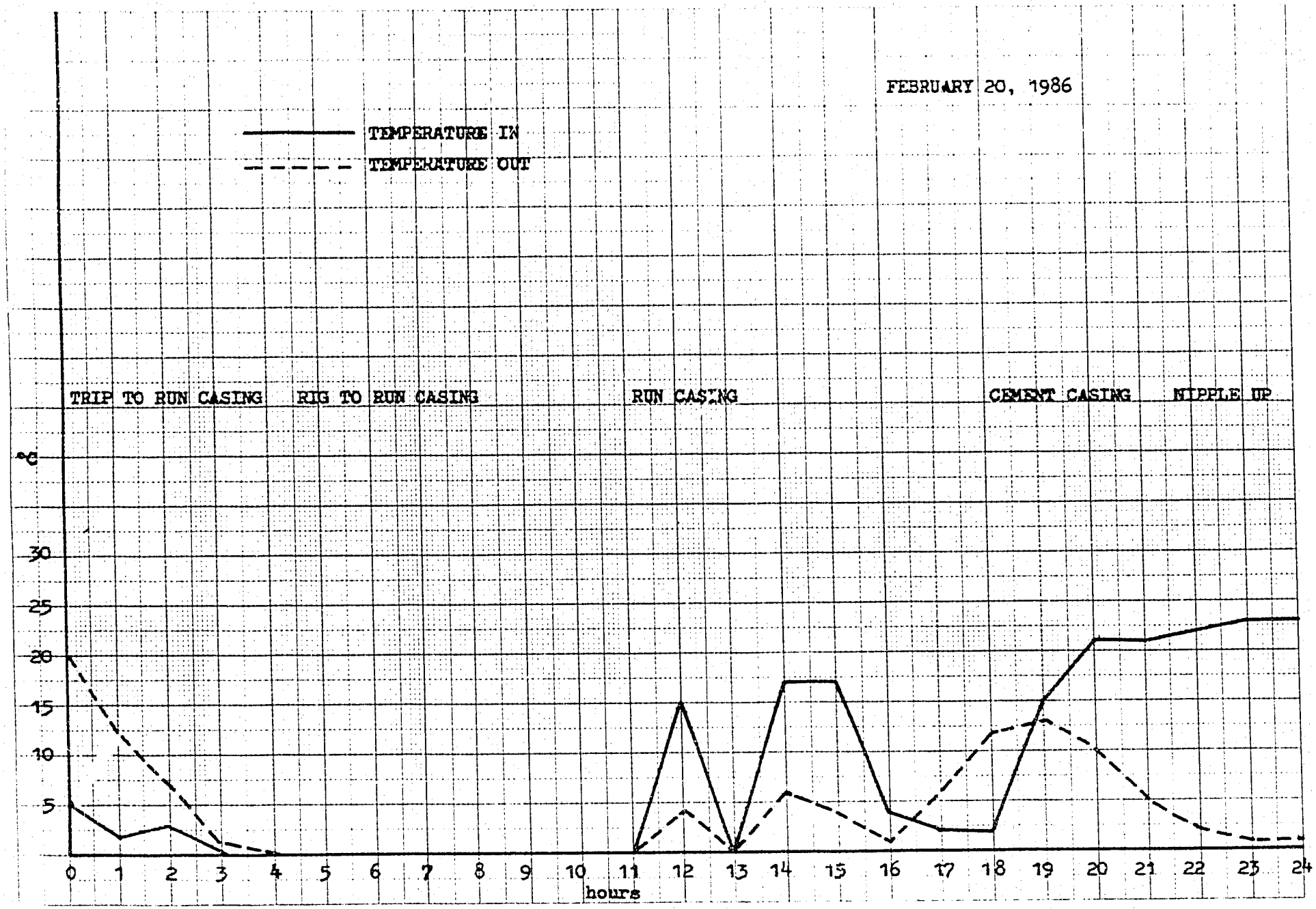
46 1510

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO

FEBRUARY 20, 1986

——— TEMPERATURE IN

– – – – – TEMPERATURE OUT

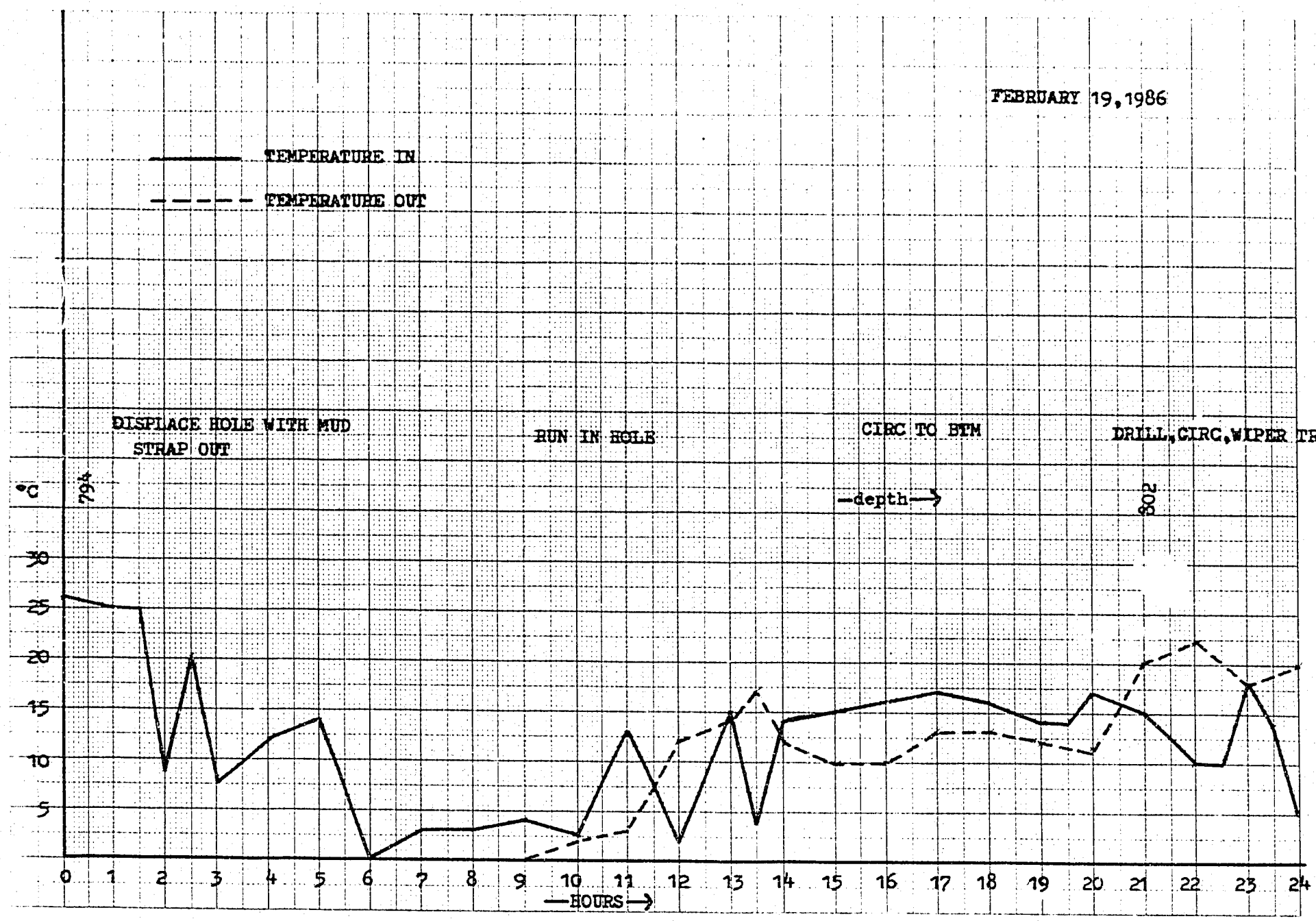


46 1510

FEBRUARY 19, 1986

_____ TEMPERATURE IN

- - - - - - TEMPERATURE OUT



46 1510

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. U.S.A.

FEBRUARY 18, 1986

TEMPERATURE IN (SUCTION TANK)

DRILL WITH AIR/FOAM →

THAW KELLY HOSE

PULL OUT OF HOLE

684 682 685 694 698 700 704 708 711 718 722 731 736 737 753 764 775 785 787 794

—depth→

°C

35 30 25 20 15 10 5

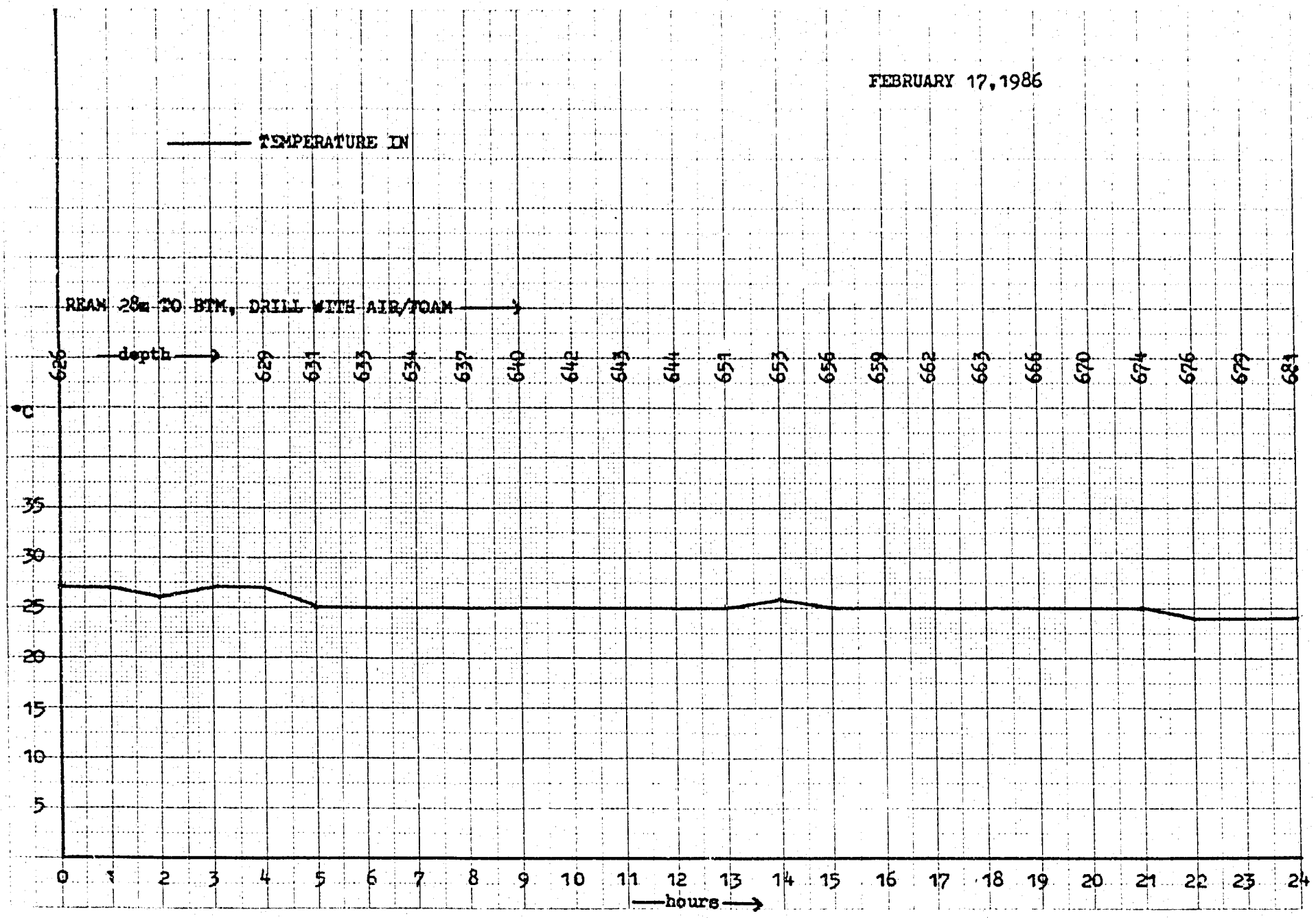
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

—hours→

46 1510

KEUFFEL & ESSER CO.

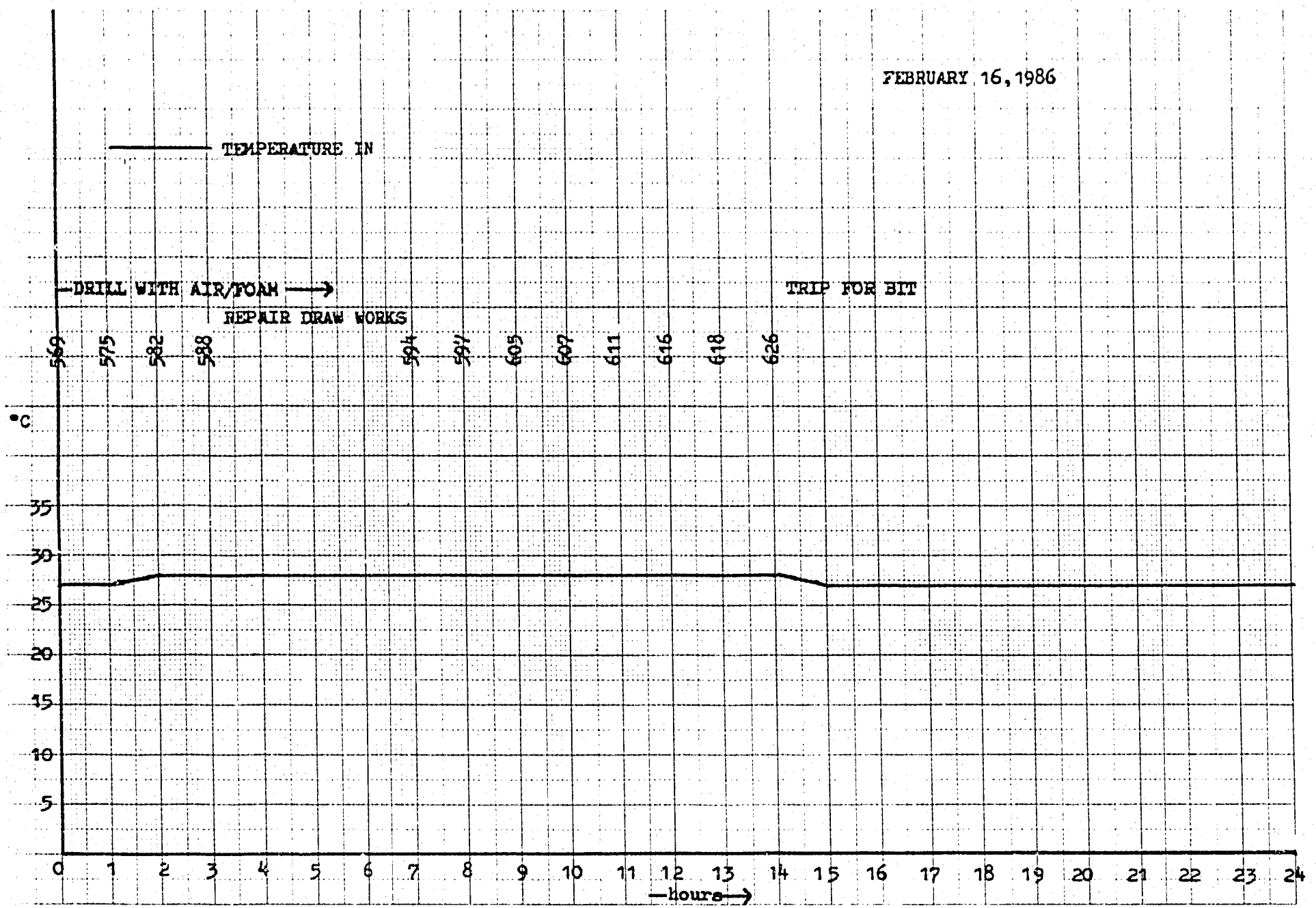
FEBRUARY 17, 1986



46 1510

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. MADE IN U.S.A.

FEBRUARY 16, 1986



46 1510

FEBRUARY 15, 1986

TEMPERATURE IN

DRILL WITH AIR/MIST | TRIP FOR FLOAT | FLARE OFF GAS | RUN IN | DRILL WITH AIR/FOAM

depth → : 440, 447, 457, 466, 426, 482, 494, 513, 532, 542, 560, 569

°C

40
35
30
25
20
15
10
5

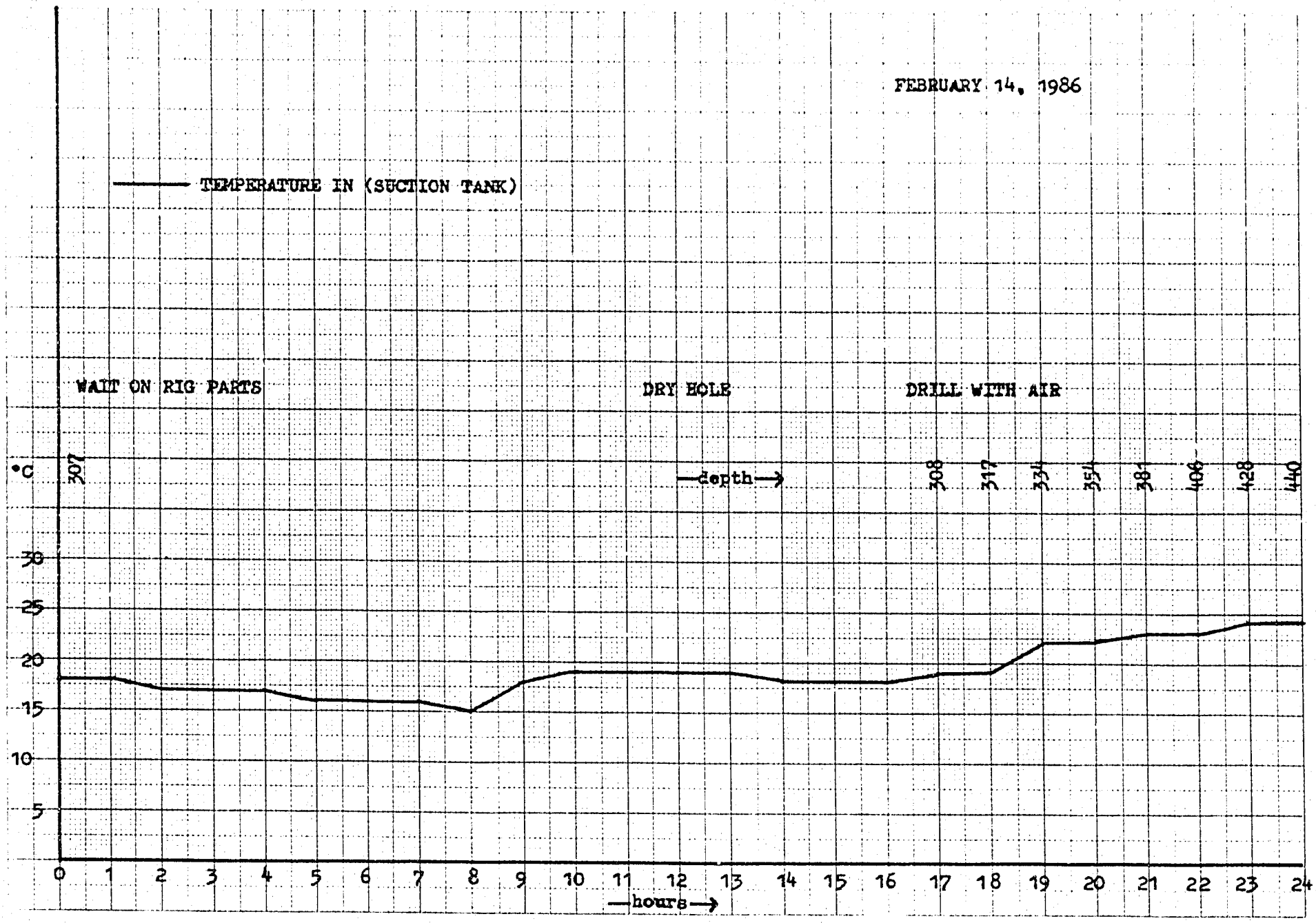
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

hours →

46 1510

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. MADE IN U.S.A.

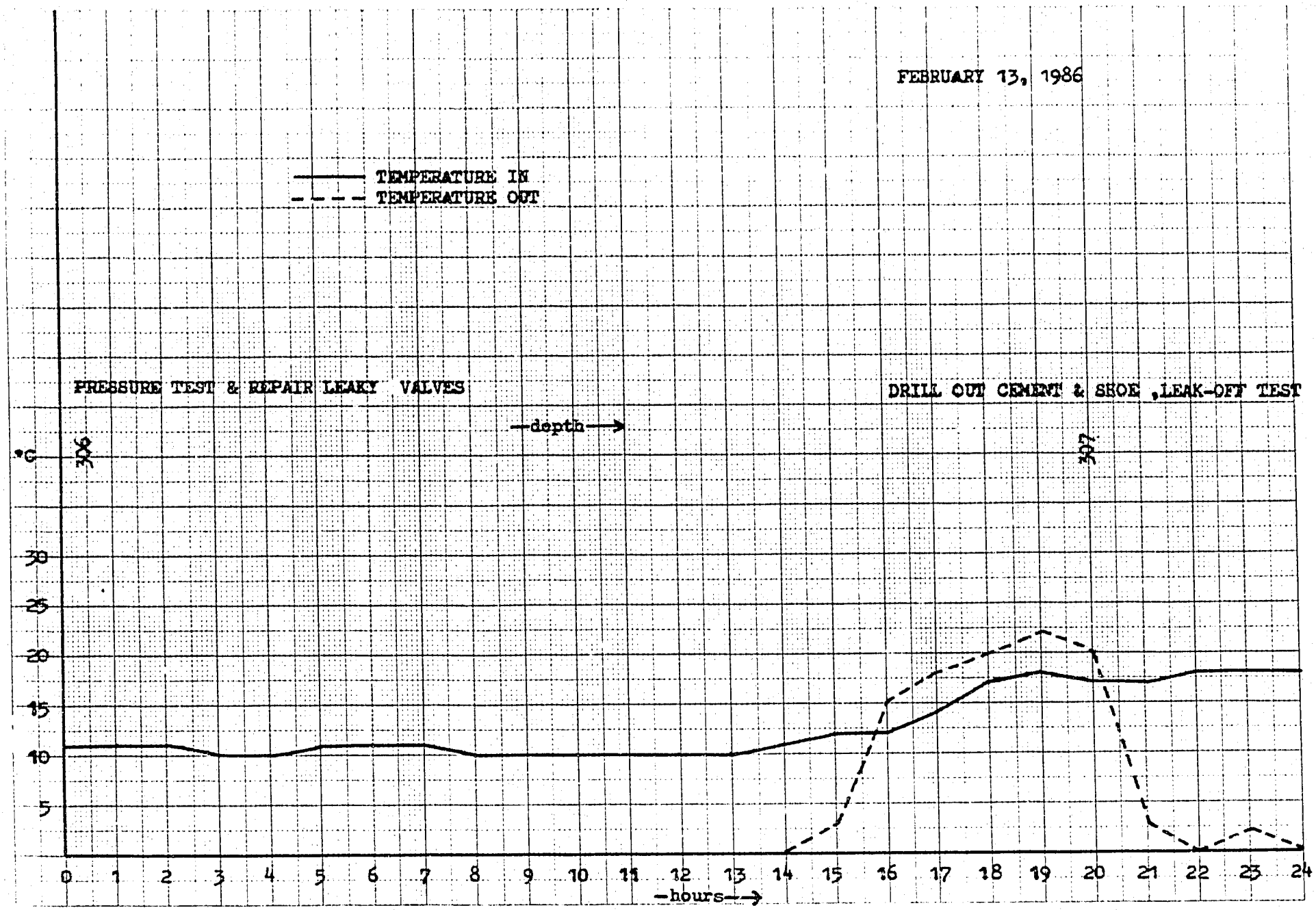
FEBRUARY 14, 1986



46 1510

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. MADE IN U.S.A.

FEBRUARY 13, 1986



46 1510

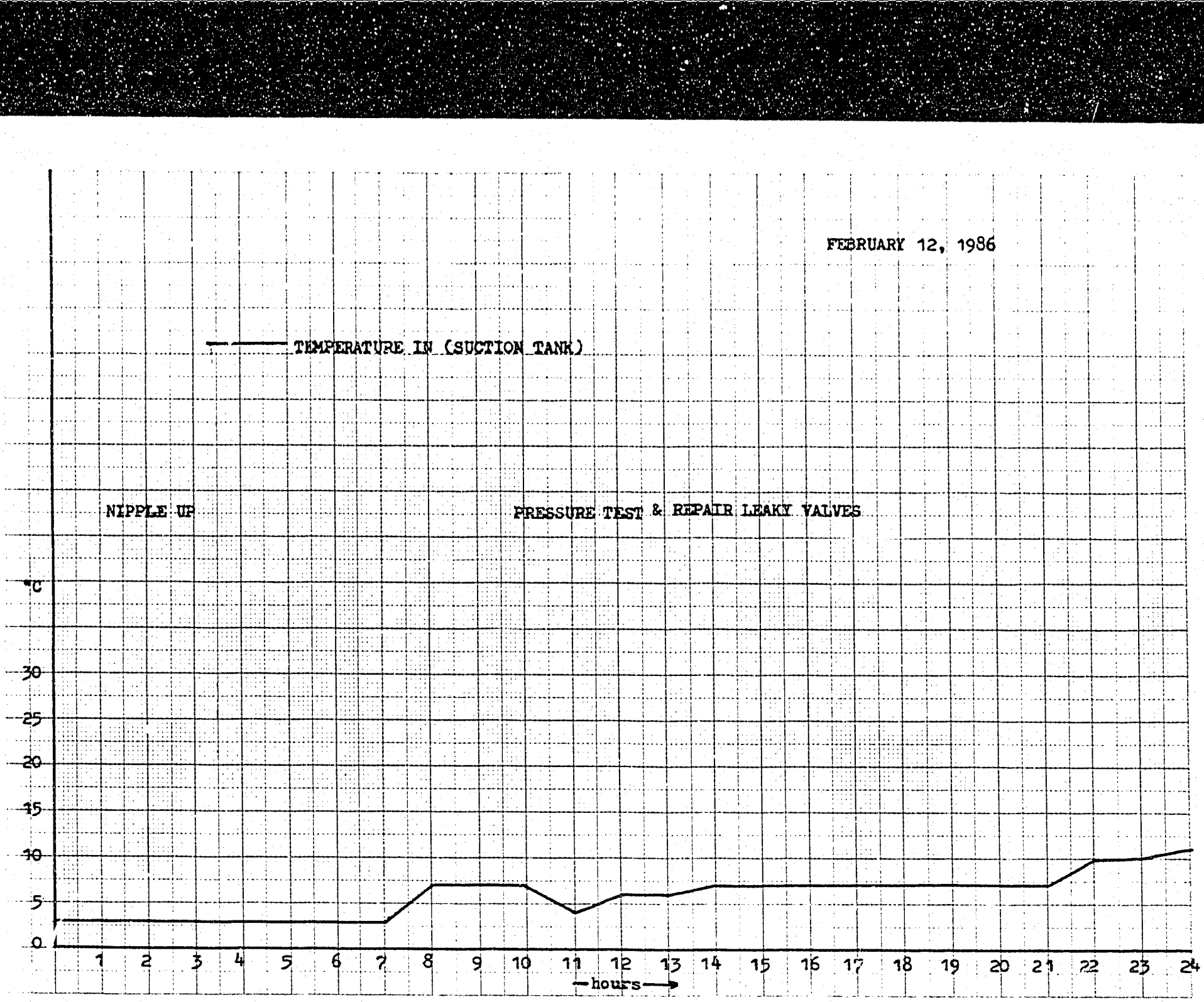
KEUFFEL & ESSER CO. MADE IN U.S.A. 10 X 10 TO THE CENTIMETER

FEBRUARY 12, 1986

TEMPERATURE IN (SUCTION TANK)

NIPPLE UP

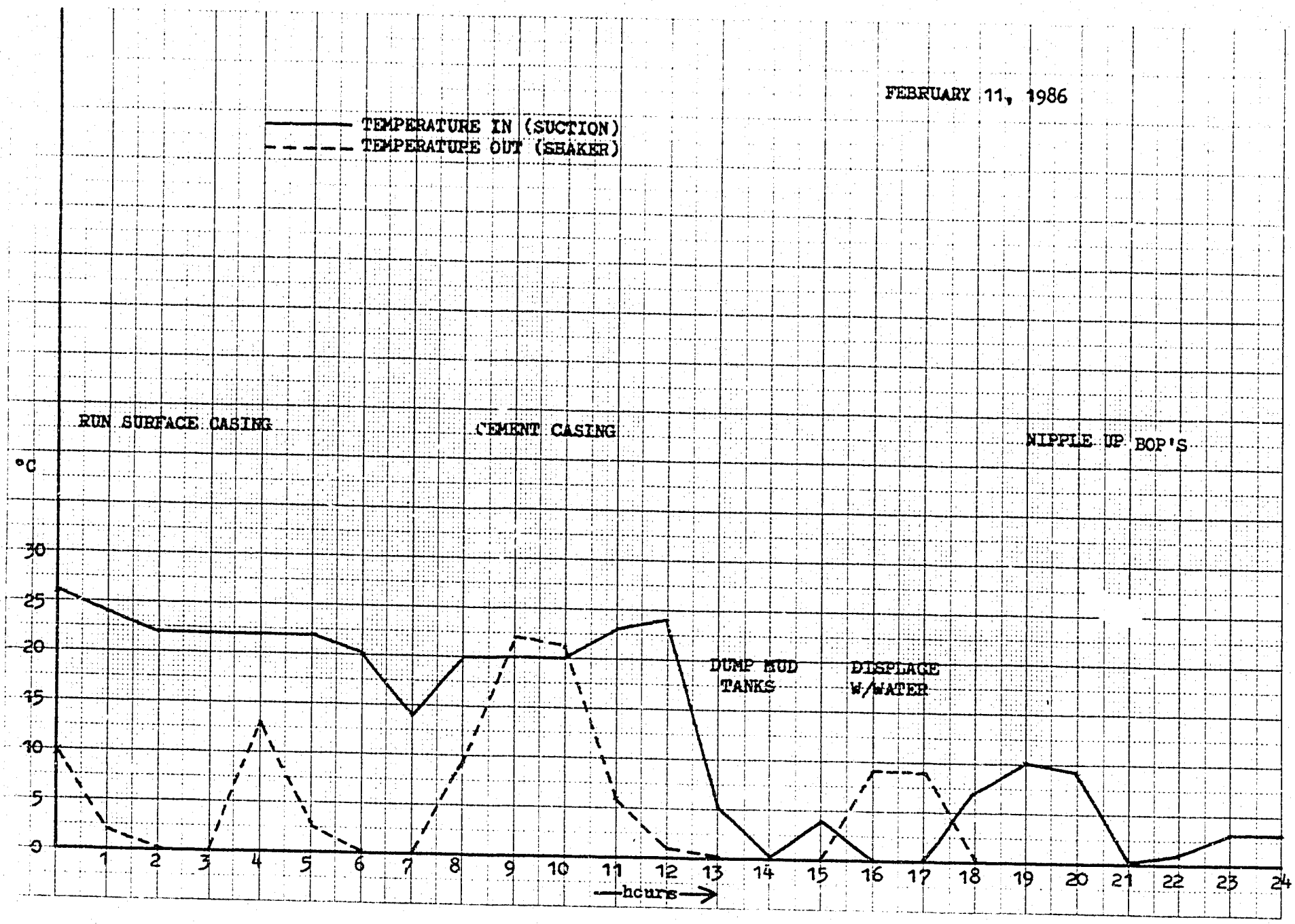
PRESSURE TEST & REPAIR LEAKY VALVES



46 1510

KEUFFEL & ESSER CO. MADE IN U.S.A.

FEBRUARY 11, 1986



46 1510

FEBRUARY 10, 1986

TEMPERATURE IN

TEMPERATURE OUT

DEPTH

208 215 219 228 236 TRIP FOR BIT 245 262 269 282 291 WIPER TRIP 300 306 TRIP FOR SURFACE CASING

°C

35
30
25
20
15
10
5
0

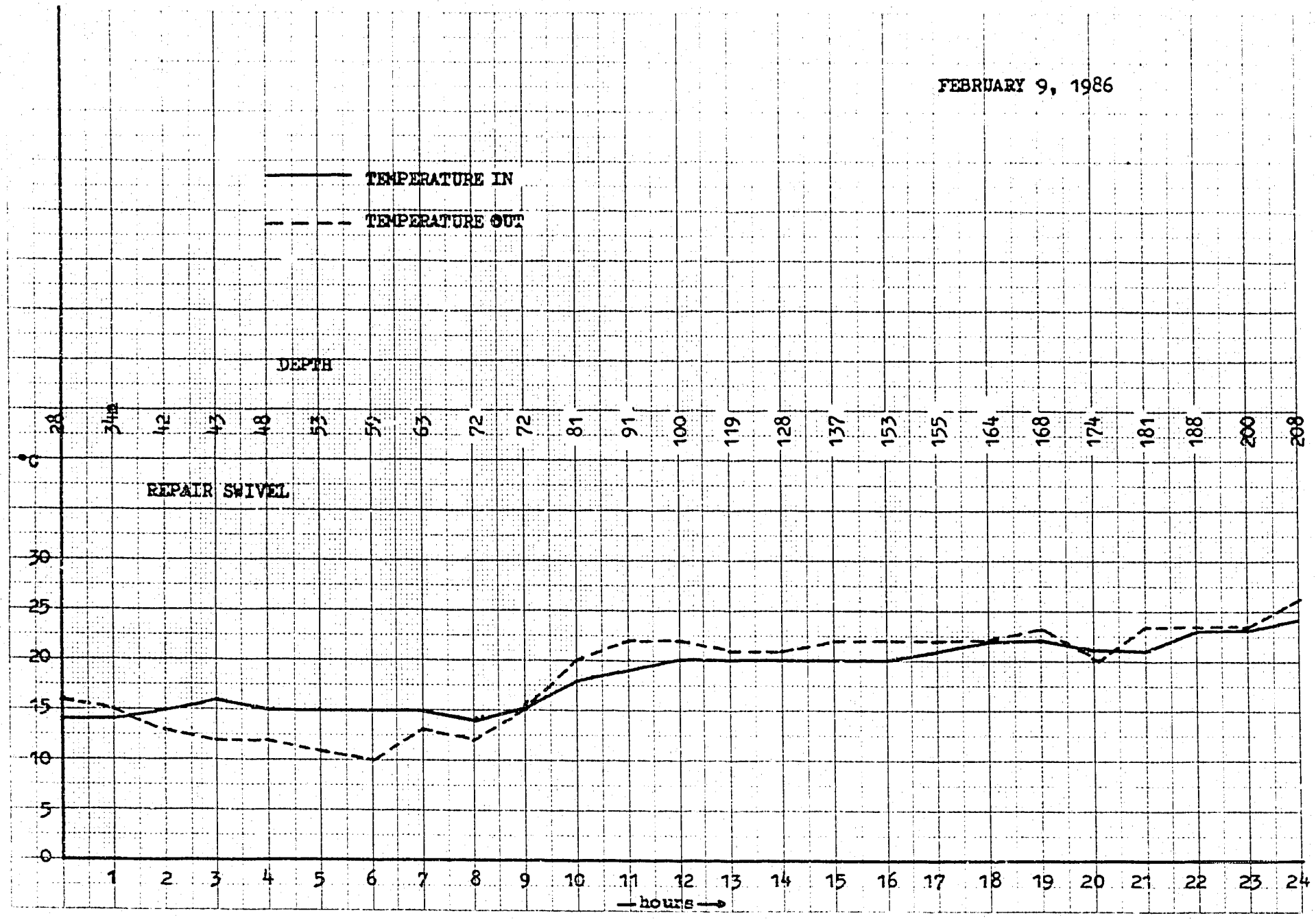
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

hours

46 1510

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. MADE IN U.S.A.

FEBRUARY 9, 1986



46 1510

K+E 10 X 10 TO THE CENTIMETER
KEUFFEL & ESSER CO. MADE IN U.S.A.

FEBRUARY 8, 1986

TEMPERATURE IN (SUCTION TANK)

TEMPERATURE OUT (SHAKER TANK)

DEPTH

13 15m 22 25 28

°C

RIG TO SPUD

SPUD 17:00

SCR UNIT DOWN

30 25 20 15 10 5 0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

hours

46150

KEUFFEL & ESSER CO. MADE IN U.S.A.
10 X 10 TO THE CENTIMETER

CANADA LANDS SURVEYS RECORDS
7 1 1 6 9
DATE 18 DEC. 1987

PLAN AND FIELD NOTES

OF SURVEY OF PROPOSED
EXPLORATORY WELL LOCATION

NSM ARROWHEAD D-50

LATITUDE 60° 29' 02.20" N
LONGITUDE 122° 54' 12.71" W

NORTHWEST TERRITORIES
GRID AREA - 60° 30' N, 122° 45' W
SURVEYED JANUARY 19 TO FEBRUARY 20, 1986
BY Mc ELHANNEY ASSOCIATES
FOR NSM RESOURCES LTD.
CANADA OIL AND GAS REGULATIONS

LEGEND

○	DENOTES	TRAVERSE STATION (30 cm SPIKE)
●	DENOTES	CLS POST (NOT MATERIAL) PLACED
⊙	DENOTES	CLS POST (NOT MATERIAL) FOUND
⊕	DENOTES	WELL LOCATION
TS	DENOTES	TRAVERSE STATION
BT	DENOTES	BEARING TREE
○	DENOTES	OLD
Fd	DENOTES	FOUND

NOTES

BEARINGS ARE ASTRONOMIC, DERIVED FROM WELLSITE PLAN NSM ET AL ARROWHEAD G-69 (CLS # G-69), AND ARE REFERRED TO 123° 45' WEST LONGITUDE. BEARINGS WERE CHECKED BY STELLAR OBSERVATION AT CLS # 2 G-50 AND AT CLS # D-50

BEARINGS AND DISTANCES SHOWN ON UNIT DETAIL AND GRID AREA ARE UTM PLANE, REFERRED TO ZONE 10, CENTRAL MERIDIAN 121° 45' 00" LONG. & FALSE EASTING OF 500,000 m

ALL OTHER DISTANCES ARE HORIZONTAL; DISTANCES AND BEARINGS THEREOF AND ARE NOT REDUCED TO THE UTM PLANE UNLESS OTHERWISE NOTED

CO-ORDINATES ARE REFERRED TO STATION CLS#1 (FOUND), WELLSITE PLAN NSM ET AL ARROWHEAD G-69.

ALL GEOGRAPHIC CO-ORDINATES ARE REFERRED TO 1927 NORTH AMERICAN DATUM (1927 NAD).
UTM CO-ORDINATES ARE COMPUTED FOR ZONE 10, CENTRAL MERIDIAN 123° WEST.

ELEVATIONS WERE DERIVED FROM STATION CLS#1 (FOUND), WELLSITE PLAN NSM ET AL ARROWHEAD G-69 AND ARE EXPRESSED IN METRES AND DECIMALS THEREOF. ELEVATION = 485.1 m.

FOR THE COMPUTATION OF CO-ORDINATES, MEASURED DISTANCES HAVE BEEN REDUCED TO THE UTM PLANE BY MULTIPLYING THEM BY AN AVERAGE COMBINED SCALE FACTOR OF 0.99951. CO-ORDINATES WERE THEN ADJUSTED TO FIT THE CONTROL.

THIS SURVEY WAS COMPLETED PRIOR TO DRILLING, THEREFORE WELL AS DRILLED MAY NOT NECESSARILY AGREE WITH PROPOSED LOCATION

SURVEYED FOR
NSM RESOURCES LTD.
BY: R.O. BLACKALL C.L.S.
1986

I, R.O. BLACKALL OF THE CITY OF FORT ST. JOHN, BRITISH COLUMBIA, CANADA LANDS SURVEYOR, MAKE OATH AND SAY THAT I HAVE PERFORMED THE SURVEY REFERRING TO LINE AND THE INSTRUCTIONS OF THE SURVEYOR GENERAL DATED THE 19th DAY OF JANUARY, 1986, AND THAT I HAVE CARRIED FAITHFULLY AND CORRECTLY EXECUTED THE SURVEY AND THAT THE ANNEXED PLAN AND FIELD NOTES, AND THAT THE SAID PLAN AND FIELD NOTES ARE CORRECT AND TRUE TO THE BEST OF MY KNOWLEDGE AND BELIEF.
SO HELP ME GOD.

SWORN BEFORE ME AT THE CITY OF FORT ST. JOHN IN THE PROVINCE OF BRITISH COLUMBIA THIS 2nd DAY OF March 1986.

R.O. Blackall
CANADA LANDS SURVEYOR

A COMMISSIONER FOR OATHS IN AND FOR THE PROVINCE OF BRITISH COLUMBIA

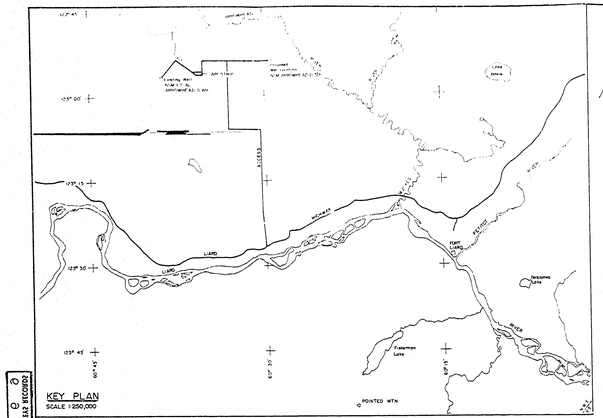
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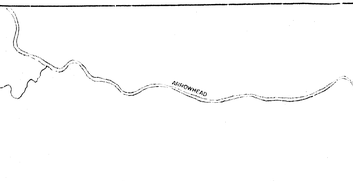
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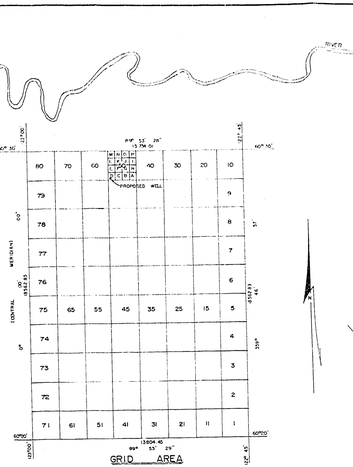
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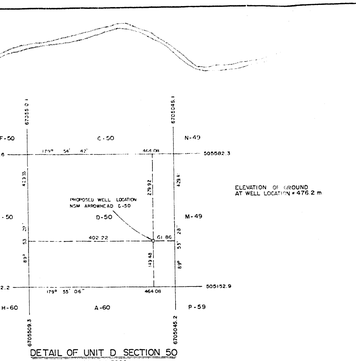
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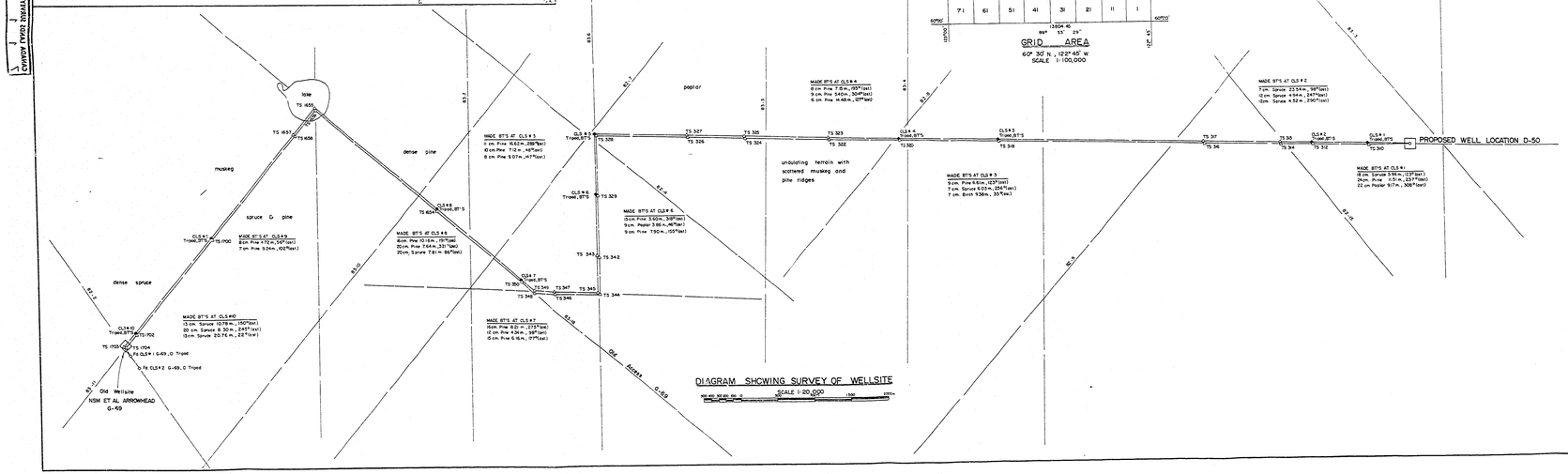
CANADA LANDS SURVEYS RECORDS
7 1 1 6 9
DATE 18 DEC. 1987











PROPOSED WELL LOCATION CO-ORDINATES, NAD				
STATION	AZIMUTH	DISTANCE	UTM NORTHING	UTM EASTING
			BALANCED TRANSIT RULE	
CLS#1 G-69	157° 36' 19.2"		6722429.136	505769.069
CLS#1 G-69	337° 36' 19.2"	128.150	6722558.767	505769.330
CLS#2	248° 36' 19.2"	745.055	6722344.167	505284.698
CLS#3	248° 36' 19.2"	645.890	6722344.167	505284.698
CLS#4	248° 36' 19.2"	1701.999	6720539.269	504648.759
TS 1457	248° 36' 19.2"	1457.969	6720514.859	505143.480
TS 1455	248° 36' 19.2"	1457.969	6719606.108	505105.253
TS 1456	220° 40' 10"	2127.172	6718213.089	504511.643
TS 1457	209° 38' 18"	1885.750	6717183.248	503980.005
TS 349	217° 24' 41"	232.574	6716982.200	503946.752
TS 348	182° 28' 40"	298.584	6716686.456	503944.613
TS 347	107° 13' 05"	585.227	6716686.456	503.86.963
TS 345	89° 47' 40"	511.352	6716811.537	503677.958
TS 343	89° 57' 19"	838.490	6716915.889	504712.333
TS 342	89° 56' 09"	427.900	6716.18.242	505134.985
TS 341	89° 56' 09"	1242.744	6716870.407	505459.152
TS 325	89° 09' 20"	762.861	6716816.179	505480.076
TS 323	89° 09' 20"	1141.403	6716923.554	505456.090
TS 322	89° 21' 40"	966.606	6720017.445	505455.951
CLS # 4	107° 58' 15"	1515.836	6720017.445	505453.332
CLS # 3	89° 05' 35"	2774.492	6720021.335	505453.332
TS 327	89° 05' 35"	1012.296	6720021.335	505340.628
TS 326	89° 21' 05"	420.905	6720658.024	505338.565
TS 325	89° 21' 05"	768.805	6720657.429	505329.738
TS 324	89° 21' 05"	562.048	6720658.138	505316.109
MUSK. D-50	89° 24' 40"	562.048	6720.07.148	505302.275
TS 310	89° 24' 55"	550.229	6720666.383	505341.359
TS 307	89° 02' 45"	971.062	6720663.924	505338.409
TS 306	89° 09' 20"	420.482	6720663.068	505336.887
TS 305	89° 11' 00"	1042.526	6720.07.727	505338.554
TS 318	89° 05' 45"	27.79.985	6720.68.900	505461.832
TS 320	89° 57' 25"	1351.861	6720.06.000	505453.532
TS 322	89° 19' 20"	1056.533	6720291.829	505.456.090
TS 324	89° 06' 00"	1145.303	6720.16.383	505477.984
TS 326	89° 11' 45"	759.748	6720.68.924	505455.144
TS 328	89° 06' 20"	1243.608	6720.67.454	505330.446
TS 329	269° 54' 15"	820.233	6720.67.454	505330.761
TS 329	269° 29' 00"	838.670	6720.68.522	505187.779
TS 343	269° 45' 35"	1.5.082	6720.68.572	505340.015
TS 344	269° 09' 05"	582.581	6720.68.168	505351.996
TS 346	269° 21' 15"	256.815	6720695.090	505334.181
TS 348	269° 21' 45"	236.813	6720695.090	505334.046
TS 350	269° 38' 25"	1450.099	6717160.002	505348.046
TS 1454	90° 38' 45"	2324.830	6718235.179	504458.391
TS 1456	104° 33' 45"	459.464	6719021.829	505450.285
TS 1458	104° 33' 45"	1789.948	6720133.726	505340.306
TS 1700	104° 43' 10"	1844.991	6720133.635	504447.539
TS 1703	304° 43' 40"	164.599	6719236.393	502863.972
TS 1704	304° 43' 40"	262.867	6722455.857	502672.480
CLS # 1 G-69	235° 52' 15"	126.221	6.22455.016	502826.082

GEOGRAPHIC CO-ORDINATES (1927 NAD)			
STATION	LATITUDE	LONGITUDE	ELEV
CLS # 1 G-69	60° 30' 22.09" N	122° 51' 53.92" W	485.1 m
CLS # D-50	60° 30' 19.422" N	122° 56' 31.418" W	503.7m
CLS # 2 D-50	60° 31' 46.18" N	122° 56' 27.017" W	5333 m
CLS # 3 D-50	60° 36' 08.612" N	122° 56' 02.587" W	5742m
CLS # 7 D-50	60° 35' 31.940" N	122° 56' 08.699" W	590.4m
CLS # 6 D-50	60° 34' 58.042" N	122° 56' 30.427" W	5804 m
CLS # 5 D-50	60° 34' 38.080" N	122° 56' 38.360" W	5815 m
CLS # 4 D-50	60° 32' 40.343" N	122° 56' 26.272" W	5768 m
CLS # 3 D-50	60° 32' 00.340" N	122° 54' 08.889" W	5721 m
CLS # 2 D-50	60° 29' 43.188" N	122° 54' 09.785" W	5731 m
CLS # 1 D-50	60° 29' 20.556" N	122° 54' 12.750" W	5.60.6 m

OIL AND GAS GRID CO-ORDINATES 1927 NAD				
	CORNER	GEOGRAPHIC LATITUDE, N	GEOGRAPHIC LONGITUDE, W	UTM ZONE 10 C.M. 123° W. NORTHING (m)	UTM ZONE 10 C.M. 123° W. EASTING (m)
GRID AREA	N.E.	60° 30'	122° 45'	6706917.8	5.3734.0
	N.W.	60° 30'	123° 00'	6706891.7	500.000.0
	S.E.	60° 20'	122° 45'	6688335.1	523804.4
	S.W.	60° 20'	123° 00'	6688338.9	500.000.0
UNIT D SECTION 50	N.E.	60° 29' 0.204"	122° 55' 34.335"	6705810.1	505581.6
	N.W.	60° 29' 0.186"	122° 56' 22.500"	6705809.3	505512.2
	S.E.	60° 26' 00.204"	122° 55' 34.375"	6705046.1	505582.3
	S.W.	60° 26' 00.186"	122° 56' 22.500"	6705045.2	505.52.9

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