NSM

MIRROR

LAKE 0-33

9211-N9-1-2

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

D.A No. 1124

E.A. 215

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 Mirror Lake G-33

Operator: NSM Resources Ltd.

Contractor: Peter Bawden Drilling

Drilling Rig or Unit: One

Location-Unit: G Section: 33

Coordinates Lat: 64° 52' 46" N Long: 126° 51' 17" W

Area: Northwest Territories

Field/Pool: Exploratory

Elevation - KB: 284 m GRD: 280 m

Approx Spud Date: 1984 02 15

Anticipated Total Depth: 1820 m KB

UWI: 300G336500126450

Drilling Program No: N/A

Permit or Lease No: 3788

Estimated Well Cost: 2,200,000

Grid Area: 65-00-126-45

Estimated Days on Location: 25

Target Horizon(s): Ronning

Canada Oil and Gas Lands Administration
Administration du pétrole et du gaz des terres du Canada
JAN 9 1984
To
File #

EVALUATION PROGRAM

Ten metre sample intervals: None

Five metre sample intervals: 20m KB to TD

Canned sample intervals: All

Conventional cores at: 1500m KB (est)

Logs and Tests: DIL-SP, BHCS-GR-C, CNL-FDC, Surf - TD
Tests as required

CASING AND CEMENTING PROGRAM

OD	Weight	Grade	Setting Depth KB	Cementing Program (Volumes)
508	140.1	H-40	15	7t Permafrost to Surface
339	81.1	J-55	125	22t Permafrost to Surface
244	53.6	J-55	475	28t To Surface
114	15.6	J-55	1820	43t To Surface casing

BOP Equipment: 1-Annular, 2 single gate; 21 mPa
Divertor to be installed on 339mm casing

Other Information: The permafrost casing (339mm) will be set in a competent formation at approximately 125m KB

Signed: [signature]
Date: DEC. 19/83

Title: Vice President, Resource Division
Company: NSM Resources Ltd.

APPROVAL

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

Signed: [signature]
Engineering Branch

Date: 23 Dec 83

File: 9211-N9-1-2

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

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 MIRROR LAKE O-33 Area: Northwest Territories

Grid Area: 65 - 00-126 - 45 Field/Pool: Exploratory

Permit or Lease No.: 3788 Final Coordinates: Lat. 64°52'46"N Long: 126°51'17"W

Drilling Unit: Bawden 1 Elevations-RT/KB: 285.2 m. SF/GL: 280 m.

Spud Date: 1800 84/03/06 Rig Released: 2000 84/04/07 Total Depth: 2026 MKB

CASING AND CEMENTING

O.D.:	Weight:	Grade:	Depth Set:	Cement and Additives:
339 mm	81.1	K-55	145.6MKB	22 T. Permafrost
244 mm	53.6	K-55	552.4MKB	31.5 T CL'G' + 2% GEL
114 mm	15.63	J-55	1603.6MKB	82.5T CL'G' + 5% C100 + .3%C102

PLUGGING PROGRAM

Approval of the following program was obtained by (person) W. G. Hegel from (person) J. Hamilton of the Canada Oil and Gas Lands Administration by means of Telecopier on April 06, 1984

Type of Plug:	Interval:	Felt:	Cement and Additives:
Bottom Cement	2026 - 1926MKB	No	7.5T CL'G' + .3% C102

114 mm casing ran and cemented-not drilled out.

Lost Circulation/Overpressure Zones: None

Equipment left on Seafloor (Describe): N/A

Provision for Re-entry (Describe and attach sketch): Casing Stub up for Wellhead

Cores Type: None Intervals:

Other Downhole Completion/Suspension Equipment: None

CERTIFICATION

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

Signed: [signature] P Eng

Name: W. G. Hegel

Title: Consulting Engineer

Date: 84/04/16

Acknowledged by: [signature] Engineering Branch

Date: 25 April 84

File:

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

Section I

Summary of Well Data

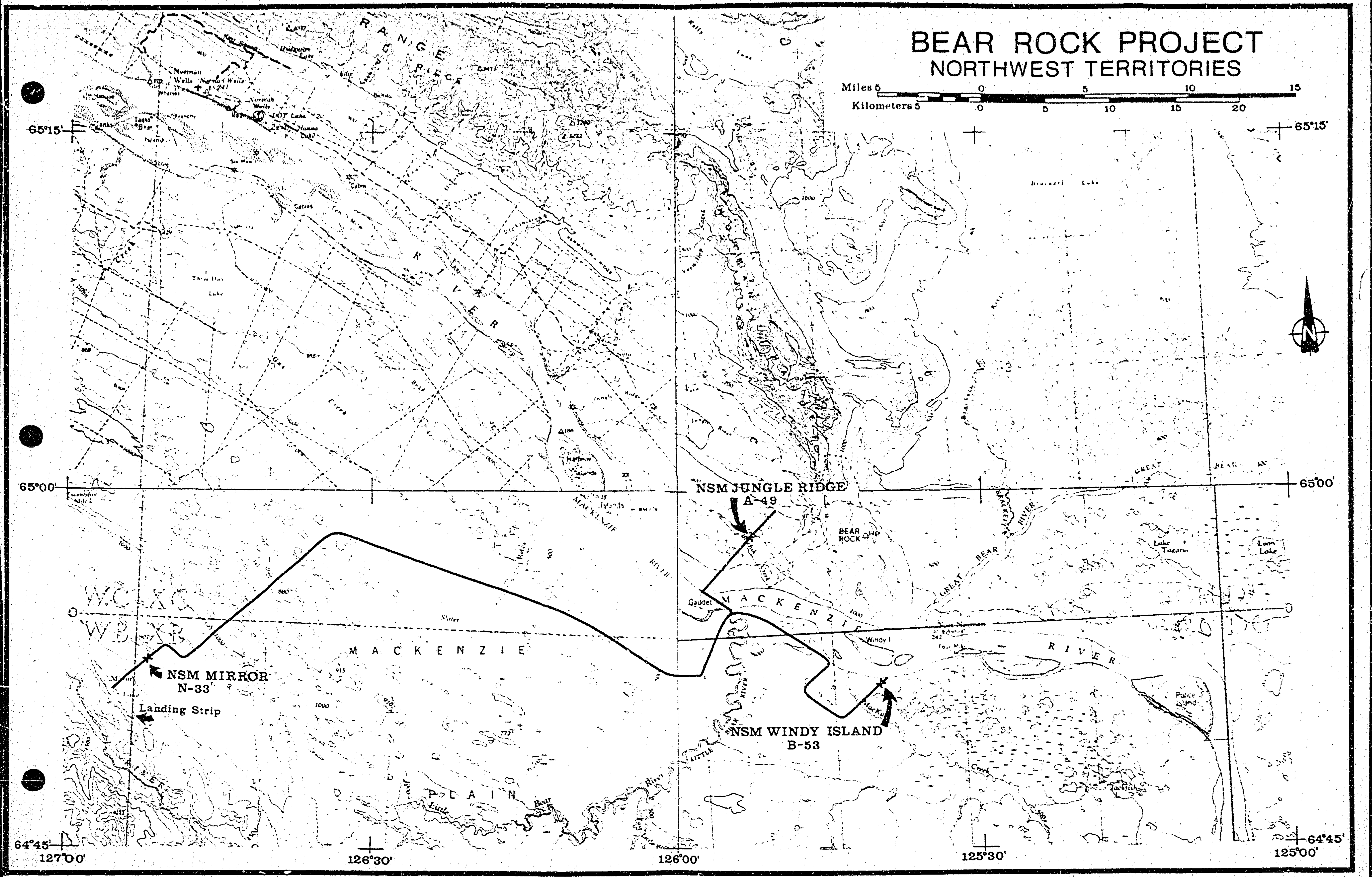
(a)	Well Name:	NSM MIRROR LAKE O-33
(b)	Permitee:	NSM Resources Ltd.
(c)	Operator:	NSM Resources Ltd. 300, 555 - 4th Avenue S.W. Calgary, Alberta T2P 3E7
(d)	Location:	O-33-65-00-126-45 64°52'46"N 126°51'17"W UWI 3000336500126450
(e)	Permit No.:	3788
(f)	Drilling Contractor:	Peter Bawden Drilling Rig No. 1 Emsco GB 500
(g)	Drilling Authority:	DA #1124 1983/12/23
(h)	Classification:	New Field Wildcat
(i)	Elevation:	Ground: 280.0 m. K.B. 285.2 m.
(j)	Spud Date:	1800 hrs. 1984/03/06
(k)	Completed Drilling Date:	0700 hrs. 1984/~~03~~04/02
(l)	Total Depth:	TD 2026 MKB PBTD 1603 MKB
(m)	Status:	Suspended Waiting on Completion
(n)	Rig Release:	2000 hrs. 1984/04/07
(o)	Casing and Hole Sizes:	Permafrost: 444 mm. w/ 340 mm. csg. Surface: 311 mm. w/ 244 mm. csg. Production: 222 mm. w/ 114 mm. csg.

WELL DATA SUMMARY

Well Name:	NSM MIRROR LAKE
Location:	O-33
Operator:	NSM RESOURCES LTD.
Province:	Northwest Territories
Status:	Wildcat
Elevations:	Ground Level: 280 m Kelly Bushing: 285.2 m
Spud Date:	March 6, 1984 @ 1800 hrs.
Drilling Contractor:	Peter Bawden Drilling Ltd., #1
Permafrost Protector Hole:	Drilled 444 mm hole, set 145.59 m of J-55, 83.5 Kg/m, ST&C, New, 340 mm, permafrost protector casing
Surface Hole:	Drilled 311 mm hole, set 552.89 m of J-55, 53.5 Kg/m, ST&C, New, 244.1 mm, surface casing
Production Casing:	135 joints, 114 mm, J-55, 15.63 Kg/m, ST&C, landed at 1600 m KB, cemented with 82.5 tonnes class G + .5% C100 + .3% C102
Logs Run:	Surface hole - Dual Induction Sonic Neutron-Density Main Hole - Dual-Sonic combination Neutron-Density VSP
Rig Manager:	Jack Clemens
Drilling Supervisor:	Bud Morrison
Geology Supervisor:	Brian Robart - Daymar Well Logging Ltd.

Section II: Operation and Engineering Summary

(a)	Daily Drilling Summary:	Attachment 1
(b)	Bit Record:	Attachment 2
(c)	Mud Record:	Attachment 3
(d)	Deviation Record:	Attachment 4
(e)	Casing Record:	Attachment 5
(f)	Drill Stem Test:	Attachment 6


BEAR ROCK PROJECT
NORTHWEST TERRITORIES
Miles 5 0 5 10 15
Kilometers 5 0 5 10 15 20
65°15'
65°15'
65°00'
65°00'
64°45'
64°45'
127°00'
126°30'
126°00'
125°30'
125°00'
RANGE
RIVER
MACKENZIE
PLAIN
NSM JUNGLE RIDGE
A-49
BEAR ROCK
GREAT BEAR RIVER
Lake Tazarui
Loon Lake
Gaudet
MACKENZIE
RIVER
Windy I
NSM MIRROR
N-33
Landing Strip
NSM WINDY ISLAND
B-53
Police Island

NEZ PERCE ENGINEERING & MANAGEMENT LTD.

DAILY DRILLING REPORT

WELL NAME & NO: NSM MIRROR LAKE O-33 DATE 84/04/07

OPERATION @ 08.00 HRS: Tear out DS/S: 32 FORMATION:

CONTRACTOR: Bawden #1 WEATHER: -17 ROADS:

DEPTH: 1603.6 m PROGRESS: m m/HR:

DEVIATION: m ° m ° m °

m ° m ° m °

m ° m ° m °

BIT NO	SIZE	TYPE	MAKE	SERIAL #	JETS	OUT	CUM M	CUM H	AVG /HR	WT	RPM	COND

LINER SIZE	STROKE LENGTH	SPM	PRESS	m^3/M	AV DP	AV DC	PRESS LOSS	PRESS LOSS JETS	LOSS JETS	JET VEL	TOTAL PR EXP	90 HHP AT BIT

MUD DATA: WT VIS W.L. F.C. pH CHLORINES

GEL PV YP SP SOLIDS

MUD ADDED: GEL CAUSTIC LIME $CaCl_2$ THINNERS

SAWDUST LCM OTHER

DRILL STRING: DC OD TD m WT

DC OD TD m WT

DP OD WT m GRADE JTS.

BHA:

TIME DIST. CODE:

1. Rig Up & Teardown 4	11. Logging	21. Fishing
2. Drilling	12. Rig to Run Csg ½	22. Control Drilling
3. Reaming	13. Run Casing 3½	23. Handling Tools
4. Coring	14. Circ Casing 2	24. WOO
5. Cond Mud & Circ 2 3/4	15. Cementing 2	25. Drill Out Cement
6. Trips 1¼	16. WOC	26. Leakoff Test
7. Rig Service	17. Nipple Up BOP	27. Plug #1 1
8. Rig Repair	18. Test BOP	28. Lay down 6½
9. Slip & Cut Line	19. DST	29. Set Steps ½
10. Survey	20. Squeeze Cement	30.

CORING: # FROM TO m REC m CUT m/HR

DAILY WATER COST ACCUMULATED COST

DAILY MUD COST ACCUMULATED COST

TOTAL DAILY COST 163,287 ACCUMULATED COST 2,081,772

DAILY DRILLING SUMMARY (Include Cementing) Ran in Circ, Ran plug #1 2026 - 1926 MKB, 7.5 T CL'G + .3% C102, L D. DP & DC. Rig up to run casing, ran 135 joints 114 mm., J-55, 15.63 kg/m. ST & C CSG, Circ 2 hrs. Cement with 82.5 T. CL'G + .5% C100 + .3% C102. Plug down at 0035 hrs. Steps set at 0055 hrs. ~~Cement~~ Complete tear out.

CSG SET @ 1603 m KB

REPORT FROM TAKEN BY

MOBILE RIG MOBILE

FUEL: 24,300 l.

PERSONNEL: Nsm 1, Rig 13, Camp 5, W/H 1, Park 1, Dutton 12, Hat 2, Clark 1, Sup. 2, Matco 1 = 39

Sent Apr. 10/84 Calgary Yellowknife ✓ Ottawa ✓

NEXFORCE ENGINEERING & MANAGEMENT LTD.

DAILY DRILLING REPORT

WELL NAME & NO: NSM MIRROR LAKE O-33 DATE: 84/04/08

OPERATION @ 08:00 HRS: Move out DS/S: FORMATION:

CONTRACTOR: Rawden 1 WEATHER: -10 ROADS:

DEPTH: m PROGRESS: m m/HR:

DEVIATION: m o m o m o m o m o m o

BIT NO.	SIZE	TYPE	MAKE	SERIAL #	JETS	OUT	CUM M	CUM H	AVG /HR	WT	RPM	COND

LINER SIZE	STROKE LENGTH	SPM	PRESS	m^3/M	AV DP	AV DC	PRESS LOSS	PRESS LOSS JETS	JET VEL	TOTAL JETS PR EXP	90 RHP AT BIT

MUD DATA: WT VIS W.L. F.C. pH CHLORINES

GEL PV YP SP SOLIDS

MUD ADDED: GEL CAUSTIC LIME $CaCl_2$ THINNERS

SAWDUST LCM OTHER

DRILL STRING: DC OD TD m WT

DC OD TD m WT

DP OD WT m GRADE JTS.

BHA:

TIME DIST. CODE.

1. Rig Up & Teardown	24	11. Logging		21. Fishing	
2. Drilling		12. Rig to Run Csg		22. Control Drilling	
3. Reaming		13. Run Casing		23. Handling Tools	
4. Coring		14. Circ. Casing		24. WOO	
5. Cond. Mud & Circ.		15. Cementing		25. Drill Out Cement	
6. Trips		16. WOC		26. Leakoff Test	
7. Rig Service		17. Nipple Up BOP		27.	
8. Rig Repair		18. Test BOP		28.	
9. Slip & Cut Line		19. DST		29	
10. Survey		20. Squeeze Cement		30.	

CORING: # FROM TO m REC m CUT m/HR

DAILY WATER COST ACCUMULATED COST

DAILY MUD COST ACCUMULATED COST

TOTAL DAILY COST 24,204 ACCUMULATED COST 2,106,174

DAILY DRILLING SUMMARY (Include Cementing)

Move out: Rig release at 2000 hours (84/04/07)

REPORT FROM TAKEN BY

MOBILE RIG MOBILE

Personnel: NSM 1, Rig 13, W/H 1, Park 1, Camp 4, Dutton 13, Hat 2, Matco 2 = 38

SENT Apr 12/84 COOLY KNIFE ✓ OTTAWA ✓

Attachment 1

NEZ PERCE ENGINEERING & MANAGEMENT LTD.

DAILY DRILLING PRECIS

DATE	DEPTH (M.)	PROGRESS	BREAKDOWN OF RIG TIME
March 06 84	62	62	Drill and Survey
07	146	84	Drill and Survey Ream 311 mm Hole from 90 m to 146 m
08	146		Run casing and cement
09	146		WOC and Nipple up BOP Hydraulics not working properly, repair
10	146		Quick Couplers
11	264	118	Pressure test, Drillout, leak off Test, Drill ahead.
12	434	170	Drilling, Tight hole, Trip NRS cause tight hole. Had to hydraulic string out of hole with Pump.
13	552	118	Drilling - Repaired compound chain
14	552		Ran caing, Cement, WOC change spool Press Rest and Drill out.
15	709	157	Drill out and Drill ahead
16	835	126	Drill, T.F.N.B., Drill, Trip for stabilization
17	978	143	Drill, Trip, Drill ahead.
18	1085	107	Drill, Trip, Drill ahead.
19	1197	112	Drill and Survey
20	1240	43	Drill, Trip, Drill ahead.
21	1293	53	Drill, TRip, Drill ahead.
22	1348	55	Trip F/Stabilization Laydown BS, Drill, Trip F/Bit
23	1415	67	Drill, Trip out to pick up Stabilization
24	1494	79	Hoist cracked Drill Collar Run in and Drill
25	1598	104	Drill ahead.
26	1659	61	Drill, Trip for Bit
27	1726	67	Drill ahead
28	1780	54	Drill and TRip for Bit
29	1820	40	Drill and Trip for Bit
30	1891	71	Drill ahead
31	1954	63	Drill ahead
Apri. 01	2012	58	Drill ahead
02	2012	58	Drill ahead
03	2026	TD	Drill toTD Circ 2 hrs. Hoist to Log. Bridge @ 921 m. Runin to clean Bridge, Hoist Run in w/Log Tool, Bridge @ 1975 m. Run in to Cond. Hole. Casing parted at 512m. Dropped 4m.
04	2026		Run in and found bridge at 1975m. Circulated out, cleaned out 32m. fill, Conditioned hole, Hoist Run Logs and start Velocity Survey

DATE	DEPTH	PROGRESS	BREAKDOWN OF RIG TIME
April 05	2026		Run Velocity Survey, Rig out Loggers. WOO Fly in inflates and make up DST #1
06	2026		RAn DST #1,2+3 were misruns, #1 packer failure, 2+3 were pump failure, lay down test tools Run in and circulate
07	1603.56		Run 135 jts. casing - circulate and cement
08	1603.56		Rig release 2000 hrs.

WRB - 1

WESTERN ROCK BIT COMPANY LIMITED

BIT RECORD

METRIC

NEW T1 T2 T3 T4 T5 T6 T7 T8 — Degree of Tooth Dullness

Page ..... Of

Province	Field		LSD	Section	Township	Range	(2) Operator		Elev.
NWT		Canada				W	NSM RESOURCES LTD.	KB	285.2

Mud Type: To ___ M ___ To ___ M ___ To ___ M ___

Location	(1) Contractor		Rig No.	Rig Make & Type	Tool Pusher
NSM MIRROR LAKE 0-33	Peter Bawden Drilling Ltd.		1		

Special Additives

	No.	O.D.	I.D.
DRILL COLLARS	1.		
	2.		

	Make	Size	Type	O.D.
TOOL JOINTS	1.			
	2.			

Year / Month / Day Time 00 00 to 24 00

Spudded ___/___/___
Set Surface ___/___/___
Under Surface ___/___/___
Under Inter. ___/___/___
Completion ___/___/___
Release ___/___/___

PUMPS: Type 1. Type 2.

Field Salesman

Stockpoint Stkpt. Code

Lost Circulation Depths

Key Seat Depths

Other Remarks - Reaming, Re-Drilling, Etc.

Lic. Formation:

Lic. Depth:

(1) (2) (3)			No	Size	Make	Type	Jets	Serial	Depth Out	Metre Drilled	Hours	Accum. Hours	Dull Cond T	B	G	No of DC	Force Wt on Bit da N	R P M	Vert. Dev.	Pump Pres.	No. 1 Spm	Liner	No. 2 Spm	Liner	Mud Density	Vis	Re Fo Ca
	9		1A	444	Smith	SDT	3/12	.9	90	90	19 1/2															
			1B	311	Smith	SDGH	3/12	.9	146	56	11 3/4															
			RR1A	444	Smith	SDT			146	56	9 1/4															
			RR1B	311	Smith	SDGH	3/7	.9	379	233	17 1/4	12														
			2B	311	Smith	FDT	3/12	.7	552	173	19 3/4															
			1C	222	Smith	SDGH	3/7	.9	713	161	19 1/2	4	2	1/8												
			2C	222	Smith	SDGH	3/7	.9	950	237	26 3/4	6	6	1/4												
			3C	222	Smith	SDGH	3/7	.9	1050	100	19 1/2	7	6	1/2												
			4C	222	Smith	F-3	3/7	.9	1197	147	26 1/2	1	2	I												
			5C	222	Smith	V2HJ	2/7	.9, 1/8.4	1240	43	16	2	3	I												
			6C	222	Smith	V2HJ	2/7	.9, 1/8.4	1293	53	18 3/4	6	8	I												
			RR7C	222	Smith	F-3	2/7	.9, 1/8.7	1344	51	13	1	2	I												
			8C	222	HW	JD4	2/7	.9, 1/8.7	1393	49	14 3/4	5	2	I												
			RR9C	222	Smith	F-3	2/7	.9, 1/8.4	1460	67	14	1	2	I												
			10C	222	Smith	F-4	2/7	.9, 1/8.7	1614	154	35 3/4	8	3	I												
			RR11C	222	Smith	F-5	2/7	.9, 1/8.7	1739	125	40 3/4	8	4	I												
			12C	222	Smith	F-5	2/7	.9, 1/8.7	1815	76	30 3/4	8	3	I												
			13C	222	Smith	F-5	2/7	.9, 1/8.7																		

R.R. - Rerun Rep. - Repaired Reg. Regreased

Attachment 2

NEZ PERCE ENGINEERING & MANAGEMENT LTD.

BIT RECORD

WELL NAME & LOCATION: NSM MIRROR LAKE O-33

BIT NO	SIZE	MAKE	TYPE	OUT	METERS	HRS	AVG DRLG RATE	JET SIZES	WT	RPM	COND.
1 A	444	SM	SDT	90	90	19½	4.6	12.7	4/5	130	
1 B	311	SM	SDGH	146	56	11 3/4	4.7	12.7	2/3	175	
1 A-RR	444	SM	SDT	146	Ream 56	9 ¼	6	12.7	7	150	
1 B-RR	311	SM	SDGH	379	233	17 ¼	13.5	3/7.9	10-14	130	
3 A	311	SM	FDT	552	173	19.75	8.7	3/12/7	12/10	130	
1	222	SM	SDGH	713	161	19.5	8.2	3/7.9	8/10	80/110	
2	222	SM	SDGH	950	237	26.75	8.8	3/7.9	10	110	
3	222	SM	SDGH	1050	100	19.5	5.12	3/7.9	14	100	
4	222	SM	F3	1197	147	26.5	5.5	3/7.9	16/19	85/110	
5	222	SM	V2HJ	1240	43	16	2.7	2/7.9	14	120	
6	222	SM	V2HJ	1293	53	17.75	2.98	2/7.9			
								18.7	14/18	120	
7/4CRR	222	SM	F3	1344	51	13	3.9	2/7.9			
								18.7	10/14	120	
8	222	HW	JD4	1393	49	14.75	3.3	2/7.9			
								18.4	16	120	
9/4 CRR	222	SM	F3	1460	67	14	4.7	2/7.9			
								18.7	14	100	
10	222	SM	F4	1614	154	35.75	4.3	2/7.9			
								18.4	18	80	
11	222	SM	F5	1739	125	40.75	3.0	2/7.9			
								1/8.4	18	65	
12	222	SM	F5	1815	76	30.75	2.47	2/7.9			
								1/8.4	18,	60	
13	222	SM	F57	2026	211	79	2.6	2/7.9			
								1/8.7	18	60	231

NEZ PERCE ENGINEERING & MANAGEMENT LTD.

Attachment 3

MUD REPORT

DATE	DEPTH	WT	VIS	WL	GEL	CAUSTIC	LIME	SAWDUST	LCM	FLUID LOSS ADDITIVE	THINNER		OTHER		
									CLC	IRISPAC	HELITEX	STAFLO	LI CARB	SODA ASH	KELZAN
March 06 '84	62	1070	38		54	02									
07	146	1140	51		59	03									
08	146	115	50		40	01									
09	WOC														
10	184	1010	29		39	03									
11	253	1060	35	17	66	01								1	
12	411	1150	40	10	106	01		5						5	2
13	544	1160	50	8	Log, and run casing			5							
14	552	WOC													
15	660	1190	34		71	1		5					15	3	
16	709	1090	35	14	70									1	
17	826	1100	36	13	36			4						1	
18	975	1110	34	11	31	5									
19	1083	1090	34	13	68	4								1	
20	1197	1120	38	10	0	9					9		31		
21	1260	1100	35	22	11	6					3	2	15		
22	1293	1100	32	18	33	2		3		1				1	
23	1344	1095	32	16	33	6									
24	1410	1115	35	17.5	74	5				1			13	1	
25	1489	1130	37	16	23	4				2				1	
26	1595	1130	36	16	33	5				1	2		10		
27	1655	1120	38	14.5	12	6				2	2		40		
28	1722	1100	37	16	32	3				2	2			1	
29	1776	1095	40	14.8	40	2			4					2	
30	1818	1095	45	12	42	4			2		1			2	
31	1885	1095	45	12	20	3			4		1			2	
April 01 '84	1954	1110	54	12	12	3								1	
02	2009	1110	56	14					2		2				
03	2026	1110	54	12.5											
04	2026	1100	45	14.0											
					1005	79		17	12	9	22	2	15	114	20

NEZ PERCE ENGINEERING & MANAGEMENT LTD.

SURVEYS

DEPTH	DEGREES	DEPTH	DEGREES	DEPTH	DEGREES
33	3/4	435	3	962	3/4
51	1	454	3¼	991	¼
75	2 1/8	473	2 7/8	1020	0
84	3 1/8	450	3	1050	½
98	2 3/4	508	3	1069	½
104	2 ¼	527	4	1098	¼
113	3	550	4	1127	1¼
124	2	574	4	1146	1½
132	2	593	4	1175	1 3/4
146	MISRUN	613	3 3/4	1196	3
164	1 ½	640	3¼	1215	3
184	2	640	4	1234	3
202	1¼	690	4¼	1254	3
221	1½	738	4¼	1270	3
240	1½	767	4½	1293	3¼
264	1½	788	4	1310	3 7/8
283	1½	807	4	1319	4
311	2	827	4	1329	4¼
340	1 3/4	855	3	1339	4½
370	3	884	2	1348	4½
392	2 7/8	913	1½	1357	4
411	2 3/4	943	1	1376	3

NEZ PERCE ENGINEERING & MANAGEMENT LTD.

SURVEYS

DEPTH	DEGREES
1385	2
1397	1 3/4
1416	1 ¼
1436	1
1455	7/8
1476	½
1495	3/8
1513	½
1543	3/4
1502	½
1621	½
1649	½
1687	3/4
1726	3/4
1754	3/4
1795	3/4
1843	3/4
1911	1
1979	1 1/8
20206	2

NSM MIRROR LAKE O-33

FORMATION TOPS

Formation	Sample	Log	Subsea
Sans Sault	36	30	+ 255.2
Imperial Shale	527	527	- 241.8
Canyon Creek	564	562	- 276.8
Canol	836	825	- 539.8
Hare Indian	856	873	- 587.8
Hume	1045.6	1046	- 760.8
Bear Rock	1203	1172	- 886.8
Bear Rock Dolomite	-	1202	- 916.8
Lone Mountain	1477	1479	-1193.8
Mount Kindle	1556	-	-
Franklin Mountain	-	-	-
TD	-	2026	-1740.8

DEVIATION SURVEYS

33 m	3/4°
51 m	1°
75 m	2 1/8°
84 m	3 1/8°
98 m	2 3/4°
104 m	2 1/4°
106 m	3 1/8°
113 m	3°
116 m	3°
125 m	2°
146 m	1 3/4°
164 m	1 1/2°
184 m	2°
202 m	1 1/4°
221 m	1 1/2°
240 m	1 1/2°
264 m	1 1/2°
283 m	1 1/2°
311 m	2°
375 m	3°
392 m	2 7/8°
411 m	2 3/4°
434 m	3°
454 m	3 1/4°
473 m	2 7/8°
490 m	3°
508 m	3°
527 m	4°
552 m	4°
574 m	4°
593 m	4°
613 m	3 3/4°

Deviation Surveys

642 m	3 1/4°
670 m	4°
690 m	4 1/4°
709 m	4 1/4°
738 m	4 1/4°
767 m	4 1/2°
788 m	4°
807 m	4°
826 m	4°
855 m	3°
884 m	2°
913 m	1 1/2°
943 m	1°
962 m	3/4°
991 m	1/4°
1020 m	0°
1050 m	1/2°
1069 m	2/3°
1098 m	1/4°
1127 m	1 1/4°
1147 m	1 1/2°
1156 m	1 7/8°
1175 m	2 3/4°
1196 m	3 1/4°
1215 m	3°
1234 m	3°
1254 m	3°
1269 m	3°
1293 m	3 1/4°
1310 m	3 7/8°
1319 m	4°
1329 m	4 1/4°

Deviation Surveys

1339 m	4 1/2°
1348 m	4 1/2°
1357 m	4°
1376 m	3°
1386 m	2°
1397 m	1 3/4°
1416 m	1 1/4°
1436 m	1°
1455 m	7/8°
1476 m	1/2°
1495 m	3/8°
1513 m	1/2°
1543 m	3/4°
1562 m	1/2°
1592 m	1/2°
1621 m	1/2°
1649 m	1/2°
1687 m	3/4°
1726 m	3/4°
1754 m	3/4°
1795 m	3/4°
1843 m	3/4°
1911 m	1°
1979 m	1 1/8°
2026 m	2°

Attachment 5

CASING RECORD

A. Permafrost: Ran 12 jts. 340mm., 81.1 kg/m., LT & C J-55

Casing: Total Length	146.03 m.
Float Shoe	0.56 m.
Landed at	146.00 MKB

Centralizers on first, second and fifth joints
Cemented to surface with 22 T. Permafrost
Cement plus 0.5% retarder

B. Surface: Ran 62 jts. 244 mm., 53.5 kg/m., ST&C, J-55

Casing:	Total Length	553.39 m.
	Float Collar	0.56 m.
	Guide Shoe	0.30 m.
	Landed at	553MKB

Centralizers on first, second and fifth joints
Cemented to surface with 31.5 T. CL'G plus 2% $CaCL_2$

C. Production: Ran 135 jts. 114 mm., 15.63kg/m., LT&C, J-55

Casing:	Total Length	1604.14m.
	Float Collar	0.43m.
	Guide Shoe	0.23m.
	Landed at	1603.8MKB

Centralizers on first, second and fourth joints plus interval from 1150 to 1250 MKB. Scratchers from 1150 to 1250 MKB.
Cemented with 82T CL'G' + .5% C100

Attachment 6

DRILL STEM TESTS

Attempted four DST's. Unable to obtain seats on any.

DST #1	1193 - 1220 MKB
DST #2	1182 - 1215 MKB
DST #3	1182 - 1215 MKB
DST #4	1185 - 1218 MKB

DST reports attached.

NORTHSTAR DRILLSTEM TESTERS LTD.

COMPANY N S M Resources Ltd.
WELL NAME NSM Mirror Lake
WELL LOCATION D-33
INTERVAL 1193-1220 T.D. 2026 m

K.B ELV. 285.2 m
GR ELV. 280.0 m
NET PAY _ m

DATE 84/04/05
TICKET # 1145 DST.# One
FORMATION _
TYPE of TEST Straddle

WELL NAME: NSM Mirror Lake D-33
TICKET No.: 1145
D.S.T. No.: One

RECORDER DATA

ALL MEASUREMENTS ARE 'SI'

PF	00	REC.#	10988	2230	10963	
SI	00	RANGE	27579	36542	41024	
SF	00	CLOCK	24	24	24	
FS	00	DEPTH	1184.20	1193.86	1193.86	
			kPa	kPa	kPa	kPa
A. Init. Hyd.			13043	13153	13153	
B. First Flow			-	-	-	
B1.Final Flow			-	-	-	
C. In Shut-in			-	-	-	
D. Init. Flow			-	-	-	
E. Final Flow			-	-	-	
F. Fi Shut-in			-	-	-	
G. Final Hyd.			-	-	-	
Inside/Outside			Inside	Outside	Outside	

HOLE and TEST DESCRIPTION

T STARTED 05:00
T ON BTM 09:00
T OPEN 00:00
T PACKED 00:00
T OUT 14:00
TOOL WT. _
WT SET ON PACKER _
WT PULLED LOOSE _
INITIAL STR WT 32 000
UNSEATED STR WT _

Hr. BTM.CHOKE 19.05
Hr. HOLE SIZE 222
Hr. D.COLL I.D. _
Hr. D.PIPE I.D. _
Hr. D.C.LENG _
daN D.P.LENG _

MUD DATA

mm MUD TYPE Gel Chem
mm WEIGHT 1105 kg/m^3
mm VIS 50 S/L
mm W.L. 12.5 cm^3
m F.C. 9.5 mm
m MUD DROP No m
daN AMT.OF FILL Nil m
daN BTM.H.TEMP _ C'
daN POROSITY % _
daN HOLE COND Good

RECOVERY

TOTAL FLUID _ m of _ m in D.C. and _ m in D.P.
_ m of _
_ m of _
_ m of _
_ m of _

GAS RECOVERY MEASURED WITH _

TIME	ORIFICE	PRESSURE	H^2O	RATE
mins.	mm	kPa	mm	m^3/d
_				

REMARKS:

Tried packers twice - did not pump up.
Moved down 1 meter - moved up 1 meter - moved down 2 meters.
Tried moving interval to 1188-1215.
Pulled out of hole - blown top packer.

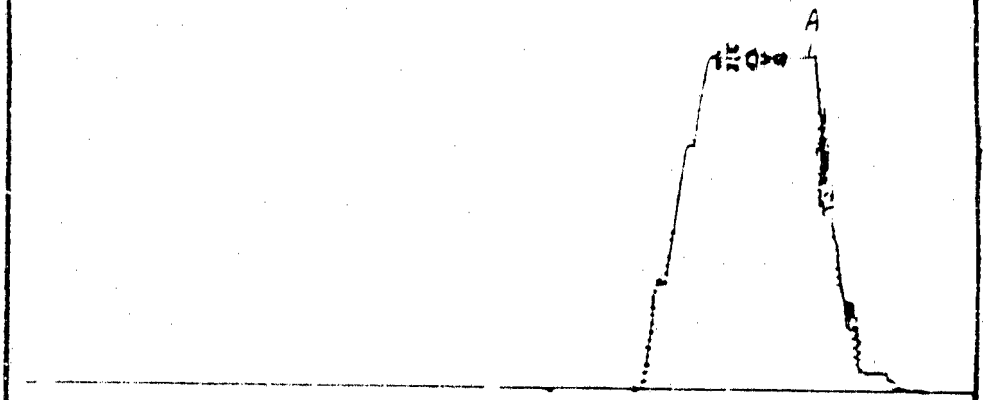
TEST MISRUN

INFLATE	
Reversing Sub	.30
XO Sub	.30
Drill Collars	-
R.T.V.	2.02
Downhole Sampler	-
Reciprocating Joint	1.77
REC. # 10988	1.47
Jars	1.67
Clutch	-
Safety Joint	1.04
Pump	1.50
Screen	1.34
ABOVE INTERVAL 13.19	-
PACKER	1.78
Depth m 1193.00	-
Perfs	.86
REC. # 2230	&
REC. # 10963	1.46
Spacing	5.79
XO Sub	.30
Drill Collar	17.85
XO Sub	.30
Stub	.42
Depth m 1219.98	-
TOTAL INTERVAL	26.98
Packer	1.86
Drasspring	1.14
Total Test Tool	25.32
Customer Rep.	-
Tester G. MacKay	/S12

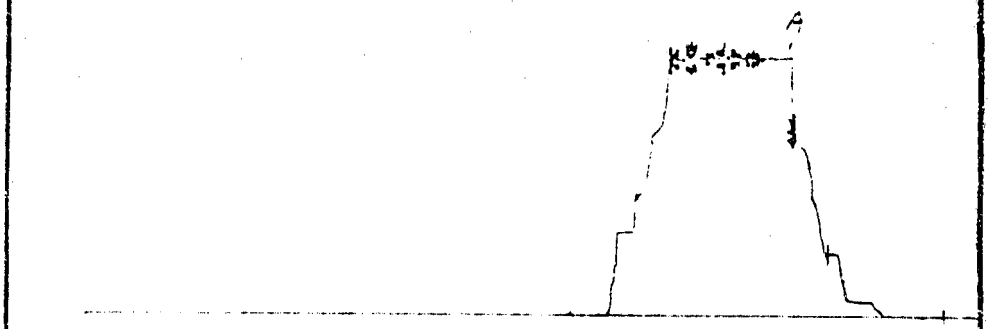
NORTHSTAR DRILLSTEM TESTERS LTD.

NSM Mirror Lake D-33 T.# 1145 DST.# One

Rec.# 10988



Rec.# 2230



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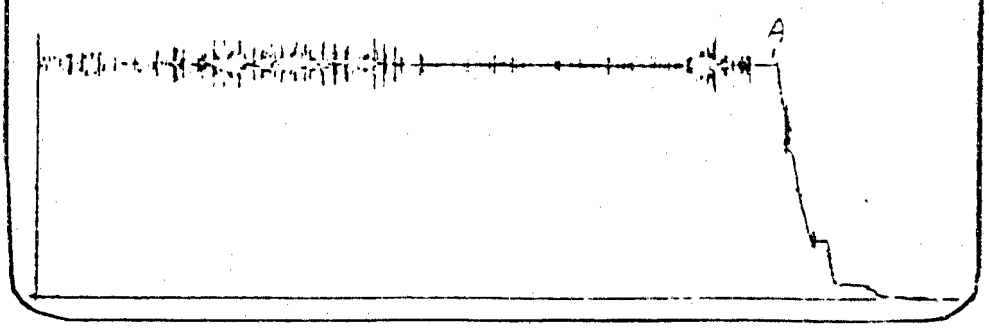


NORTHSTAR DRILLSTEM TESTERS LTD.

COMPANY N S M Resources Ltd.
WELL NAME NSM Mirror Lake
WELL LOCATION D-33
INTERVAL 1182-1215 T.D. 2026 m

KB ELV. 285.20 m
GR ELV. 280.00 m
NET PAY - m

DATE 84/04/05
TICKET # 1146 DST.# Two
FORMATION -
TYPE of TEST Straddle

WELL NAME: NSM Mirror Lake D-33
TICKET No. 1146
DST. No. Two

RECORDER DATA

ALL MEASUREMENTS ARE 'SI'

PF	OO	REC.#	10988	2230	10963	
SI	OO	RANGE	27579	36542	41024	
SF	OO	CLOCK	24	24	24	
FS	OO	DEPTH	1173.20	1182.86	1182.86	
			kPa	kPa	kPa	kPa
A. Init. Hyd.			12992	3097	13092	
B. First Flow			-	-	-	
B1.Final Flow			-	-	-	
C. In Shut-in			-	-	-	
D. Init. Flow			-	-	-	
E. Final Flow			-	-	-	
F. Fi Shut-in			-	-	-	
G. Final Hyd.			-	-	-	
Inside/Outside			Inside	Outside	Outside	

HOLE and TEST DESCRIPTION

T STARTED	00:00	Hr. BTM.CHOKE	19.05 mm
T ON BTM	17:30	Hr. HOLE SIZE	222 mm
T [illegible]	00:00	Hr. D.COLL I.D.	- mm
T PULLED	00:00	Hr. D.PIPE I.D.	- mm
T OUT	00:00	Hr. D.C.LENG	- m
TOOL WT.	6 000	daN D.P.LENG	- m
WT SET ON PACKER	-		
WT PULLED LOOSE	-		
INITIAL STR WT	32 000		
UNSEATED STR WT	-		

MUD DATA

MUD TYPE	Gel Chem	
WEIGHT	1105	kg/m^3
VIS	48	S/L
W.L.	13.5	cm^3
F.C.	2.0	mm
MUD DROP	No	m
daN AMT.OF FILL	Nil	m
daN BTM.H.TEMP	-	C°
daN POROSITY %	-	
daN HOLE COND	Good	

RECOVERY

TOTAL FLUID - m of - m in D.C. and - m in D.P.

- m of -
- m of -
- m of -
- m of -

GAS RECOVERY MEASURED WITH -

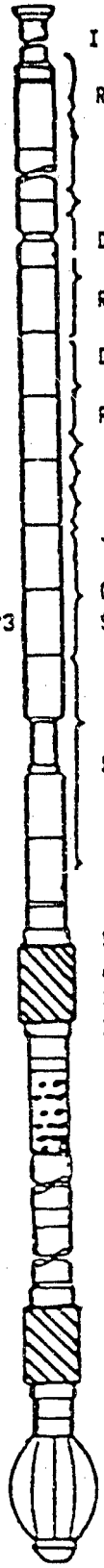
TIME	ORIFICE	PRESSURE	H^2O	RATE
mins.	mm	kPa	mm	m^3/d
-				

REMARKS:

Packers failed to pump up - tried twice.

Run in to 1477-1510 meters and tried. Reset.

TEST MISRUN

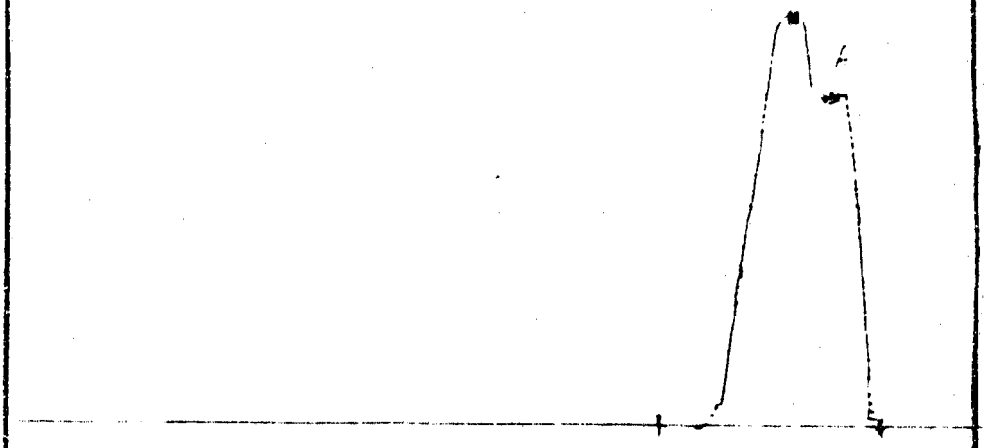


INFLATE	
Reversing Sub	.30
XO Sub	.30
Drill Collars	-
R.T.V.	2.02
Downhole Sampler	-
Reciprocating Joint	1.77
REC. # 10988	1.47
Jars	1.67
Clutch	-
Safety Joint	1.04
Pump	1.50
Screen	1.34
ABOVE INTERVAL	13.19
PACKER	[illegible]
Depth m 1182.0	-
Perfs	[illegible]
REC. # 2230	[illegible]
REC. # 10963	[illegible]
Spacing	[illegible]
XO Sub	[illegible]
Drill Collar	26.83
XO Sub	.30
Stub	.42
Depth m 1215.21	-
Total Interval	33.21
Packer	1.86
Drasspring	1.14
Total Test Tool	22.57
Customer Rep.	-
Tester G. MacKay	/S12

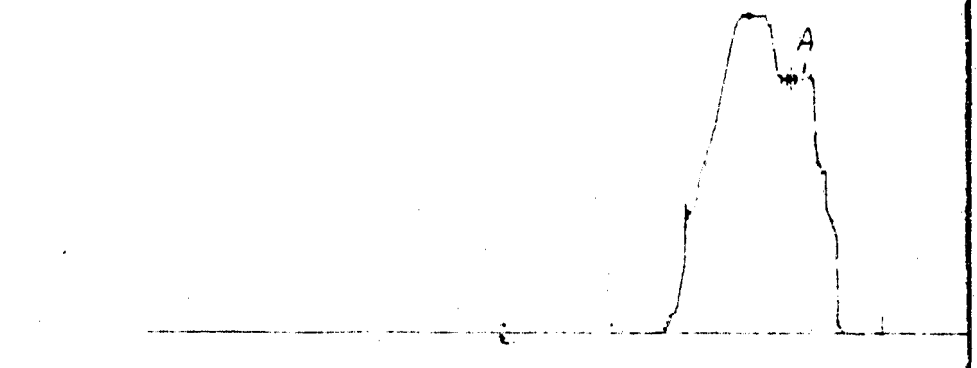
NORTHSTAR DRILLSTEM TESTERS LTD.

NSM Mirror Lake D-33 T.# 1146 DST.# Two

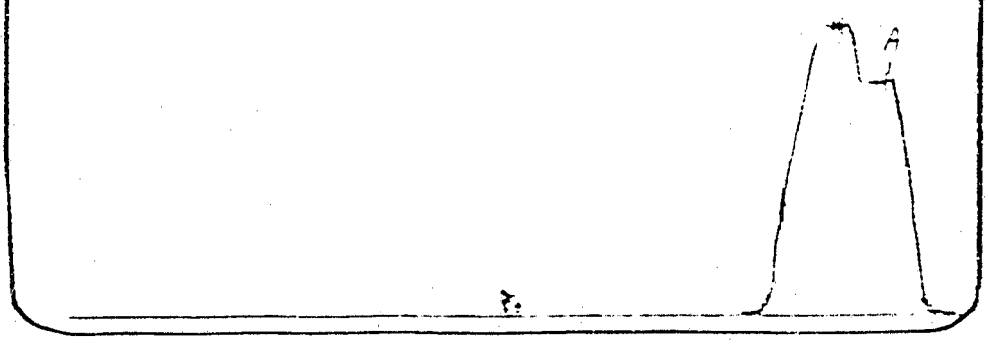
Rec.# 10988



Rec.# 2230



Rec.# 10963



NORTHSTAR DRILLSTEM TESTERS LTD.

COMPANY N S M Resources Ltd.
WELL NAME NSM Mirror Lake
WELL LOCATION D-33
INTERVAL 1182-1215 T.D. 2026 m

KB ELV. 285.20 m
GR ELV. 280.00 m
NET PAY - m

DATE 84/04/05
TICKET # 1146 DST.# Three
FORMATION -
TYPE of TEST Straddle

WELL NAME: NSM Mirror Lake D-33
TICKET No.: 1146
D.S.T. No.: Three

ALL MEASUREMENTS ARE 'SI'

RECORDER DATA

PF	00	REC.#	10988	2230	10963	
SI	00	RANGE	27579	36542	41024	
SF	00	CLOCK	24	24	24	
FS	00	DEPTH	1173.20	1182.86	1182.86	
			kPa	kPa	kPa	kPa
A. Init. Hyd.			16104	16214	16217	
B. First Flow			-	-	-	
B1.Final Flow			-	-	-	
C. In Shut-in			-	-	-	
D. Init. Flow			-	-	-	
E. Final Flow			-	-	-	
F. Fi Shut-in			-	-	-	
G. Final Hyd.			-	-	-	
Inside/Outside			Inside	Outside	Outside	

HOLE and TEST DESCRIPTION

T STARTED	00:00	Hr. BTM.CHOKE	19.05	mm	
T ON BTM	00:00	Hr. HOLE SIZE	222	mm	
T OFF	00:00	Hr. D.COLL I.D.	-	mm	
T PULLED	00:00	Hr. D.PIPE I.D.	-	mm	
T OUT	00:00	Hr. D.C.LENG	-	m	
TOOL WT.	6 000	daN D.P.LENG	-	m	
WT SET ON PACKER	-				
WT PULLED LOOSE	-				
INITIAL STR WT	32 000				
UNSEATED STR WT	-				

MUD DATA

mm	MUD TYPE	Gel Chem	
mm	WEIGHT	1105	kg/m^3
mm	VIS	48	S/L
mm	W.L.	13.5	cm^3
m	F.C.	2.0	%
m	MUD DROP	No	m
daN	AMT.OF FILL	Nil	m
daN	BTM.H.TEMP	-	C°
daN	POROSITY %	-	
daN	HOLE COND	Good	

RECOVERY

TOTAL FLUID - m of - m in D.C. and - m in D.P.
- m of -
- m of -
- m of -
- m of -

GAS RECOVERY MEASURED WITH -

TIME	ORIFICE	PRESSURE	H^2O	RATE
mins.	mm	kPa	mm	m^3/d
-				

REMARKS:

Packers failed to pump up.

TEST MISRUN

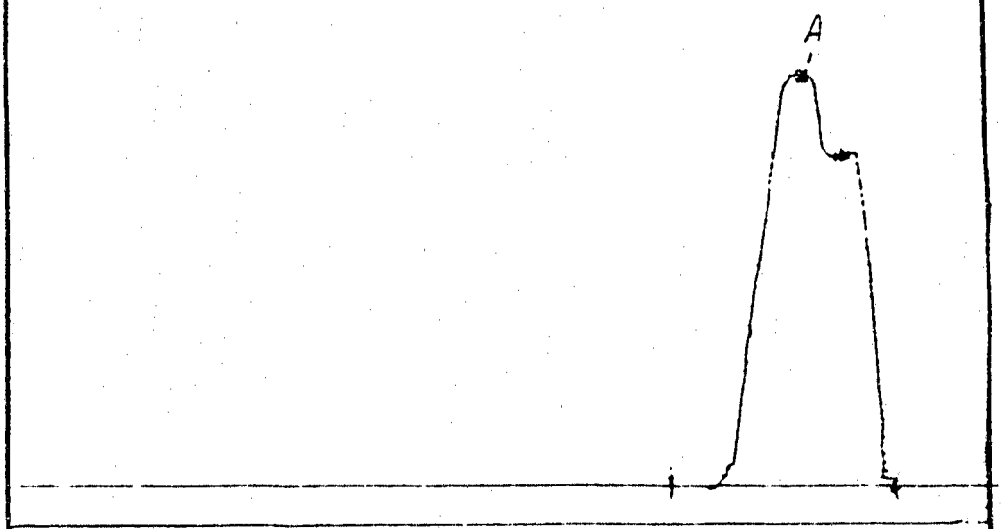
.rts with DST #2

INFLATE	
Reversing Sub	.30
XO Sub	.30
Drill Collars	-
R.T.V.	2.02
Downhole Sampler	-
Reciprocating Joint	1.77
REC. # 10988	1.47
Jars	1.67
Clutch	-
Safety Joint	1.04
Pump	1.50
Screen	1.34
ABOVE INTERVAL 13.19	-
PACKER	1.78
Depth m 1182.00	-
Perfs	.66
REC. # 2230	&
REC. # 10963	1.46
Spacing	3.04
XO Sub	.30
Drill Collar	26.83
XO Sub	.30
Stub	.42
Depth m 1215.21	-
TOTAL INTERVAL	33.21
Packer	1.86
Drasspring	1.14
Total Test Tool	22.57
Customer Rep.	-
Tester G. MacKay	/S12

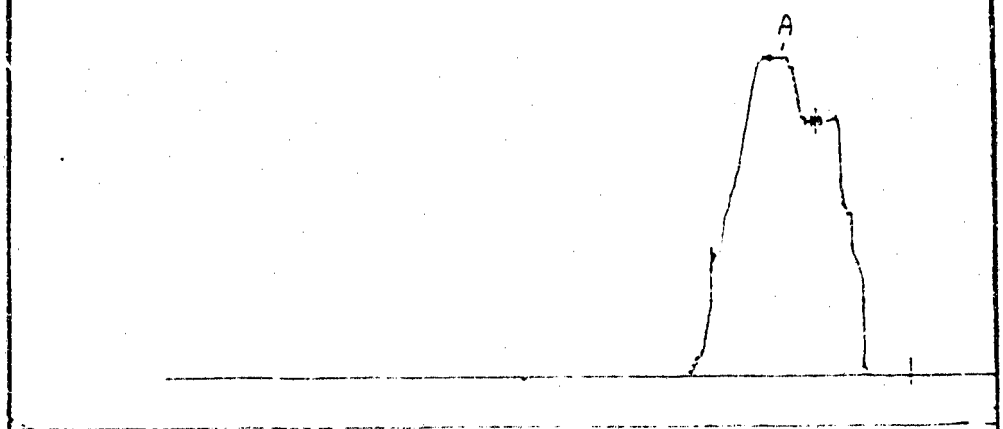
NORTHSTAR DRILLSTEM TESTERS LTD.

NSM Mirror Lake D-33 T.# 1146 DST.# Three

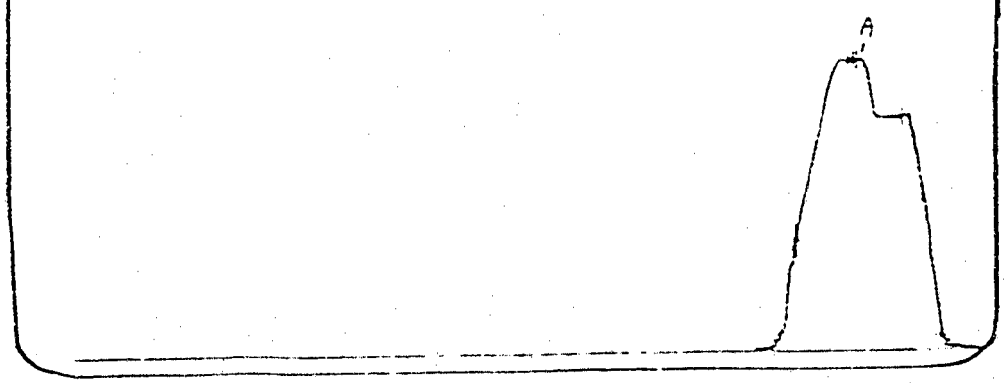
Rec.# 10988



Rec.# 2230



Rec.# 10963



NORTHSTAR DRILLSTEM TESTERS LTD.

COMPANY N S M Resources Limited
WELL NAME NSM Mirror Lake
WELL LOCATION D-33
INTERVAL 1185-1218 T.D. 2026 m

KB ELV. 285.2 m
GR ELV. 280.0 m
NET PAY – m

DATE 84/04/06
TICKET # 1147 DST.# Four
FORMATION –
TYPE of TEST Straddle

WELL NAME: NSM Mirror Lake D-33

RECORDER DATA

ALL MEASUREMENTS ARE 'SI'

PF	00	REC.#	10988	2230	10963	
SI	00	RANGE	27579	36542	41024	
SF	00	CLOCK	24	24	24	
FS	00	DEPTH	1176.20	1185.86	1185.86	
			kPa	kPa	kPa	kPa
A. Init. Hyd.			12992	13097	13092	
B. First Flow			–	–	–	
B1.Final Flow			–	–	–	
C. In Shut-in			–	–	–	
D. Init. Flow			–	–	–	
E. Final Flow			–	–	–	
F. Fi Shut-in			–	–	–	
G. Final Hyd.			–	–	–	
Inside/Outside			Inside	Outside	Outside	

HOLE and TEST DESCRIPTION

T STARTED	22:30	Hr. BTM.CHOKE	19.05
T ON BTM	00:00	Hr. HOLE SIZE	222
T O[illegible]	00:00	Hr. D.COLL I.D.	–
T PULLED	00:00	Hr. D.PIPE I.D.	–
T OUT	03:00	Hr. D.C.LENG	–
TOOL WT.	–	daN D.P.LENG	–
WT SET ON PACKER	–		
WT PULLED LOOSE	–		
INITIAL STR WT	32 000		
UNSEATED STR WT	32 000		

MUD DATA

MUD TYPE	Gel Chem	
WEIGHT	1105	kg/m^3
VIS	48	S/L
W.L.	13.5	cm^3
F.C.	2.0	mm
MUD DROP	No	
AMT.OF FILL	Nil	
BTM.H.TEMP	–	C°
POROSITY %	–	
HOLE COND	Good	

RECOVERY

TOTAL FLUID – m of – m in D.C. and – m in D.P.

– m of –
– m of –
– m of –
– m of –

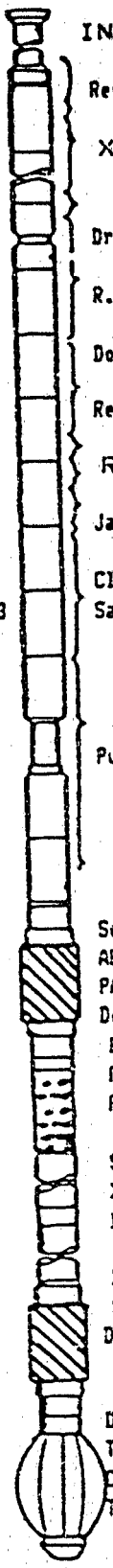
GAS RECOVERY MEASURED WITH –

TIME	ORIFICE	PRESSURE	H^2O	RATE
mins.	mm	kPa	mm	m^3/d
–				

REMARKS:

Packers failed to pump up.

TEST MISRUN



INFLATE	
Reversing Sub	.30
XO Sub	.30
Drill Collars	–
R.T.V.	2.02
Downhole Sampler	–
Reciprocating Joint	1.77
REC. # 10988	1.47
Jars	1.67
Clutch	–
Safety Joint	1.04
Pump	1.50
Screen	1.34
ABOVE INTERVAL 13.19	–
PACKER	1.78
Depth m 1185.00	–
Perfs	.86
REC. # 2230	&
REC. # 10963	1.46
Spacing	3.04
XO Sub	.30
Drill Collar	26.83
XO Sub	.30
Stub	.42
Depth m 1218.21	–
TOTAL INTERVAL	33.21
Packer	1.86
Drasspring	1.14
Total Test Tool 22.57	–
Customer Rep.	–
Tester G. MacKay	/S12

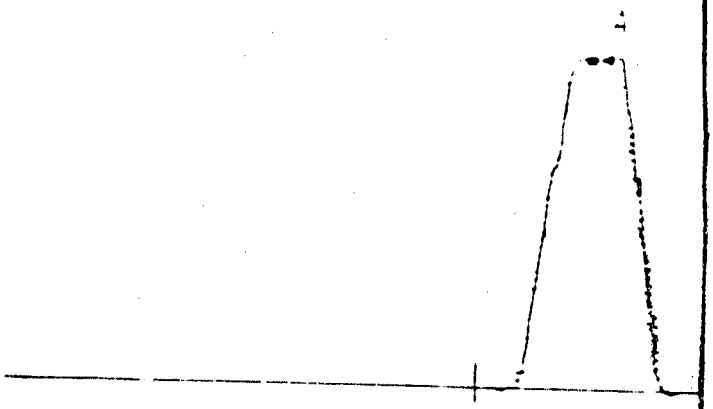
TICKET No. 1147

D.S.T. No. Four

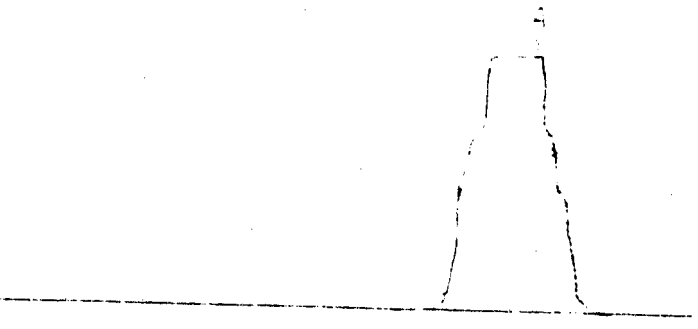
NORTHSTAR DRILLSTEM TESTERS LTD.

NSM Mirror Lake D-33 T.# 1147 DST.# Four

Rec.# 10988



Rec.# 2230



Rec.# 10963

Section III

GEOLOGICAL SUMMARY

(a) Formation Tops: Attachment 7

(b) Cores: None Taken

(c) Mud Log/Sample Description
Attachment 8

(d) Electric Logs Attachment 9

Logs Ran:
- CNL/CNS TD to 146 MKB
- BCS TD to 146 MKB
- DIL TD to 146 MKB

Attachment 7

GEOLOGIC TOPS
NOM MIRROR LAKE O-33
N.W.T.

K.B.=385.2

FORMATION	AGE	DRILLDEPTH	SUBSEA
SPUD	CRETACEOUS?		385.2
SANS SAULT	CRETACEOUS	30	355.2
IMPERIAL SHALE	DEVONIAN	527	-141.8
CANYON CREEK		562	-176.8
CANOL		825	-439.8
HARE INDIAN		873	-487.8
HUME		1046	-660.8
BEAR ROCK		1172	-786.8
BEAR ROCK DOLOMITE		1202	-816.8
RONNING-LONE MT.	SILURO-ORDOVICIAN	1479	-1093.8
TOTAL DEPTH		2026	-1740.8

DRILL STEM TESTS

DST #1

BEAR ROCK 1193 - 1220 m

Packer failure
Misrun

DST #2

BEAR ROCK 1182 - 1215 m

Packer Failure
Misrun

DST #3

LONE MOUNTAIN 1477 - 1510 m

Pump Failure
Misrun

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NSM MIRROR LAKE O-33

TABLE OF CONTENTS

GEOLOGICAL REPORT

on

NSM MIRROR LAKE

O-33

Northwest Territories, Canada

for

NSM RESOURCES LTD.

TABLE OF CONTENTS

March 1984

Brian Robart
Geological Technician

LITHOLOGY AND FORMATION EVALUATION

IMPERIAL

The Imperial formation consists of dark gray shales with calcareous, arenaceous sections. The formation probably includes that section called the Sans Sault in this well. This section consists of dark gray shales with sideritic sands and silts throughout. There are occasional red, arkosic sands. One of the more interesting sections of the well is a sandstone occurring at approximately 60 m. It appears to be a Lower Cretaceous sand, very fine to coarse grained, friable, with occasional clays in the pore spaces. There is excellent show, with stain, light yellow fluorescence, and a good streaming white cut.

Near the base of the formation there is the Canyon Member. It consists of silts and very fine grained sandstones, calcareous in nature, with little or no porosity, but there is evidence of hydrocarbons.

Conclusion: The Imperial formation, itself, has no hydrocarbon reservoir potential. The sand above at 60 m should be evaluated very carefully as it appears to have porosity, permeability and evidence of hydrocarbons.

CANOL/HARE INDIAN

The Canol/Hare Indian formation consists of a mixture of dark gray, siliceous mudstone and black, bituminous shales. There are traces of pyrite and black bituminous dolomite.

Conclusion: There is no hydrocarbon reservoir potential in this formation.

HUME

The Hume formation consists of upper and lower reef members with a limy, shale section separating them. There are traces of hydrocarbons in the upper section, with occasional gold fluorescence and a very slow, milky cut. In the lower section, there appears to be a great deal of fracturing, with hydrocarbons detected by the gas equipment, and abundant calcite, filled fractures, and free calcite.

Conclusion: The Hume limestone appears to have no hydrocarbon reservoir potential in this well due to a lack of porosity.

Lithology and Formation Evaluation

BEAR ROCK

The Bear Rock formation consists of interbedded dolomites and anhydrites. The dolomites are very anhydritic, with stringers and lenses throughout, primarily micro crystalline, pelletoidal in part. Where recrystallization occurs, there is occasional 4-6% porosity. One of these zones (1206-1208m) appears to be a potential oil zone, with gold fluorescence and a good streaming white cut.

Conclusion: The Bear Rock appears to have excellent potential from 2106 - 1208 m. There appears to be oil in a good, clean porous dolomite. The rest of the formation has no potential.

RONNING GROUP

The formations in the Ronning Group are gradational going from a crystalline dolomite to dolomitized reef remains. The lower reefs show a high degree of silicification, with large chert pebbles or concretions occurring. The group is very calcareous with occasional red and green iron staining. There are occasional thin green shale interbeds in the Mount Kindle. The well was TD'd early and is probably in the Franklin Mountain formation which consisted of dark gray and dark brown, argillaceous dolomites.

Conclusion: There is no porosity in the Mount Kindle reef section. There is a trace of porosity in finely crystalline sections of the Lone Mountain. There are some gas shows but they are mostly wet as there is only methane in the gas shows.

SAMPLE DESCRIPTIONS

20 m — Shale, 80%, black, blocky, arenaceous, carbonaceous, occasionally micro micaceous, hard, Sandstone, 20%, light gray-brown, silty to very fine grained, rounded predominantly, medium sorted, clay cement, tite, trace glauconite

25 m — Shale, 50%, as above, carbonaceous, arenaceous, Siltstone, 50%, gray-brown, sandy, partly siliceous, clay cement and matrix, hard, trace sandstone, as above

30 m — Shale, 40%, as above, carbonaceous, arenaceous, Siltstone, 20%, as above, sandy in part, trace pyrite, Sandstone, 40%, white, light brown, clear and frosted quartz, very fine to coarse grained, poor sorted, siliceous cement, tite to 14% porosity, trace clay lenses, trace bitumen or dead oil

35 m — Shale, 40%, dark gray, blocky, metallic lustre, siliceous, silty, firm, Sandstone, 60%, white, clear quartz, unconsolidated, as above, trace coarse grained with very fine sand matrix, light brown, very fine grained to fine grained, angular to rounded, medium sorted, kaolin (?) cemented, tite to 10% porosity, trace stained, pale yellow fluorescence, good streaming white cut

40 m — Shale, 100%, dark gray, blocky - fissile in part, occasionally silty, occasionally micro micaceous, firm

45 m — Shale, 100%, as above predominantly, trace black, blocky, very carbonaceous, oil saturated, hard

50 m — Shale, 100%, dark gray, blocky, occasionally arenaceous, calcareous, white with light brown, limy stringers, trace siderite flakes, soft to firm

55 m — Shale, 80%, dark gray, as above, Siltstone, 20%, red-brown, yellow-brown, sideritic, sandy, hard

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

65 m — Shale, 100%, dark gray, blocky, sand and silt lenses, sideritic flakes, soft to firm

70 m — Shale, 90%, as above, very sideritic in part, Siltstone, 10%, red-brown, very sideritic, sandy, hard

75 m — Shale 90%, dark gray, blocky to fissile in part, occasionally carbonaceous, arenaceous in part, firm, trace sideritic flakes,

Sample Descriptions

	Siltstone, 10%, brown-gray, yellow streaked, very calcareous, sandy in part, very sideritic, hard, occurs as stringers in shale
80 m	Shale, 100%, as above, with abundant siltstone as above
85 m	Shale, 100%, as above, abundant siltstone, trace fossil fragments, abundant red staining
90 m	Shale, 80%, dark gray, blocky, slightly calcareous in part, firm with trace sideritic flakes, Siltstone, 20%, gray-brown, occasionally red and yellow, calcareous, sideritic, hard, sandy throughout
95 m	Shale, 100%, as above, arenaceous in part with siltstone laminae and stringers
100 m	Shale, 100%, as above
105 m	Shale, 90%, as above, slightly calcareous where arenaceous, Siltstone, 10%, as above, sandy, sideritic
110 m	Shale, 100%, dark gray, blocky to fissile, carbonaceous in part, occasionally arenaceous, firm to hard, abundant siltstone, lenses and stringers
115 m	Shale, 90%, as above, Siltstone, 10%, brown-gray, occasionally red, arkosic in part, sideritic, slightly to very calcareous, hard, sandy with trace fossil imprints
120 m	Shale, 100%, as above,with very calcareous siltstone stringers
125 m	Siltstone, 100%, dark gray with brown, arenaceous section, very calcareous in part, firm to hard, with trace siderite
130 m	Shale, 100%, as above, arenaceous section with fossil fragments
135 m	Shale, 100%, as above
140 m	Shale, 100%, as above
145 m	Shale, 100%, dark gray, blocky to fissile, dull lustre, even texture, firm to hard, abundant dark brown, sideritic shale
150 m	Shale, 100%, as above, abundant purple to dark brown, sideritic shale
155 m	Shale, 100%, as above, with arenaceous laminae and stringers

Sample Descriptions

160 m	Shale, 100%, as above, trace yellow brown, sandy siltstone, abundant fossil fragments
165 m	Shale, 90%, dark gray, blocky, slightly carbonaceous, arenaceous in part, firm to hard, Siltstone, 10%, grading to very fine grained sandstone, slightly to very calcareous, sideritic, hard, trace fossil fragments
170 m	Shale, 90%, as above, Siltstone, 10%, as above, very sandy
175 m	Shale, 100%, dark gray, blocky to fissile, arenaceous in part, micro micaceous, firm to hard, abundant siltstone as above
180 m	Shale, 90%, as above, arenaceous in part, occasionally carbonaceous, Sandstone, 10%, brown-white, yellow in part, silty to very fine grained, rounded, medium sorted, calcareous cement with sideritic stringers throughout, tite
185 m	Shale, 100%, as above, sandstone and siltstone lenses and stringers throughout
190 m	Shale, 90%, dark gray, blocky to fissile, carbonaceous in part, arenaceous in part, firm to hard, Siltstone, 10%, gray-brown, yellow, sandy, grading to very fine grained sandstone in part, calcareous, sideritic, hard, trace shell imprints and fragments
195 m	Shale, 90%, as above, Siltstone, 10%, as above, red predominantly, abundant siderite pellets throughout
200 m	Shale, 100%, as above, abundant sandy siltstone
205 m	Shale, 100%, as above, arenaceous in part
210 m	Shale, 100%, dark gray, blocky, carbonaceous in part, arenaceous, calcareous section, firm to hard, abundant siltstone, red, yellow-brown, very sideritic with siderite pellets, calcareous, hard, grading to very fine grained sandstone in part
215 m	Shale, 90%, as above, arenaceous section, Sandstone, 10%, brown white, yellow, silty to very fine grained, rounded, medium sorted, calcareous, sideritic cement, tite, abundant fossil fragments and shell imprints
220 m	Shale, 80%, as above, very arenaceous in part, Siltstone, 20%, yellow, brown, gray, sandy, calcareous, very sideritic with siderite pellets, hard, trace fossil fragments

Sample Descriptions

225 m — Shale, 100%, dark gray, blocky, carbonaceous in part, arenaceous section to siltstone predominantly with trace glauconite, firm to hard

230 m — Shale, 100%, as above, abundant siltstone

235 m — Shale, 90%, dark gray, blocky, slightly calcareous in part, sandy and silty section, firm to hard, trace dark brown, sideritic shale, Siltstone, 10%, gray, brown-gray, yellow, sandy, calcareous, sideritic, hard

240 m — Shale, 90%, as above, Siltstone, 10%, as above, very sideritic

245 m — Shale, 80%, as above, Siltstone, 10%, as above, Sandstone, 10%, red predominant, silty to fine grained, angular to rounded predominant, poor sorted, very sideritic in part, arkosic, no porosity

250 m — Shale, 90%, dark gray, blocky, arenaceous in part with calcareous sections, firm to hard, trace siderite, Siltstone, 10%, gray, sandy, calcareous, slightly sideritic, hard

255 m — Shale, 90%, as above, Siltstone, 10%, as above, very sideritic in part

260 m — Shale, 80%, dark gray, blocky, carbonaceous in part, arenaceous section, slightly calcareous, firm to hard, Siltstone, 20%, gray, sandy with very fine grained, rounded sand grain, calcareous, partly sideritic, hard with fossil imprints

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

270 m — Shale, 90%, dark gray, blocky to fissile in part, carbonaceous in part, arenaceous in part, firm to hard, Siltstone, 10%, gray-white, calcareous, sandy, hard

275 m — Shale, 100%, as above, abundant siltstone, as above

280 m — Shale, 90%, as above, micro micaceous in part, Siltstone, 10%, gray-brown, yellow hues, sideritic, calcareous, sandy, hard

285 m — Shale, 80%, dark gray, blocky, carbonaceous in part, arenaceous section, micro micaceous in part, dull lustre predominantly, firm to hard, Siltstone, 20%, as above, slightly sideritic

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

Sample Descriptions

295 m — Shale, 90%, as above, Sandstone, 10%, gray-white, green hue, silty to very fine grained, rounded, medium sorted, calcareous cement, tite

300 m — Shale, 100%, dark gray, blocky to fissile, carbonaceous in part, micro micaceous in part, firm to hard

305 m — Shale, 100%, as above, abundant sandstone and siltstone

310 m — Shale, 80%, dark gray - black, fissile in part, carbonaceous in part, occasional arenaceous section, firm to hard, Siltstone, 20%, gray white, calcareous, slightly argillaceous, sandy, hard

315 m — Shale, 80%, as above, trace sideritic flakes, Siltstone, 20%, as above

320 m — Shale, 100%, as above, trace siderite, trace glauconitic siltstone

325 m — Shale, 100%, dark gray - black, blocky to fissile, carbonaceous in part, micro micaceous in part arenaceous section, firm to hard, abundant siderite, trace siltstone

330 m — Shale, 80%, as above, abundant siderite, Siltstone, 20%, brown, yellow-brown, sideritic, calcareous, sandy, hard

335 m — Shale, 80%, dark gray, blocky to fissile, occasionally carbonaceous, arenaceous in part, firm to hard, Siltstone, 20%, gray to gray-white, slightly to very calcareous, partly sideritic, sandy, hard

340 m — Shale, 80%, as above, Siltstone, 20%, as above, very argillaceous in part with clay cement and matrix

345 m — Shale, 40%, as above, Sandstone, 60%, gray, gray-white, light brown in part, silty to very fine grained, subangular to well rounded, medium sorted, slightly calcareous cement, tite, very silty

350 m — Shale, 30%, as above, Siltstone, 30%, gray, gray-brown, slightly calcareous, argillaceous, sandy, hard, Sandstone, 40%, as above, very silty

355 m — Shale, 30%, dark gray, blocky, carbonaceous in part, very silty, hard, Siltstone, 70%, gray to gray-brown, sandy, grading to very fine grained sandstone in part, calcareous, hard

Sample Descriptions

360 m — Shale, 50%, as above, abundant cavings, Siltstone, 40%, as above, occasionally sandy, Sandstone, 10%, white, with occasional red staining, very fine to fine grained, sub-rounded to well rounded, well sorted, calcareous cement, tite

365 m — Shale, 30%, dark gray, blocky, carbonaceous, arenaceous, hard, Siltstone, 70%, dark gray, gray-brown, occasionally yellow, sandy, argillaceous in part, sideritic, slightly calcareous, hard

370 m — Shale, 40%, as above, Siltstone, 60%, as above, sandy, abundant siderite nodules

375 m — Shale, 30%, as above, trace siderite concretions, Siltstone, 70%, as above, sandy

380 m — Shale, 50%, dark gray-black, blocky to fissile, carbonaceous, arenaceous, firm to hard, trace siderite concretions, Siltstone, 50%, dark gray, gray-green, sandy, slightly calcareous, sideritic, hard with very argillaceous sections

385 m — Shale, 30%, as above, Siltstone, 70%, as above in part, gray-white predominant, slightly to very calcareous, partly sideritic, sandy, hard, with argillaceous sections

390 m — Shale, 60%, as above, abundant cavings, Siltstone, 40%, as above, with carbonaceous streaks

395 m — Shale, 70%, as above, with trace dark brown, bituminous shale, Siltstone, 30%, as above, occasional dark brown staining

400 m — Shale, 50%, dark gray, blocky to fissile, arenaceous, occasionally carbonaceous, firm to hard, Siltstone, 50%, gray to gray-white, occasionally gray brown, sandy, slightly calcareous, argillaceous, partly sideritic, hard

405 m — Shale, 20%, dark gray to gray-brown, blocky, very silty, sideritic, hard, Siltstone, 60%, dark gray to gray-brown, slightly calcareous, sideritic, argillaceous, hard, Sandstone, 20%, red white, silty to coarse grained, angular to rounded, poor sorted, arkosic, tite

410 m — Shale, 30%, as above, Siltstone, 70%, as above, very sandy

415 m — Shale, 50%, as above, Siltstone, 50%, as above

420 m — Shale, 60%, dark gray, blocky to fissile, silty, carbonaceous in part, micro micaceous, hard to brittle, Siltstone, 40%, gray

Sample Descriptions

to gray-brown, calcareous, sideritic, argillaceous, hard

425 m — Shale, 100%, dark gray, blocky, very silty, carbonaceous in part, occasional trace bitumen streaks, hard

430 m — Shale, 40%, as above, Siltstone, 60%, light gray, sandy, calcareous, sideritic, argillaceous, hard

435 m — Shale, 50%, dark gray, blocky to fissile, carbonaceous, silty in part, hard, Siltstone, 50%, as above, sandy and argillaceous

440 m — Shale, 40%, dark gray, blocky to fissile, carbonaceous in part, occasionally silty, hard, Siltstone, 60%, light gray to gray white, calcareous, sideritic, very argillaceous, sandy, hard

445 m — Shale, 60%, as above. trace fossil fragments, Siltstone, 40%, as above, very sideritic with yellow staining in part

450 m — Shale, 60%, as above, abundant cavings, Siltstone, 40%, as above

455 m — Shale, 100%, dark gray, blocky to fissile, carbonaceous in part, silty, firm to hard, trace siltstone, trace coal cavings ?

460 m — Shale, 70%, as above, Siltstone, 30%, light gray to gray-white, sandy in part, calcareous, sideritic, very argillaceous, hard

465 m — Shale, 60%, as above, trace fossil fragments in siltstone, Siltstone, 40%, as above

470 m — Shale, 90%, dark gray, as above predominantly, trace dark brown, silty, very sideritic, hard, Siltstone, 10%, as above, brown in part

475 m — Shale, 100%, dark gray, blocky to fissile, carbonaceous in part, silty, micro micaceous, hard, abundant siltstone

480 m — Shale, 40%, as above, Siltstone, 50%, gray white, light brown in part, calcareous, sideritic, sandy, argillaceous, hard, Sandstone, 10%, light gray-brown, silty to very fine grained, rounded, well sorted, calcareous, sideritic cement, tite, very silty, argillaceous in part

485 m — Shale, 40%, dark gray, blocky, very silty, hard, Siltstone, 60%, light to dark gray, calcareous, sideritic, very argillaceous, hard

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

Sample Descriptions

495 m — Shale, 50%, as above, Siltstone, 50%, as above

500 m — Shale, 80%, dark gray, blocky, carbonaceous, silty, hard, Siltstone, 20%, gray-brown, sandy, sideritic, argillaceous, calcareous, hard

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

510 m — Shale, 90%, as above, very carbonaceous, micro micaceous, Siltstone, 10%, as above, micaceous in part

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

520 m — Shale, 90%, dark gray, blocky, occasionally fissile, silty in part, micro micaceous in part, firm to hard, Siltstone, 10%, gray-white, calcareous, sandy, argillaceous, hard

525 m — Shale, 90%, as above, silty throughout, Siltstone, 10%, as above, argillaceous

530 m — Shale, 80%, as above, Siltstone, 10%, as above, Sandstone, 10%, brown, very fine grained, angular to rounded, poor sorted, calcareous cement, with limestone matrix, tite, abundant siderite, bituminous stain throughout

535 m — Shale, 40%, dark gray, blocky, very silty, sideritic flakes, hard, Siltstone, 60%, light gray, sandy, calcareous, argillaceous, very hard

540 m — Shale, 20%, as above, trace sandstone, as above, Siltstone, 80%, as above, calcareous, very argillaceous

545 m — Shale, 80%, as above, trace light and dark brown limestone, fossils, Siltstone, 20%, as above

550 m — Shale, 100%, dark gray, blocky, very carbonaceous, hard

555 m — Shale, 100%, dark gray, blocky, carbonaceous, occasionally micro micaceous, hard, with trace cement from casing

560 m — Shale, 100%, dark gray, fissile, bituminous streaks, occasionally silty, firm to brittle, abundant cement through sample

565 m — Shale, 100%, as above, trace fine to medium grained sand grains, sub-rounded, with occasional quartz overgrowths

570 m — Shale, 20%, as above, Siltstone, 40%, gray-brown, slightly calcareous, argillaceous, sandy, hard, trace light brown stain, no fluorescence, slow white cut, Sandstone, 40%, gray-brown, silty to very fine grained, rounded, well sorted, slightly calcareous cement, tite, trace light brown stain, slight white cut, trace dead oil

575 m — Shale, 20%, as above, Siltstone, 50%, as above, sandy, Sandstone, 30%, as above, very silty

Sample Descriptions

580 m Shale, 30%, as above, Siltstone, 70%, gray-brown, slightly to very calcareous, slightly argillaceous, very sandy, hard, trace dead oil

585 m Shale, 20%, as above, Siltstone, 80%, as above, Totals - 40% of sample - 60%, casing cement

590 m Siltstone, 70%, as above, abundant casing cement in sample, Sandstone, 30%, dark gray, very fine grained, subrounded, well sorted, slightly calcareous, clay cement, tite, very argillaceous

595 m Siltstone, 70%, dark gray, slightly calcareous, very argillaceous, sandy, clay cement and matrix, hard, Sandstone, 30%, as above, trace dead oil

600 m Missed Sample

605 m Shale, 40%, dark gray, blocky, fissile, metallic lustre, carbonaceous in part, sideritic flakes, hard, Siltstone, 50%, dark gray, sandy, slightly calcareous, very argillaceous, with clay cement and matrix, hard to friable, Sandstone, 10%, as above, very argillaceous

610 m Shale, 70%, as above, Siltstone, 30%, as above, - predominantly cement from casing in sample

615 m Shale, 60%, as above, sideritic flakes, Siltstone, 20%, as above, sandy, Sandstone, 20%, light gray to gray-brown, silty to very fine grained, subangular to rounded, well sorted, slightly calcareous, clay cement, tite, occasional trace dead oil

620 m Shale, 70%, dark gray, fissile, metallic lustre, abundant sideritic flakes throughout, hard to brittle, Siltstone, 30%, as above, abundant cement cavings throughout sample

625 m Shale, 80%, as above, Siltstone, 20%, as above

630 m Shale, 90%, as above, abundant bitumen and casing iron, sample, 40% casing cement, Siltstone, 10%, as above

635 m Shale, 90%, as above, Siltstone, 10%, cavings predominantly, abundant cement in sample

640 m Shale, 100%, dark gray, blocky to fissile, metallic lustre, carbonaceous in part, brittle, with trace sideritic flakes

645 m Shale, 100%, as above

650 m Shale, 100%, as above, carbonaceous throughout

655 m Shale, 100%, dark gray, blocky to fissile, carbonaceous, occasionally silty and calcareous, firm to soft, trace sideritic flakes

660 m Shale, 100%, as above, 40% of sample casing cement

Sample Descriptions

665 m Shale, 100%, dark gray, blocky to fissile, carbonaceous, occasional sideritic flakes, trace bituminous streaks, firm to soft

670 m Shale, 100%, as above, bituminous streaks throughout

675 m Shale, 100, as above, occasionally silty and calcareous

680 m Shale, 100%, as above, occasionally very micro micaceous

685 m Shale, 100%, dark gray, blocky to fissile, carbonaceous in part, bituminous streaks throughout, occasionally silty and slightly calcareous, firm to soft, with trace sideritic flakes

690 m Shale, 100%, dark gray, blocky to fissile, carbonaceous in part, occasionally silty, with bituminous streaks, firm to soft, abundant casing cement

695 m Missed Sample

700 m Shale, 100%, as above, abundant casing cement and pipe iron

705 m Shale, 100%, blocky to fissile, carbonaceous in part, sideritic flakes throughout, occasionally silty and calcareous, trace bituminous streaks, firm to soft

710 m Shale, 100%, as above

715 m Shale, 100%, as above, very silty section

720 m Shale, 100%, as above in part, becoming dark gray, carbonaceous, very even textured

725 m Shale, 100%, dark gray, blocky to fissile, carbonaceous, firm to soft, with micro micaceous section

730 m Shale, 100%, as above, trace siltstone cavings

735 m Shale, 100%, as above

740 m Shale, 100%, dark gray, blocky to fissile, metallic lustre, carbonaceous, firm to soft

745 m Shale, 100%, dark gray to black, blocky to fissile, dull lustre in part, carbonaceous, occasionally silty, firm to hard

750 m Shale, 100%, as above, abundant siltstone, gray, sandy, slightly calcareous, argillaceous, hard

755 m Shale, 100%, as above, predominantly dark gray, with metallic lustre

760 m Shale, 100%, as above, with siltstone

Sample Descriptions

765 m Shale, 100%, dark gray to black, blocky to fissile, metallic lustre in part, carbonaceous, micro micaceous in part, firm to hard

770 m Shale, 100%, as above, trace silty section

775 m Shale, 100%, as above, very carbonaceous in part

780 m Shale, 100%, dark gray, blocky to fissile, carbonaceous, occasionally silty, firm to hard, with trace sideritic flakes throughout

785 m Shale, 100%, as above

790 m Shale, 100%, as above, trace slickensided shale

795 m Shale, 100%, dark gray to black, blocky to fissile, metallic lustre, carbonaceous, occasionally silty, firm to hard, with trace sideritic flakes

800 m Shale, 100%, as above

805 m Shale, 100%, as above

810 m Shale, 100%, as above, trace silty sections

815 m Shale, 100%, dark gray to black, blocky to fissile, carbonaceous, occasionally silty, firm to hard

820 m Shale, 100%, dark gray to black, blocky to fissile, carbonaceous, occasionally silty, firm to hard

825 m Shale, 100%, as above, with metallic lustre

830 m Shale, 100%, as above

835 m Shale, 100%, as above

840 m Shale, 100%, dark gray, as above in part, dark gray, fissile, waxy, carbonaceous, hard

845 m Shale, 100%, as above, trace light brown, fragmental limestone, trace dark brown, bituminous, dolomitic

850 m Shale, 100%, dark gray to black, blocky to fissile, waxy, very carbonaceous in part, metallic lustre, as above

855 m Shale, 100%, abundant dark gray, as above, black, blocky, very carbonaceous, minor microscopic pyrite inclusions, hard

860 m Missed Sample

865 m Shale, 100%, as above, trace slickensided shale

Sample Descriptions

870 m Shale, 100%, black predominantly, blocky, very carbonaceous, trace pyrite inclusions, hard

875 m Shale, 100%, as above, trace dolomite, dark brown, crypto crystalline, bituminous, dense

880 m Shale, 100, black, blocky, very micaceous, very carbonaceous, hard

885 m Shale, 100%, as above, trace micro fracture, calcite filled

890 m Shale, 100%, as above, very carbonaceous, trace pyrite

895 m Shale, 100%, as above, abundant pyrite, trace pipe iron

900 m Shale, 100%, black, blocky to fissile, very carbonaceous, pyritic in part, hard

905 m Shale, 100%, as above

910 m Shale, 100%, as above, pyritic in part

915 m Shale, 100%, black predominantly, very carbonaceous, pyritic, hard

920 m Shale, 100%, dark gray predominantly, fissile, metallic lustre, carbonaceous, brittle (probably cavings), black, as above

925 m Shale, 100%, black, blocky to fissile, very carbonaceous, pyritic in part, hard

930 m Shale, 100%, as above, occasional dark gray-brown, very bituminous

935 m Shale, 100%, as above, evidence of fracture, with calcite and slickensided shale

940 m Shale, 100%, dark gray-brown, bituminous in part, black predominantly, blocky to fissile, very carbonaceous, pyritic, hard, with abundant pyrite, trace gray-black dolomite, micro crystalline, argillaceous, bituminous, dense

945 m Shale, 100%, as above, trace dolomite, trace pyrite, abundant dark gray, with metallic lustre (cavings ?)

950 m Shale, 100%, as above, occasional white, calcareous inclusions, trace pyrite, trace slickensided shale

955 m Shale, 100%, black, blocky predominantly, very carbonaceous, occasionally bituminous, pyritic in part, hard, trace slickensided shale, trace clear calcite

960 m Shale, 100%, as above, trace medium gray, fissile, splintery, siliceous shale

Sample Descriptions

965 m Shale, 100%, as above, abundant medium gray, cavings, trace pyrite

970 m Shale, 100%, as above, trace pyrite, trace fracture zones, with slickensided shale and clear calcite, trace black, bituminous dolomite

975 m Shale, 100%, black predominantly, blocky, very carbonaceous, pyritic, bituminous, hard, abundant slickensided shale, trace medium gray, splintery, (probably cavings)

980 m Shale, 100%, as above, trace pyrite, abundant slickensided shale

985 m Shale, 100%, as above, very carbonaceous, very bituminous

990 m Shale, 100%, as above, very carbonaceous, pyritic

995 m Shale, 100%, black predominantly, blocky, very carbonaceous, bituminous in part, abundant pyrite, hard, medium gray in part, fissile, splintery, siliceous, brittle

1000 m Shale, 100%, as above, trace slickensided shale

1005 m Shale, 100%, as above, trace calcite

1010 m Shale, 100%, as above, trace calcite

1015 m Shale, 100%, black, blocky, very carbonaceous, very bituminous, pyritic in part, hard, trace medium gray, fissile, splintery, siliceous, brittle

1020 m Shale, 100%, black, as above, very carbonaceous, bituminous in part, trace pyrite

1025 m Shale, 100%, as above, trace dolomite, black, gray, micro crystalline, bituminous, dense

1030 m Shale, 100%, as above, abundant dark gray, fissile, metallic lustre, with micro micaceous sections, brittle

1035 m Shale, 100%, black predominantly, blocky, very carbonaceous, bituminous in part, trace pyrite, hard, abundant dark gray shale, as above

1040 m Shale, 100%, as above, trace black, bituminous dolomite

1045 m Shale, 100%, as above, trace dolomite, trace clear calcite crystals

1050 m Shale, 70%, as above, Limestone, 30%, light and dark brown, chocolate brown in part, reefoid, fossiliferous material, no apparent porosity, trace gold fluorescence, very slight white cut, abundant calcite and calcite filled micro fracture

1055 m Shale, 40%, as above, Limestone, 60%, abundant chocolate, crypto

crystalline, fragmental, light brown predominantly, micro crystalline, chalky, abundant fossil fragments, trace calcite

1060 m Shale, 30%, cavings, Limestone, 70%, as above, no apparent porosity

1065 m Shale, 30%, cavings, Limestone, 70%, light to dark brown, crypto crystalline, fragmental in part, micro crystalline, very fossiliferous, (possibly reefoid),no apparent porosity, trace dead oil on fractured planes, abundant calcite filled micro fractures, trace gold fluorescence, very slow white cut

1070 m Shale, 40%, cavings, Limestone, 60%, as above, predominantly dark brown, no apparent porosity, trace calcite

1075 m Shale, 60%, cavings, Limestone, 40%, as above, occasional gold fluorescence, very slow white cut, no apparent porosity

1080 m Shale, 70%, cavings, Limestone, 30%, light to dark brown, fragmental in part, micro crystalline, slightly argillaceous, dense predominantly, occasional trace gold fluorescence, very slow white cut, trace dead oil, abundant calcite

1085 m Shale, 20%, cavings, Limestone, 80%, as above, no apparent porosity

1090 m Shale, 50%, cavings, Limestone, 50%, dark brown, chocolate, crypto crystalline fragments, mixed with light brown, micro crystalline, fossiliferous, (reefoid), chalky, no apparent porosity, occasional gold fluorescence, very slight white cut, trace dead oil

1095 m Shale, 80%, cavings, Limestone, 20%, as above

1100 m Shale, 60%, cavings, Limestone, 40%, light to dark brown, reefoid material ?, no apparent porosity, trace calcite filled fractures, trace dead oil and occasional gold fluorescence

1105 m Shale, 60%, cavings, Limestone, 40%, as above, predominantly fossiliferous, reefoid material

1110 m Shale, 40%, as above, cavings, Limestone, 60%, as above predominantly, trace light gray, micro crystalline, very argillaceous, grading to marlstone in part, dense

1115 m Shale, 40%, cavings, Limestone, 60%, light and dark brown, fragmental, reefoid material, no apparent porosity, trace micro fractures, calcite filled, occasional gold fluorescence, trace dead oil

1120 m Shale, 30%, as above, Limestone, 70%, as above in part, light gray-brown, crypto crystalline, slightly dolomitic, slightly to very argillaceous, dense

1125 m Shale, 70%, cavings predominantly, trace light gray-green, blocky, very calcareous, grading to marlstone in part, Limestone, 30%, as above

Sample Descriptions

1130 m Shale, 70%, cavings, Limestone, 30%, as above in part, predominantly dark brown, light brown, reefoid material, as above, cavings?

1135 m Shale, 50%, as above, cavings, Limestone, 50%, light gray to light gray-brown, crypto crystalline, trace fossils, slightly dolomitic, argillaceous, dense, with chalky matrix between fragments

1140 m Shale, 50%, cavings, Limestone, 50%, as above, abundant cavings, from sidewall reamer, 60' behind bit

1145 m Shale, 30%, cavings, Limestone, 70%, light brown to buff, micro crystalline predominantly, slightly argillaceous in part, reefoid material ?, dense, with no apparent porosity, abundant fossil fragments, trace dead oil, trace clear calcite

1150 m Shale, 50%, cavings, Limestone, 50%, as above, mottled light and dark brown, with dark brown fragments throughout

1155 m Shale, 60%, cavings, Limestone, 40%, as above, abundant fossil fragments, possibly lower reef ?, trace pyrite

1160 m Shale, 40%, cavings, Limestone, 60%, dark brown predominantly, fragmental, fossiliferous ?, light brown, chalky matrix, no apparent porosity

1165 m Shale, 70%, cavings predominantly, trace green, waxy, pyritic shale, Limestone, 30%, as above, occasional light gray, slightly argillaceous

1170 m Shale, 30%, cavings, Limestone, 70%, light gray to gray-brown, dark brown, micro crystalline, fragmental in part, pellets in part, slightly argillaceous, dense predominantly, fossil fragments, abundant calcite, possible vugs, trace dead oil

1175 m Shale, 70%, cavings, Limestone, 30%, as above, dark brown, fragmental predominantly

1180 m Shale, 60%, cavings, Limestone, 40%, chocolate brown, fragmental predominantly, light brown to buff, micro crystalline, slightly argillaceous in part, dense, abundant calcite, trace pyrite

1185 m Shale, 20%, cavings, Limestone, 80%, as above, chocolate to light brown

1190 m Shale, 20%, cavings, Limestone, 80%, light to dark brown, fragmental, with light brown, chalky matrix, abundant fossil fragments, trace brown stain, gold fluorescence, slow white cut, (possibly cavings ?)

1195 m Shale, 60%, cavings, Limestone, 40%, as above, trace dark brown, crypto crystalline, bituminous, dense

1200 m Shale, 50%, cavings, Limestone, 50%, as above, no apparent porosity

1205 m Shale, 20%, cavings, Limestone, 20%, cavings, Dolomite, 20%, light brown, white, stained brown, very fine to fine crystalline, 4-6% porosity.

gold fluorescence, brown stain, white cut, Anhydrite, 40%, white, micro sucrosic in part

1210 m Shale, 30%, cavings, Limestone, 30%, cavings, Dolomite, 20%, as above, dense predominantly, trace 4-6% porosity, Anhydrite, 20%, as above

1215 m Shale, 20%, cavings, Limestone, 40%, cavings, Dolomite, 10%, light brown, gray-brown, micro crystalline, dense predominantly, trace stain and fluorescence, Anhydrite, 30%, white, micro sucrosic in part

1220 m Shale, 20%, cavings, Limestone, 50%, from Hume, Dolomite, 20%, light gray to gray-brown, micro crystalline predominantly, slightly to very calcareous, slightly argillaceous, dense, Anhydrite, 10%, as above

1225 m Limestone, 40%, from Hume, Dolomite, 50%, as above, anhydritic, mottled light to dar. brown, gray-brown in part, Anhydrite, 10%, white, micro sucrosic in part

1230 m Shale, 20%, cavings, Limestone, 20%, cavings from Hume, Dolomite, 50%, as above, very anhydritic, Anhydrite, 10%, as above

1235 m Dolomite, 70%, mottled light and dark brown, micro crystalline, frag mental in part, very anhydritic, slightly to very calca'eous, dense, occasional trace intercrystalline porosity, Anhydrite, 30%, white, platy crystals predominantly

1240 m Snale, 70%, cavings, Limestone, 20%, cavings, Dolomite, 10%, as above

1245 m Shale, 70%, cavings, Limestone, 10%, cavings, Dolomite, 20%, brown, light brown, partly pelletoidal, partly fragmental, anhydritic, dense

1250 m Shal-, 60%, cavings, Dolomite, 40%, as above, partly pelletoidal, very anhydritic

1255 m Shale, 60%, as above, Dolomite, 40%, as above in part, brown, very fine to fine crystalline, 6-8% to light brown stain, no fluorescence, no cut

1260 m Shale, 50%, cavings, Dolomite, 50%, mottled light and dark brown, micro crystalline in part, partly fragmental, partly pelletoidal, very anhydritic, dense predominantly, trace light brown, very fine to fine crystalline, 4-6% porosity, abundant anhydrite

1265 m Shale, 50%, cavings, Limestone, 20%, from Hume, Dolomite, 30%, as above, very anhydritic

1270 m Shale, 30%, cavings, Dolomite, 70%, light gray-brown to brown, crypto crystalline in part, pelletal in part, very fine to fine crystalline in part, anhydritic, slightly calcareous, dense predominantly, with occa-sional trace to 4% porosity in crystalline sections, abundant clear, white, calcite crystals

Sample Descriptions

1275 m Shale, 20%, cavings, Dolomite, 80%, as above, predominantly, with dark gray-brown dolomite, evidence of fracturing with clear, calcite crystals, trace secondary crystal growth on the edges of chips

1280 m Shale, 30%, cavings, Dolomite, 70%, as above, very anhydritic, trace bitumen on sides of chips, trace bituminous streaks throughout anhydrite stringers, abundant anhydrite

1285 m Shale, 10%, cavings, Dolomite, 90%, light brown-gray, dark brown, crypto crystalline in part, pelletal and fragmental in part, very anhydritic throughout, slightly calcareous, dense predominantly, trace fossil fragments, abundant clear, calcite crystals, trace bitumen on fracture planes

1290 m Shale, 20%, cavings, Dolomite, 80%, as above ir part, dark brown, crypto crystalline, trace clear calcite in part, (micro fracture, fossil fragments ?), dense, abundant anhydrite

1295 m Shale, 50%, cavings, Dolomite, 50%, as above, abundant anhydrite

1300 m Shale, 30%, cavings, Dolomite, 30%, light to dark brown, occasional gray-brown, crypto crystalline predominantly, partly pelletal, anhydritic throughout, dense, trace fractured clear, calcite crystals on edge of chips, Anhydrite, 40%, white to brown, platy crystals

1305 m Shale, 20%, cavings, Dolomite, 40%, light brown predominantly, crypto crystalline, slightly to very calcareous, dense, Anhydrite, 40%, as above

1310 m Dolomite, 80%, as above, light to dark brown, partly pelletal, Anhydrite, 20%, as above

1315 m Shale, 50%, cavings, Dolomite, 20%, as above, Anhydrite, 30%, gray-white to brown, platy

1320 m Shale, 70%, cavings, Dolomite, 20%, light to dark brown, crypto crystalline in part, pelletal in part, slightly to very calcareous, anhydritic throughout, dense, trace clear calcite crystals, Anhydrite, 10%, as above

1325 m Shale, 60%, cavings, Dolomite, 40%, as above, abundant anhydrite

1330 m Shale, 60%, cavings, Dolomite, 40%, as above, very anhydritic in part, no visible porosity

1335 m Shale, 40%, cavings, Dolomite, 30%, light gray-brown, light brown, dark brown, crypto crystalline, partly pelletal, slightly to very calcareous, anhydritic, dense, Anhydrite, 30%, as above

1340 m Shale, 20%, cavings, Dolomite, 40%, light to dark brown, as above, pelletal predominantly, very anhydritic, Anhydrite, 40%, light brown predominantly, micro sucrosic

Sample Descriptions

1345 m Shale, 70%, cavings, Dolomite, 20%, as above predominantly, trace dolomitic mud, with interbedded dolomite pellets, Anhydrite, 10%, as above

1350 m Shale, 60%, cavings, Dolomite, 30%, light gray-brown, light to dark brown, crypto to micro crystalline, partly pelletal, anhydritic, slightly to very calcareous, dense, with trace bituminous streaks, Anhydrite, 10%, lenses and stringers through section

1355 m Shale, 60%, cavings, Dolomite, 10%, as above, Anhydrite, 30%, brown predominantly, micro sucrosic to platy crystals

1360 m Shale, 40%, cavings, Dolomite, 30%, light gray-brown to brown, pelletal in part, occasional micro crystalline, very anhydritic, slightly to very calcareous, dense, Anhydrite, 30%, as above

1365 m Shale, 50%, cavings, Dolomite, 20%, as above, no porosity, very anhydritic, Anhydrite, 30%, as above

1370 m Shale, 30%, cavings, Dolomite, 40%, light to dark brown, micro crystalline in part, very fine crystalline, pelletal in part, very anhydritic, slightly to very calcareous, dense, trace clear calcite crystals, Anhydrite, 30%, as above

1375 m Shale, 30%, cavings, Dolomite, 50%, as above, trace very poor pin point porosity, no stain, no fluorescence, Anhydrite, 20%, as above

1380 m Shale, 30%, cavings, Dolomite, 40%, light gray-brown to light brown, micro crystalline, slightly to very calcareous, anhydritic, dense, Anhydrite, 30%, as above

1385 m Shale, 30%, as above, cavings, Dolomite, 30%, as above, very anhydritic, Anhydrite, 40%, as above

1390 m Shale, 40%, cavings, Dolomite, 20%, as above, very anhydritic, argillaceous in part, Anhydrite, 40%, as above

1395 m Shale, 30%, cavings, Dolomite, 40%, light brown, light gray-brown, micro crystalline, slightly argillaceous in part, slightly to very calcareous, anhydritic, dense, Anhydrite, 30%, as above

1400 m Shale, 40%, cavings, trace gray, dolomitic, partly anhydritic, shale, Dolomite, 10%, as above, Anhydrite, 50%, gray-brown

1405 m Shale, 30%, cavings, Dolomite, 40%, light gray-brown, brown, micro crystalline, partly pelletal, slightly to very calcareous, argillaceous and silty section, dense, Anhydrite, 30%, as above

1410 m Shale, 20%, cavings, Dolomite, 30%, as above, Anhydrite, 50%, buff to gray-brown occasionally

Sample Descriptions

1415 m Shale, 20%, cavings, Dolomite, 60%, light brown to buff, micro crystalline in part, very fine to fine crystalline predominantly, dense, slightly to very calcareous, anhydritic throughout, Anhydrite, 20%, as above

1420 m Dolomite, 30%, brown, gray-brown in part, micro crystalline, partly pelletal, slightly to very calcareous, anhydritic, with stringers and lenses throughout, dense, Anhydrite, 70%, buff to dark brown, occasionally dark gray-brown

1425 m Dolomite, 70%, as above, very pelletal, very calcareous, Anhydrite, 30%, as above

1430 m Dolomite, 70%, as above in part, dark brown, pelletal packed, slightly to very calcareous, dense, trace 4% leached, intrastructural porosity, Anhydrite, 30%, as above

1435 m Shale, 20%, cavings, Dolomite, 10%, as above, Anhydrite, 70%, gray-brown, brown to buff

1440 m Shale, 30%, cavings, Dolomite, 20%, light brown to buff, micro crystalline, micro pelletal, anhydritic, slightly to very calcareous, dense, Anhydrite, 50%, as above

1445 m Shale, 20%, cavings, Dolomite, 40%, as above, partly pelletal, partly micro crystalline, Anhydrite, 40%, as above

1450 m Shale, 10%, cavings, Dolomite, 60%, brown, buff, dark brown, micro to fine crystalline, slightly to very calcareous, anhydritic, trace poor intercrystalline porosity, Anhydrite, 30%, as above

1455 m Shale, 20%, cavings, Dolomite, 50%, as above, trace very poor intercrystalline porosity, trace bituminous streaks, Anhydrite, 30%, as above

1460 m Shale, 50%, cavings, Dolomite, 30%, as above, Anhydrite, 20%, as above

1465 m Shale, 30%, cavings, Dolomite, 50%, light to dark brown, micro to fine crystalline, slightly to very calcareous, anhydritic throughout, dense, Anhydrite, 20%, as above

1470 m Shale, 50%, cavings, Dolomite, 10%, as above, Anhydrite, 40%, as above

1475 m Shale, 40%, cavings, Dolomite, 40%, light gray-white, micro crystalline, partly argillaceous, dense, trace bituminous, Anhydrite, 20%, as above

1480 m Dolomite, 70%, as above in part, light gray-brown to light brown, micro to fine crystalline, very calcareous, dense to 4% porosity, Anhydrite, 30%, as above

1485 m Dolomite, light gray-brown, gray-brown, micro to very fine crystal- argillaceous, very calcareous, dense, very abrasive, as above

Sample Descriptions

1490 m Dolomite, 50%, as above in part, cavings predominantly, Anhydrite, 50%, as above, probably cavings ?

1495 m Dolomite, 70%, light gray-brown, micro crystalline, occasionally very fine crystalline, abundant calcite, very calcareous, slightly argillaceous, dense, trace dead oil streaks, Anhydrite, 30%, as above, occasionally white, micro sucrosic

1500 m Dolomite, 80%, as above, trace fossil remnants, Anhydrite, 20%, as above

1505 m Dolomite, 90%, light brown, micro crystalline predominantly, occasionally very fine to fine crystalline, with 4% porosity, very calcareous, dense predominantly, with argillaceous section, and dead oil streaks, Anhydrite, 10%, as above

1510 m Dolomite, 80%, light to medium brown, micro crystalline predominantly, very fine to fine crystalline in part, occasional trace to 4% porosity, very calcareous, dense predominantly, trace dead oil, trace to fragmental section, possible fossil remnants, Anhydrite, 20%, brown, platy crystals

1515 m Dolomite, 80%, as above, trace to 4% pin point porosity, Anhydrite, 20%, as above

1520 m No Sample

1525 m Dolomite, 80%, as above, micro crystalline predominantly, anhydritic in part, Anhydrite, 20%, as above

1530 m Shale, 10%, cavings, Dolomite, 90%, light brown to buff, micro to occasionally very fine crystalline, calcareous, slightly anhydritic, with anhydrite lenses, dense, trace stylolites, trace dead oil

1535 m Shale, 20%, cavings, Dolomite, 50%, as above predominantly, trace dark gray, crypto crystalline, very dense, Anhydrite, 30%, as above, Bear Rock ?

1540 m Shale, 10%, cavings, Dolomite, 70%, as above in part, dark brown, crypto crystalline, bituminous, dense, trace dead oil, Anhydrite, 20%, as above

1545 m Dolomite, 90%, as above in part, dark gray, dark gray-brown, crypto to micro crystalline, slightly to very calcareous, dense, Anhydrite, 10%, as above

1550 m Shale, 20%, cavings, Dolomite, 80%, as above

1555 m Shale, 30%, cavings, Dolomite, 50%, as above in part, becoming light brown, micro crystalline, very calcareous, dense, Anhydrite, 20%, as above

Sample Descriptions

1560 m Shale, 20%, cavings, Dolomite, 80%, light brown to buff, micro to very fine crystalline, very calcareous, dense predominantly, trace chert, white, translucent in part, possibly tripolitic

1565 m Shale, 20%, cavings, Dolomite, 80%, as above, abundant chert, appearing as rounded pebbles in dolomite, occasional trace dead oil

1570 m Shale, 20%, cavings, Dolomite, 80%, white, light brown to buff, micro to fine crystalline, slightly calcareous, dense, trace poor intercrystalline porosity, trace chert

1575 m Shale, 20%, cavings, trace anhydrite from Bear Rock, Dolomite, 80%, as above, trace very poor intercrystalline porosity

1580 m Shale, 20%, cavings, abundant cavings from Bear Rock, Dolomite, 80%, as above, very abrasive, trace very poor intercrystalline porosity, trace dead oil

1585 m Shale, 20%, cavings, Dolomite, 60%, white, light brown, micro to very fine crystalline, slightly to very calcareous, dense predominantly, occasional trace poor intercrystalline porosity, trace dead oil, Anhydrite, 20%, cavings

1590 m Shale, 10%, cavings, abundant anhydrite cavings, Dolomite, 90%, as above, light gray-brown, crypto crystalline, very calcareous, slightly argillaceous, dense

1595 m Dolomite, 100%, as above, trace calcite filled fractures

1600 m Dolomite, 100%, as above, abundant white and brown chert

1605 m Shale, 20%, cavings, Dolomite, 60%, light brown, buff, white, micro to very fine crystalline, slightly calcareous, dense, abundant chert, Anhydrite, 20%, cavings

1610 m Shale, 10%, cavings, Dolomite, 90%, as above, occasional green stain, abundant coarse chert fragments, trace rounded chert concretions, trace selenite crystals, trace pyrite

1615 m Shale, 10%, cavings, Dolomite, 90%, as above, occasionally well rounded, coarse quartz grains, abundant chert, trace bitumen on edges of chips, (possibly fractured)

1620 m Shale, 10%, cavings predominantly, trace green, fissile, platy, waxy shale, with interbedded pyrite, Dolomite, 90%, light brown, buff, white, micro to very fine crystalline, occasionally medium fragments, slightly to very calcareous, dense, trace pyrite, light pink to red ferric stain, occasional trace chert

1625 m Dolomite, 100%, as above, abundant pink stain, trace pyrite, trace green shale, as above, trace chert fragments

Sample Descriptions

1630 m Dolomite, 100%, as above, very fragmental, medium fragments

1635 m Dolomite, 80%, as above in part, abundant silicified fossil fragments, trace crinoid stems, very fragmental, pink and green stain throughout, Chert, 20%, white, fragmental concretions (probably silicified fossil fragments)

1640 m Dolomite, 100%, white, buff, occasionally pink, micro to very fine crystalline in part, fragmental, fossiliferous, trace crinoid stems, dense, trace bituminous in fractures, occasional trace chert, trace pyrite

1645 m Dolomite, 80%, as above, very fragmental, abundant pink stain, trace pyrite, Chert, 20%, white, fragmental, bituminous on fractured planes

1650 m Dolomite, 100%, as above, abundant gray-green, waxy shale, trace fractures, with clear calcite (fibrous)

1655 m Dolomite, 100%, white, buff, pink stain, micro to very fine crystalline, occasionally fragmental, occasionally fossiliferous, trace stylolites, trace pyrite, dense predominantly, abundant dark gray-green shale, waxy, pyritic

1660 m Dolomite, 100%, as above, abundant chert, brown, white, occasionally white, siliceous matrix, occasional minor pyrite inclusions

1665 m Dolomite, 100%, as above, abundant light brown, colored fragments in white siliceous matrix, trace selenite crystals

1670 m Dolomite, 90%, white, buff, micro crystalline, very fine crystalline, fragmental, fossiliferous in part, dense predominantly, occasionally pink-orange stain, occasionally green waxy shale, Chert, 10%, white, fragmental, metasomatic fossil replacement ?

1675 m Dolomite, 100%, as above, trace chert, trace stylolites

1680 m Dolomite, 100%, as above, trace chert, trace gray, crypto crystalline, dolomitic, occasional green stain

1685 m Dolomite, 100%, white, buff, micro crystalline in part, very fine crystalline in part, fine to medium fragments, fossiliferous in part, dense, trace chert, trace red and green stain, trace dark gray-green, waxy shale, occasional minor pyrite inclusions

1690 m Dolomite, 100%, as above, occasional chert, occasionally light brown, crypto crystalline sections

1695 m Dolomite, 100%, as above, trace green, waxy shale, with pyrite inclusions

1700 m Dolomite, 100%, white with occasional green stains, micro crystalline predominantly, slightly to very calcareous, occasionally pyritic, dense

Sample Descriptions

1705 m Dolomite, 100%, as above, trace pink staining, fragmental in part, trace pyrite

1710 m Dolomite, 90%, as above predominantly, trace gray, crypto crystalline, slightly calcareous, slightly argillaceous with shale laminations, dense, Shale, 10%, dark gray to dark gray-brown, fissile, trace pyrite, very hard

1715 m Dolomite, 80%, as above, very fossiliferous in part, fragmental, trace pyrite, Shale, 20%, as above, hard

1720 m Dolomite, 80 white, buff, occasionally pink and green staining, micro to very ne crystalline, occasionally coarsely fragmental, slightly calcareous, dense, trace pyrite, trace stylolites, Shale, 20%, dark gray-green, dark gray, fissile, carbonaceous, very hard, trace pyrite

1725 m Dolomite, 90%, as above, occasional trace brown, crypto crystalline with very poor vuggy porosity, Shale, 10%, as above

1730 m Shale, 10%, cavings predominantly, trace green, waxy shale, Dolomite, 90%, white, buff, as above, fragmenta' predominantly, fossiliferous, trace stylolites, trace pyrite

1735 m Dolomite, 100%, white, buff, coarsely crystalline, fragmental predominantly, micro to very fine crystalline in part, slightly to very calcareous, trace gray, crypto crystalline, argillaceous, dense, trace stylolites, trace pyrite

1740 m Shale, 40%, cavings, Dolomite, 60%, as above, abundant gray, crypto crystalline dolomite

1745 m Shale, 50%, cavings, Dolomite, 50%, as above in part, gray, dark gray with white crystalline interbeds, crypto to micro crystalline, argillaceous, slightly calcareous, dense, with trace pyrite and oil

1750 m Shale, 20%, cavings, Dolomite, 80%, white, as above in part, dark gray predominantly as above, abundant dead oil staining, trace calcite filled vugs

1755 m Dolomite, 100%, dark gray to gray-brown, brown-white, crypto crystalline in part, micro to fine crystalline, occasionally fragmental, slightly calcareous, trace dead oil, dense

1760 m Dolomite, 100%, as above, trace thin shale laminations, trace minor fractures

1765 m Dolomite, 100%, as above, trace dead oil on fracture planes, trace pyrite

Sample Descriptions

1770 m — Dolomite, 100%, white, gray-white, micro crystalline, slightly calcareous, occasionally very argillaceous with stylolites and thin shale laminations, gray, crypto crystalline, dense, trace well rounded coarse quartz grains

1775 m — Dolomite, 100%, as above, predominantly white to buff, as above, dark gray, crypto crystalline, argillaceous in part, dense

1780 m — Dolomite, 100%, as above, very argillaceous in part, trace dead oil

1785 m — Dolomite, 100%, dark gray predominantly, crypto to micro crystalline, occasional fragments with trace coarse, clear dolomitic rhombs, trace dead oil, dense, minor fracturing, trace dolomite fossil fragments, (possibly Amphipora?)

1790 m — Shale, 10%, black, dark gray, occasionally green, cavings ?, Dolomite, 90%, as above, trace fracturing, trace fossil remains, trace pyrite

1795 m — Shale, 30%, cavings, Dolomite, 70%, cavings from Mount Kindle predominantly

1800 m — Shale, 30%, cavings, Dolomite, 70%, abundant cavings, dark gray, gray-white, crypto crystalline, micro crystalline predominantly, argillaceous, calcareous, dense, trace fractures, trace calcite, occasional fossil remains, trace dead oil

1805 m — Shale, 20%, cavings predominant, Dolomite, 80%, as above, occasionally brown-white, abundant dead oil

1810 m — Dolomite, 100%, as above predominantly, occasionally white, brown-white, fragmental, fossiliferous, dense, abundant dead oil

1815 m — Dolomite, 100%, white, fragmental, brown, gray-white, dark gray, micro crystalline, slightly calcareous, dense, abundant dead oil, trace pyrite, trace dark gray-green, waxy, shale, with pyritic inclusions

1820 m — Shale, 20%, dark gray-black, blocky, dull lustre, carbonaceous, hard, Dolomite, 80%, as above, trace dead oil staining, trace fossil remains

1825 m — Dolomite, 100%, dark gray in part, brown to buff predominantly, very fine crystalline, fragmental, fossiliferous, dense, trace stylolites, trace dead oil

1830 m — Dolomite, 100%, light gray-brown, micro to very fine crystalline, calcareous, fossiliferous in part, dense, trace calcite filled fractures, trace chert, trace stylolites

1835 m — Dolomite, 100%, as above, predominantly, trace dark gray, crypto crystalline, argillaceous, dense, abundant dead oil in fractures

Sample Descriptions

1840 m Dolomite, 100%, gray-brown, brown, dark gray, micro crystalline predominantly, occasionally very fine crystalline, fossiliferous in part, dense, bituminous streaks throughout, occasional trace pyrite

1845 m Dolomite, 100%, as above, fossilized reef remains, dolomitized, slightly calcareous, dense, occasional trace dead oil

1850 m Dolomite, 100%, gray-brown to dark gray, micro crystalline, fossil remains, slightly to very calcareous, dense, very argillaceous in part, with thin shale laminations

1855 m Dolomite, 100%, gray-brown predominantly, micro to very fine crystalline, fossiliferous, trace stylolites, dead oil on fracture planes, slightly calcareous, dense

1860 m Dolomite, 100%, as above, brown-white, coarsely fragmental, fossiliferous, trace shell fragments, trace chert, trace pyrite, trace dead oil

1865 m Dolomite, 100%, white to buff, crypto crystalline in part, micro crystalline predominantly, calcareous, dense, occasional trace dead oil, trace fossil remains

1870 m Dolomite, 100%, white to light brown, micro to very fine crystalline, calcareous, dense with trace calcite filled vugs, trace chert, occasional dead oil, trace pale yellow, white mineral fluorescence

1875 m Dolomite, 100%, as above, trace dark brown, crypto crystalline, argillaceous, dense

1880 m Dolomite, 100%, as above in part, light brown predominantly, micro crystalline predominantly, calcareous, dense

1885 m Dolomite, 100%, white to light brown, micro crystalline, calcareous, dense, occasional trace thin, dark gray shale laminations

1890 m Dolomite, 100%, as above, trace chert, oolitic, metasomatic

1895 m Dolomite, 100%, as above in part, dark gray, micro crystalline, pelletal, dense, occasional trace shale, trace dead oil

1900 m Dolomite, 100%, as above in part, dark gray to dark gray-brown, dark brown, crypto crystalline, argillaceous, slightly calcareous, dense

1905 m Dolomite, 100%, as above, trace shaly section, with occasional dead oil and bitumen streaks

1910 m Dolomite, 100%, light brown, buff, micro crystalline, calcareous, dense, trace dark gray-brown, as above

1915 m Dolomite, 100%, as above, mottled dark gray, white, light brown, micro crystalline, calcareous, argillaceous, dense, abundant dead oil through-

out and on fracture planes

1920 m Dolomite, 100%, light brown to buff, as above, micro to very fine crystalline

1925 m Dolomite, 100%, white predominantly, micro to very fine crystalline, calcareous, fossiliferous in part, dense with trace very poor intercrystalline porosity, occasionally dark gray, shaly dolomite, with fossil imprints

1930 m Dolomite, 100%, dark gray, micro to very fine crystalline, pelletal in part, occasionally crypto crystalline, dense, argillaceous in part, trace fossil remains

1935 m Dolomite, 100%, dark gray, gray-white, micro to very fine crystalline, fragmental in part, fossiliferous, bitumen streaks, slightly to very calcareous, argillaceous, dense, fossil remains, calcite filled micro fractures

1940 m Dolomite, 100%, as above in part, light brown, gray-brown, micro to very fine crystalline, calcareous, dense, trace selenite crystals

1945 m Dolomite, 100%, as above, trace coarse fractured dolomite, trace fossil remains

1950 m Dolomite, 100%, as above, trace gray-brown, crypto crystalline, slightly argillaceous, dense

1955 m Dolomite, 100%, dark gray, mottled brown and white, fossiliferous, as above, dark gray, brown, crypto crystalline, slightly argillaceous in part, calcareous, dense

1960 m Dolomite, 100%, fossiliferous, as above in part, dark gray to gray-brown, crypto crystalline, as above

1965 m Dolomite, 100%, as above, trace dead oil

1970 m Dolomite, 100%, dark gray to dark gray-brown, crypto crystalline, slightly argillaceous, calcareous, dense, occasional trace dead oil

1975 m Dolomite, 100%, as above, trace dark gray, carbonaceous shale

1980 m Dolomite, 100%, as above, with interbedded light brown, micro crystalline, slightly argillaceous, dense, trace fractures with dead oil on fracture planes

1985 m Dolomite, 100%, dark brown, light brown, gray-brown, crypto crystalline predominantly, slightly argillaceous, calcareous, dense, trace dark gray, carbonaceous shale

Sample Descriptions

1990 m Dolomite, 100%, as above, trace shale, trace pelletal dolomite, cavings?

1995 m Dolomite, 100%, as above, slightly to very calcareous, argillaceous, dense

2000 m Dolomite, 100%, dark gray, dark gray-brown, crypto crystalline, argillaceous, slightly calcareous, dense

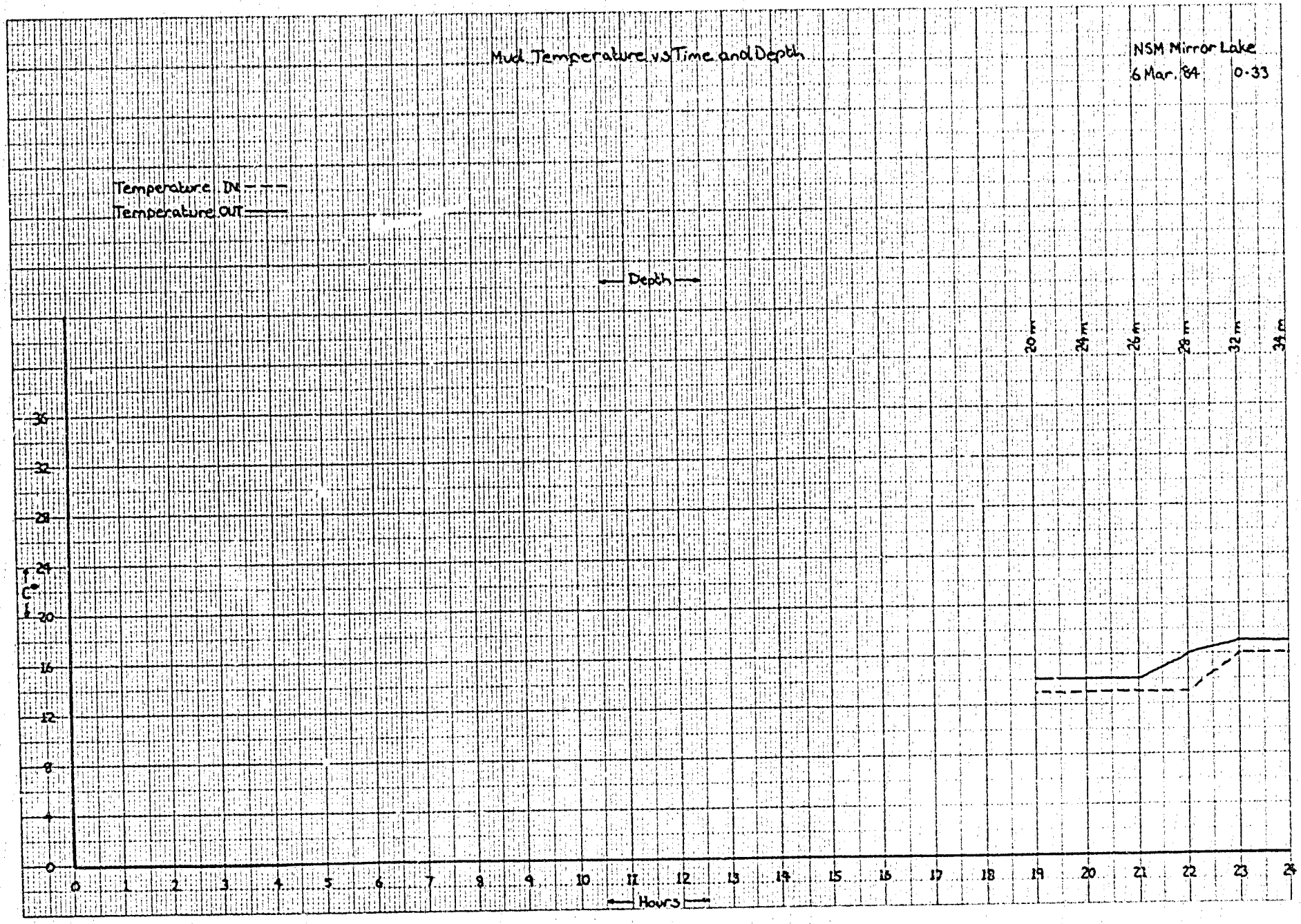
2005 m Dolomite, 100%, as above, trace calcite filled fractures or vugs

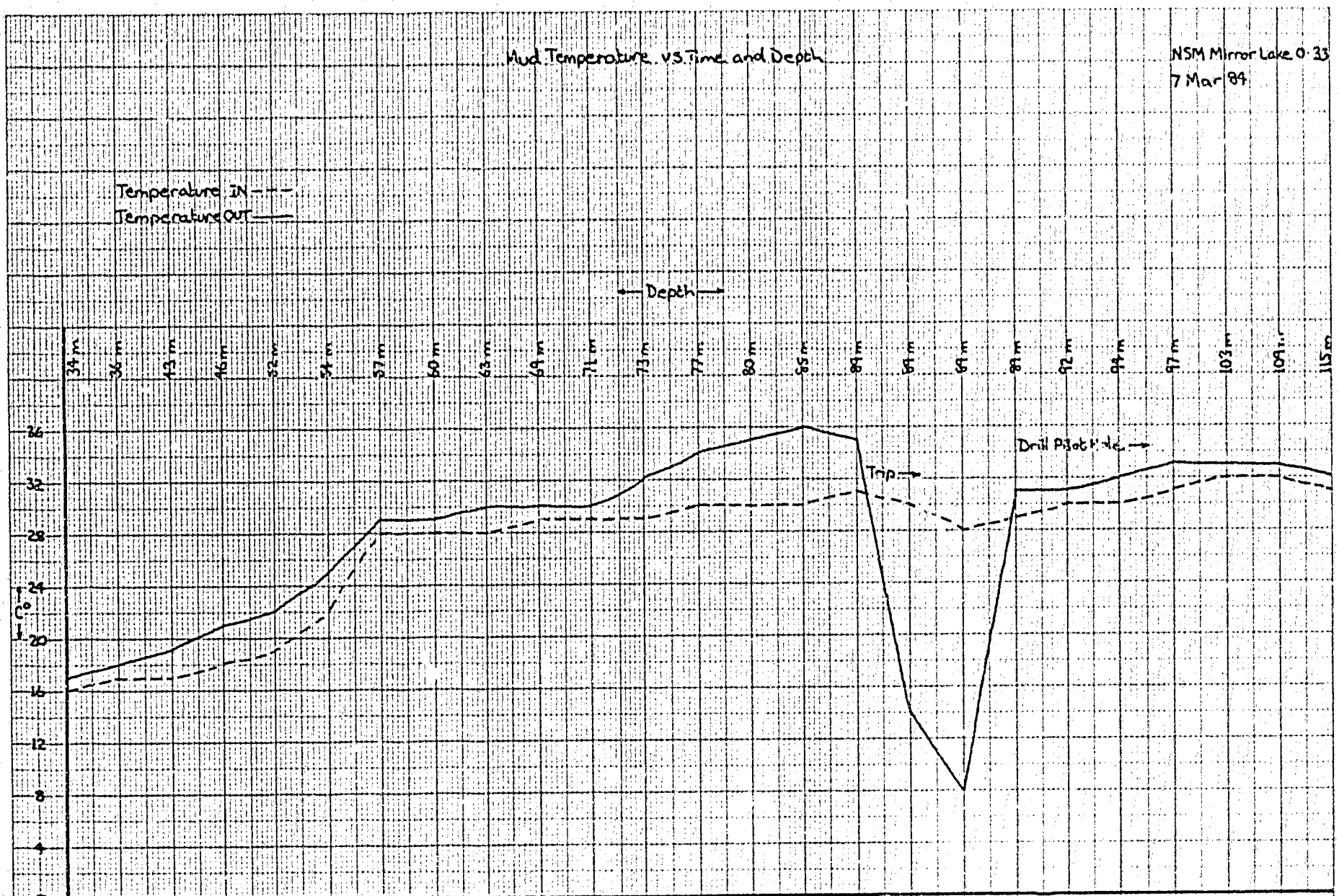
2010 m Dolomite, 100%, as above, trace dead oil on fracture planes

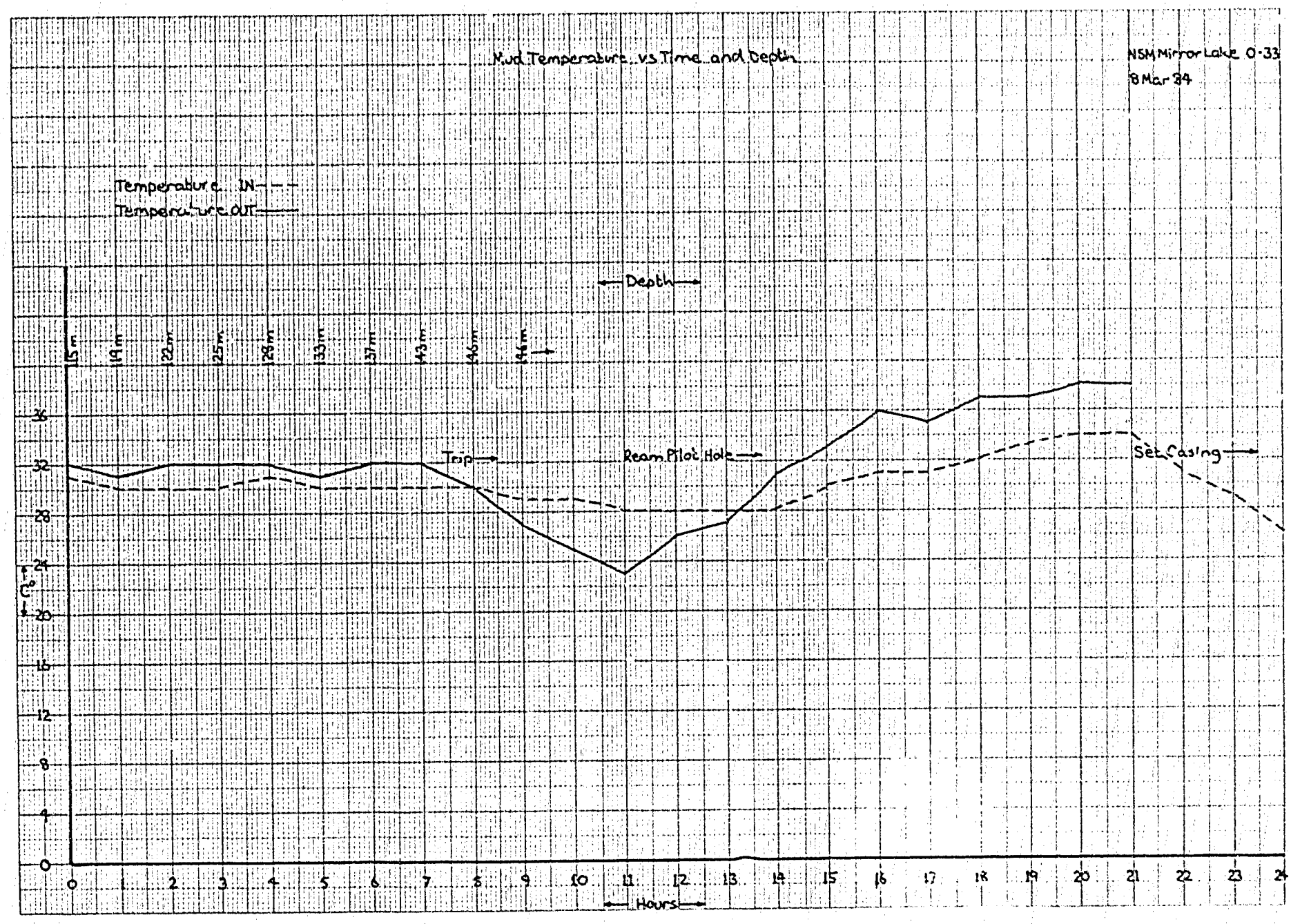
2015 m Dolomite, 100%, as above, crypto crystalline, very argillaceous, dense

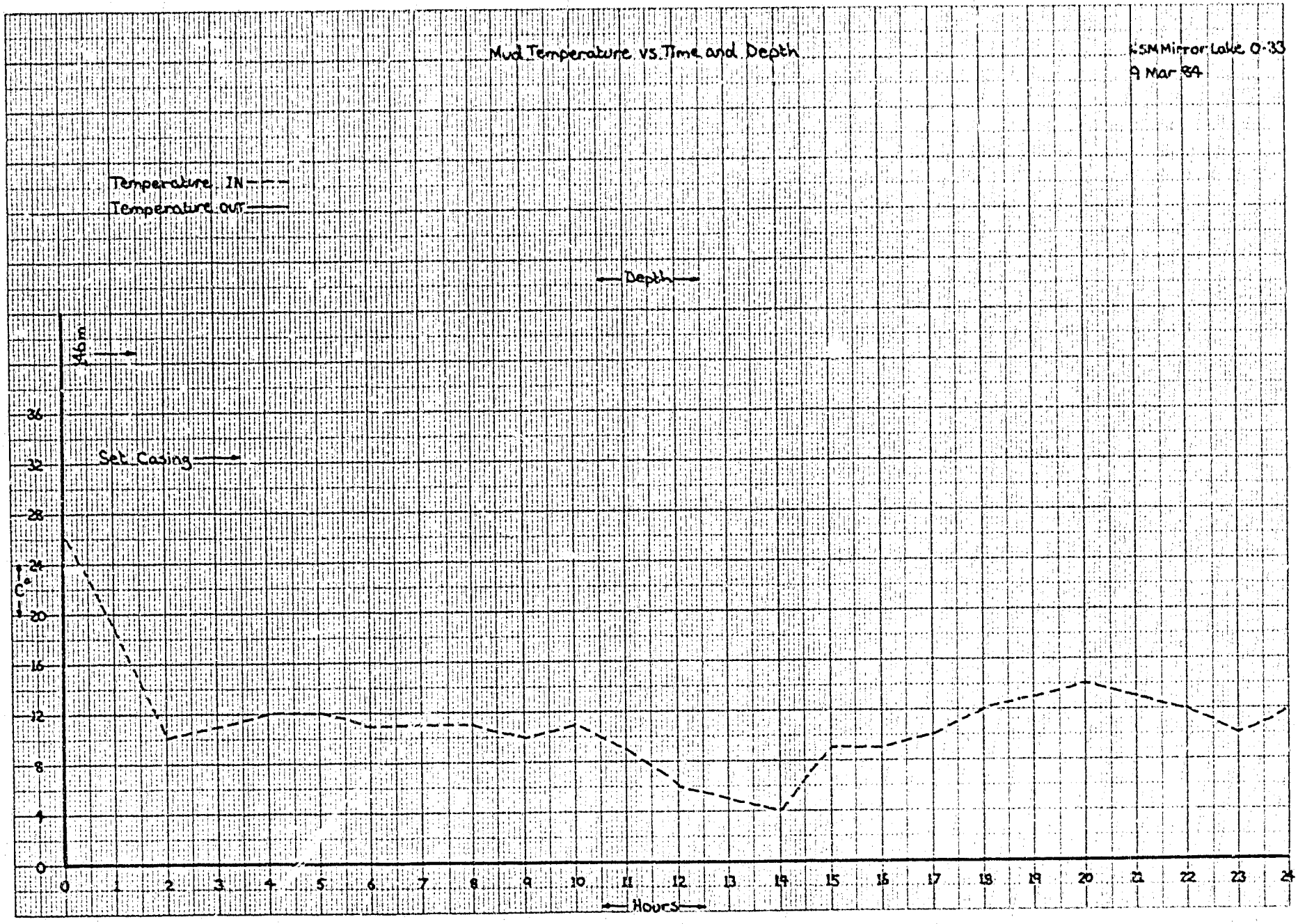
2020 m Dolomite, 90%, dark gray to dark gray-brown, crypto crystalline, occasionally micro crystalline, very argillaceous, dense, Shale, 10%, dark gray, blocky to fissile, carbonaceous, hard

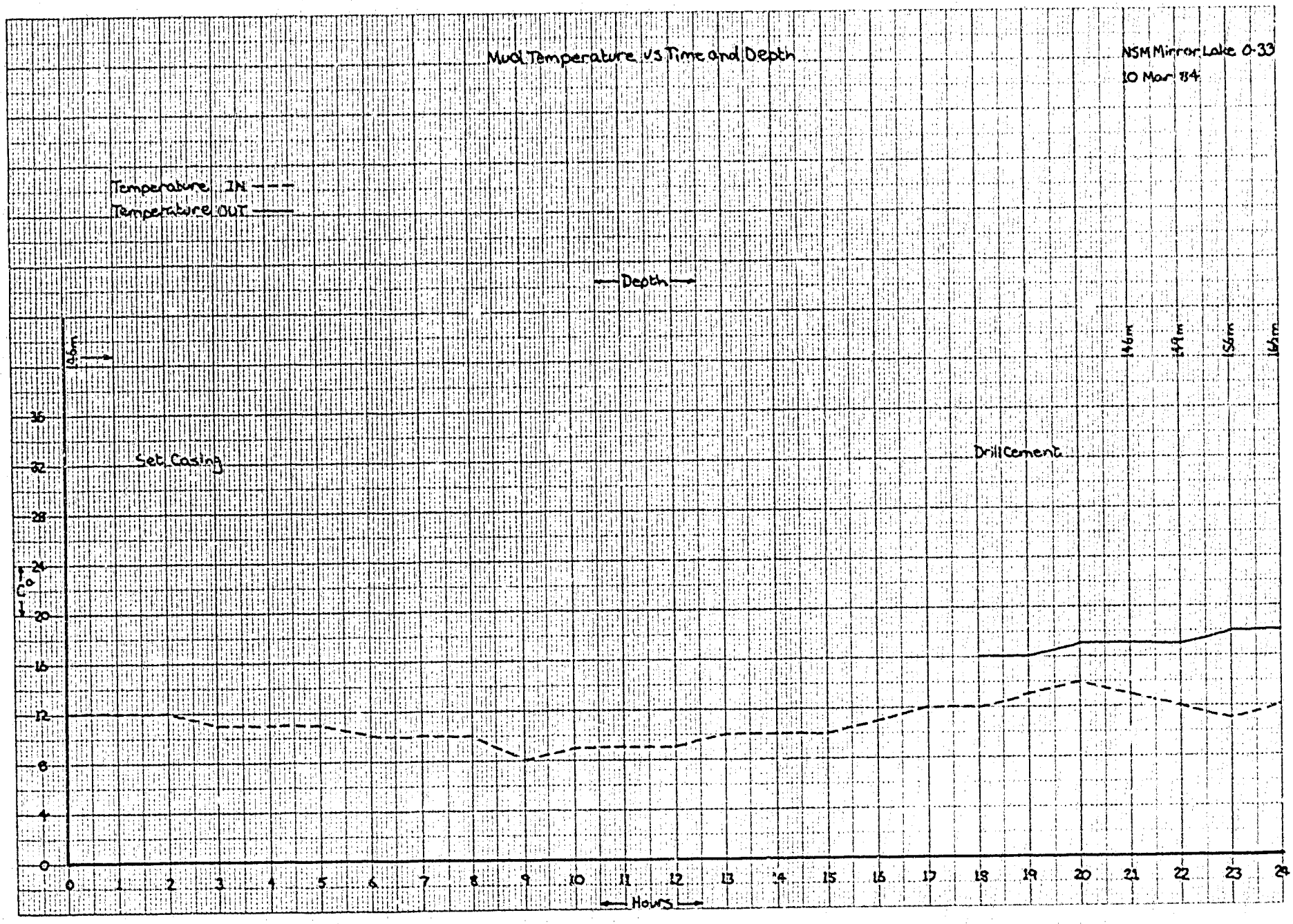
2025 m Dolomite, 100%, as above, trace very argillaceous, chalky, grading to dolomitic marl

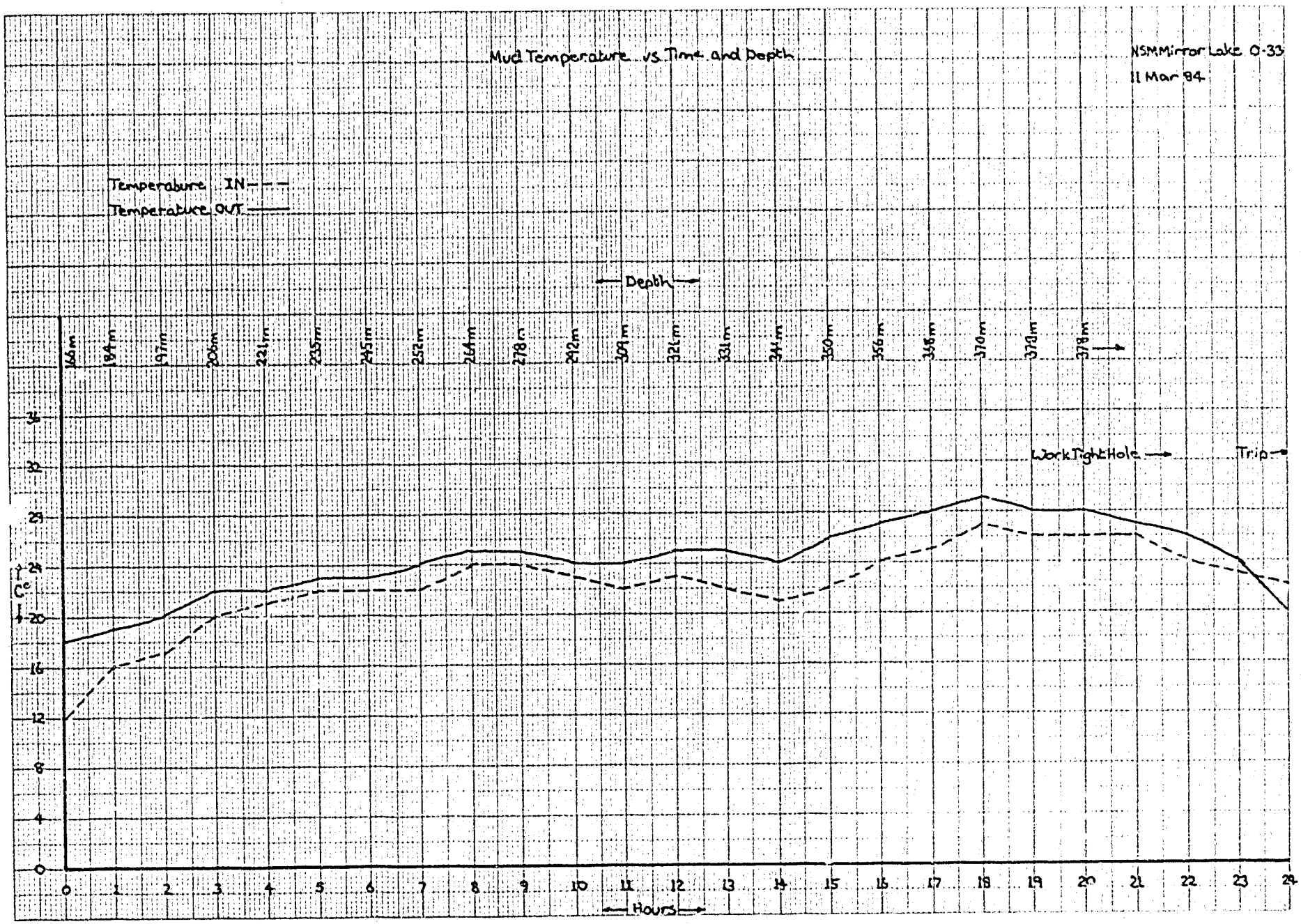


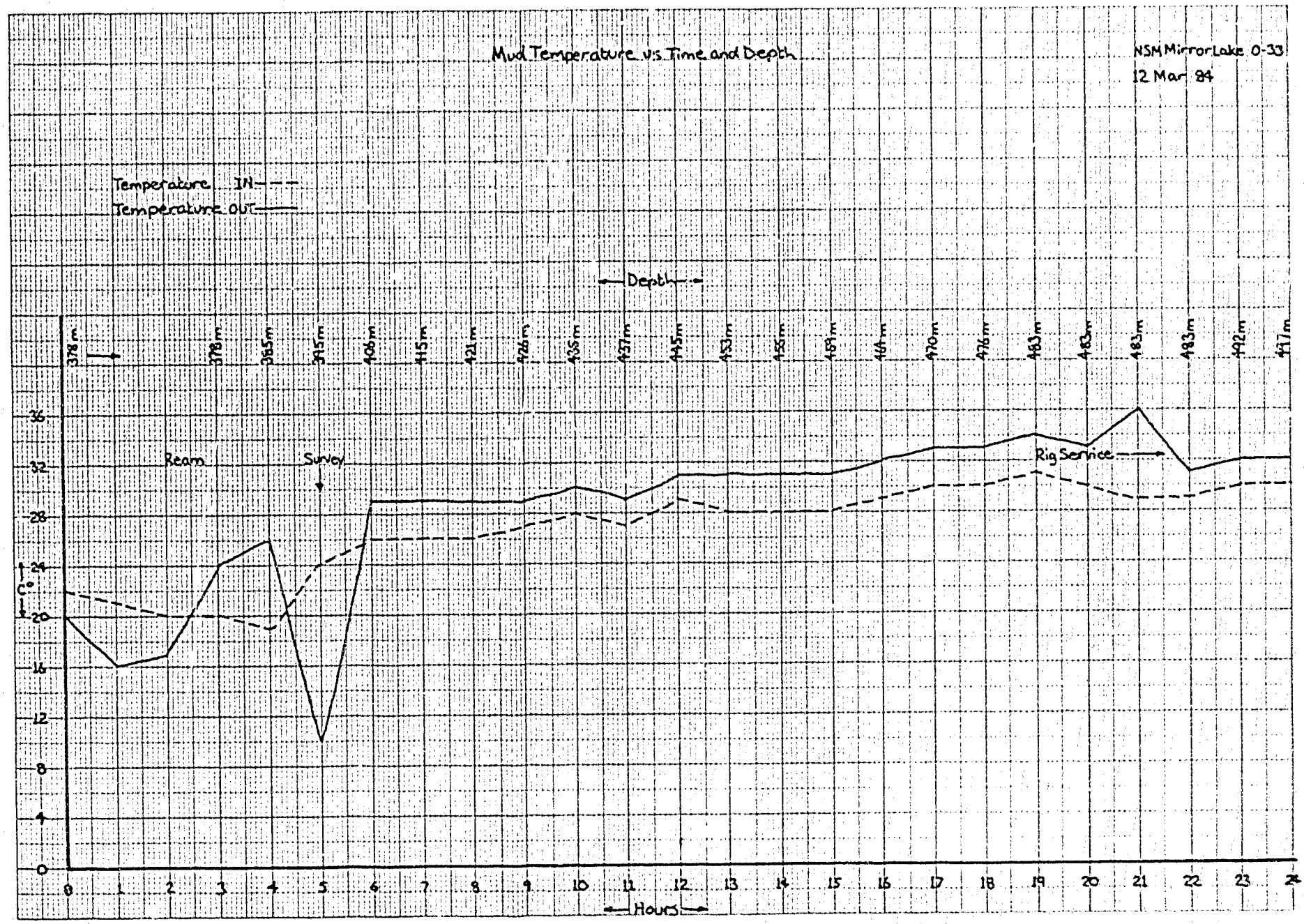


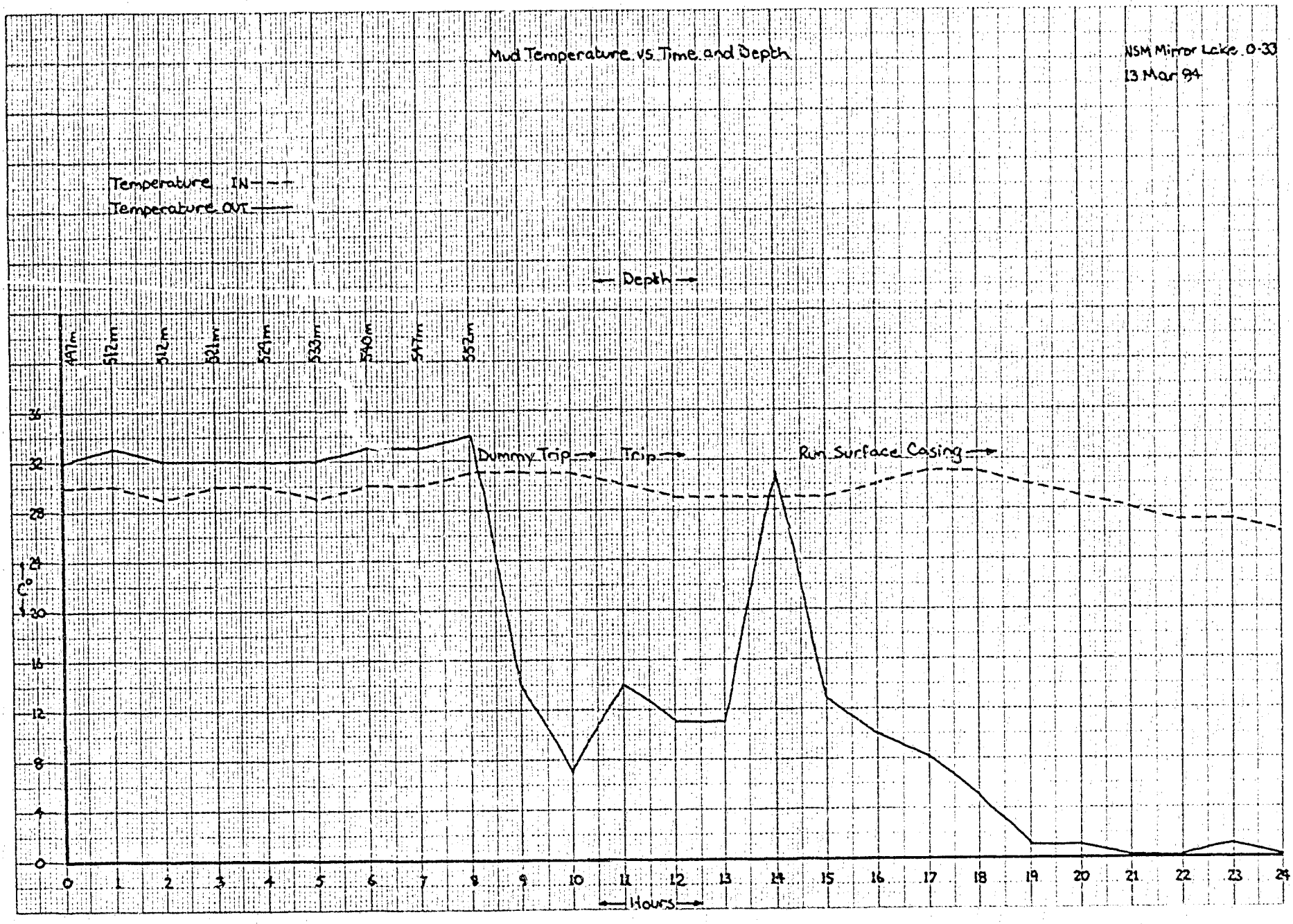


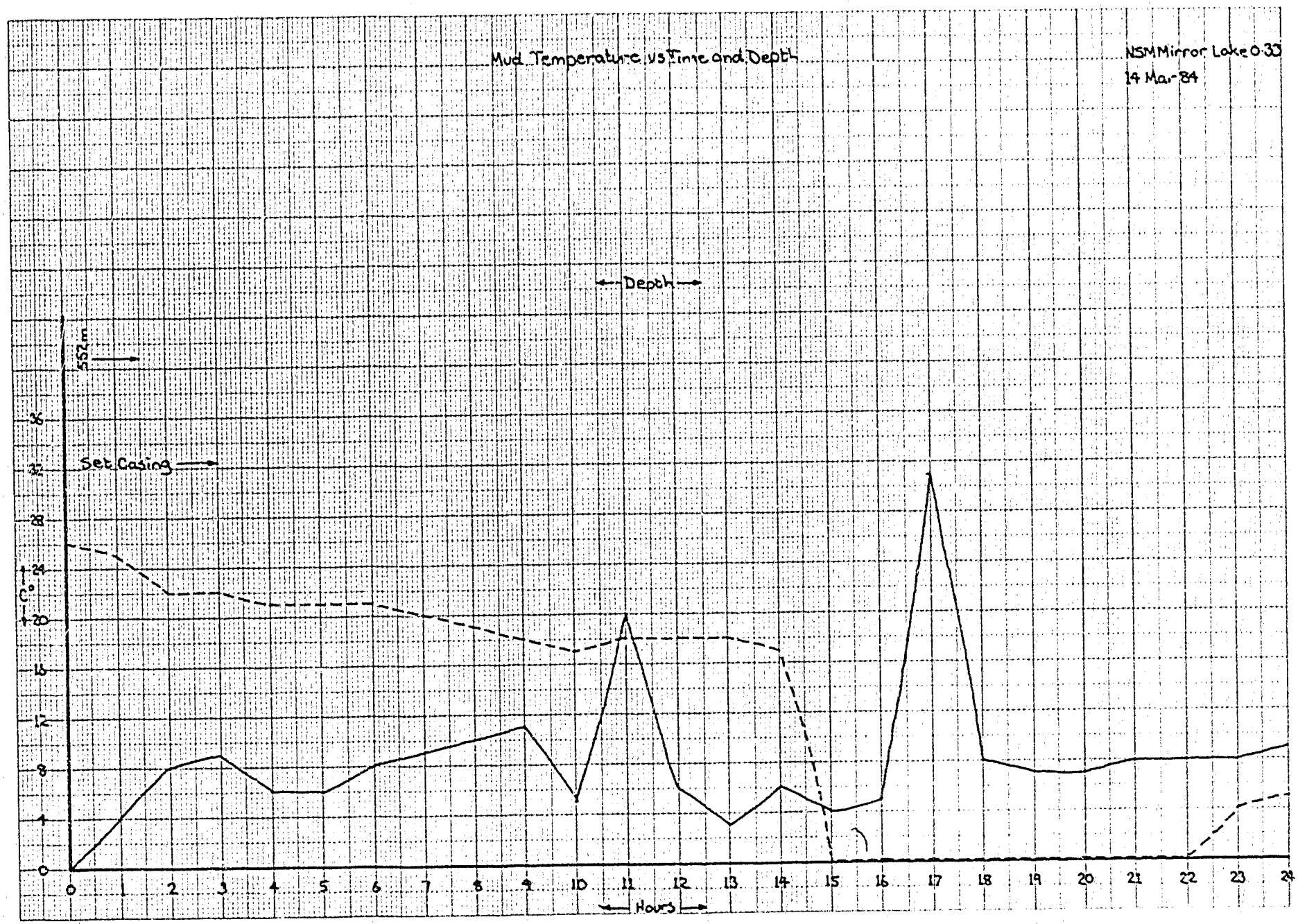


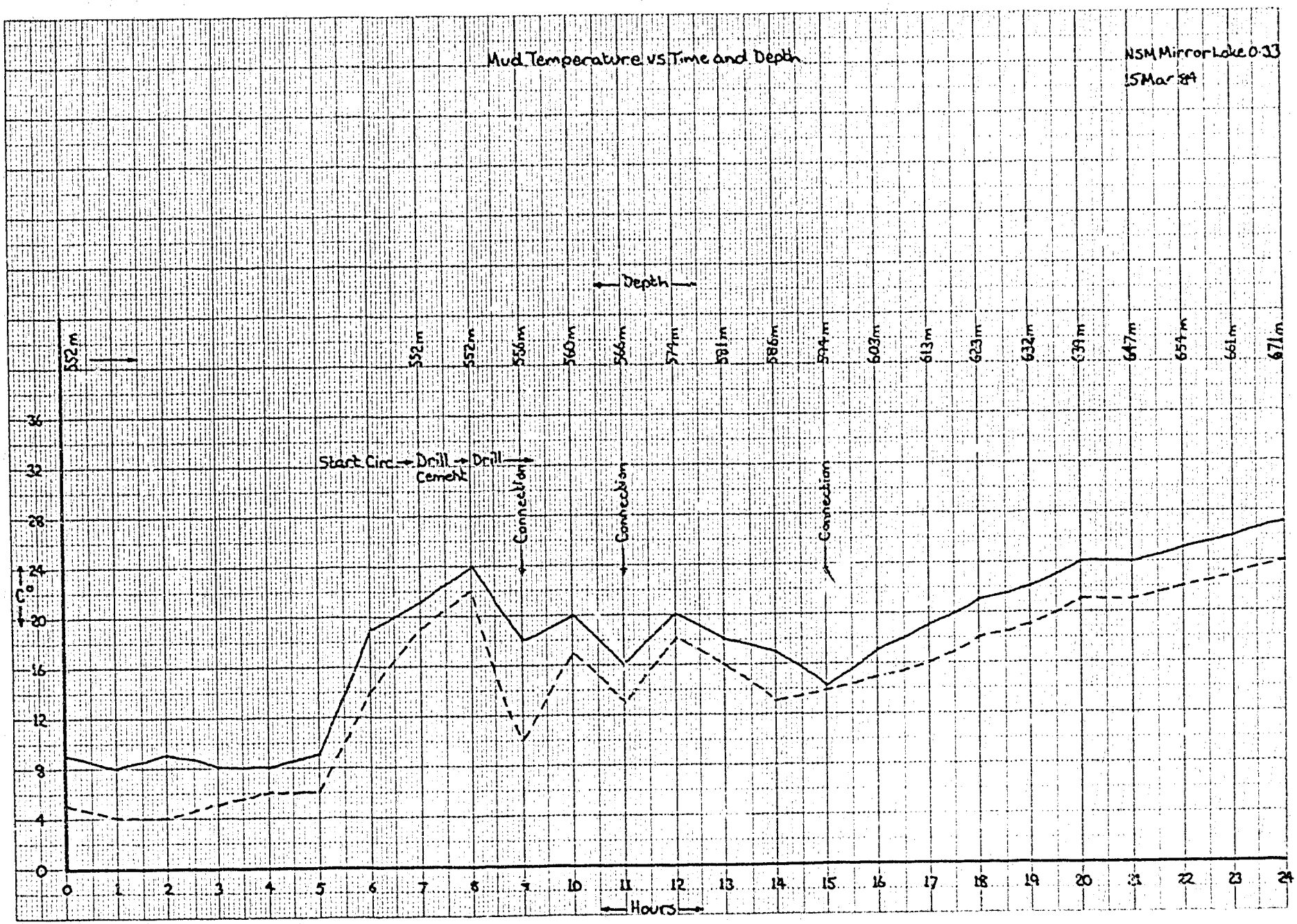


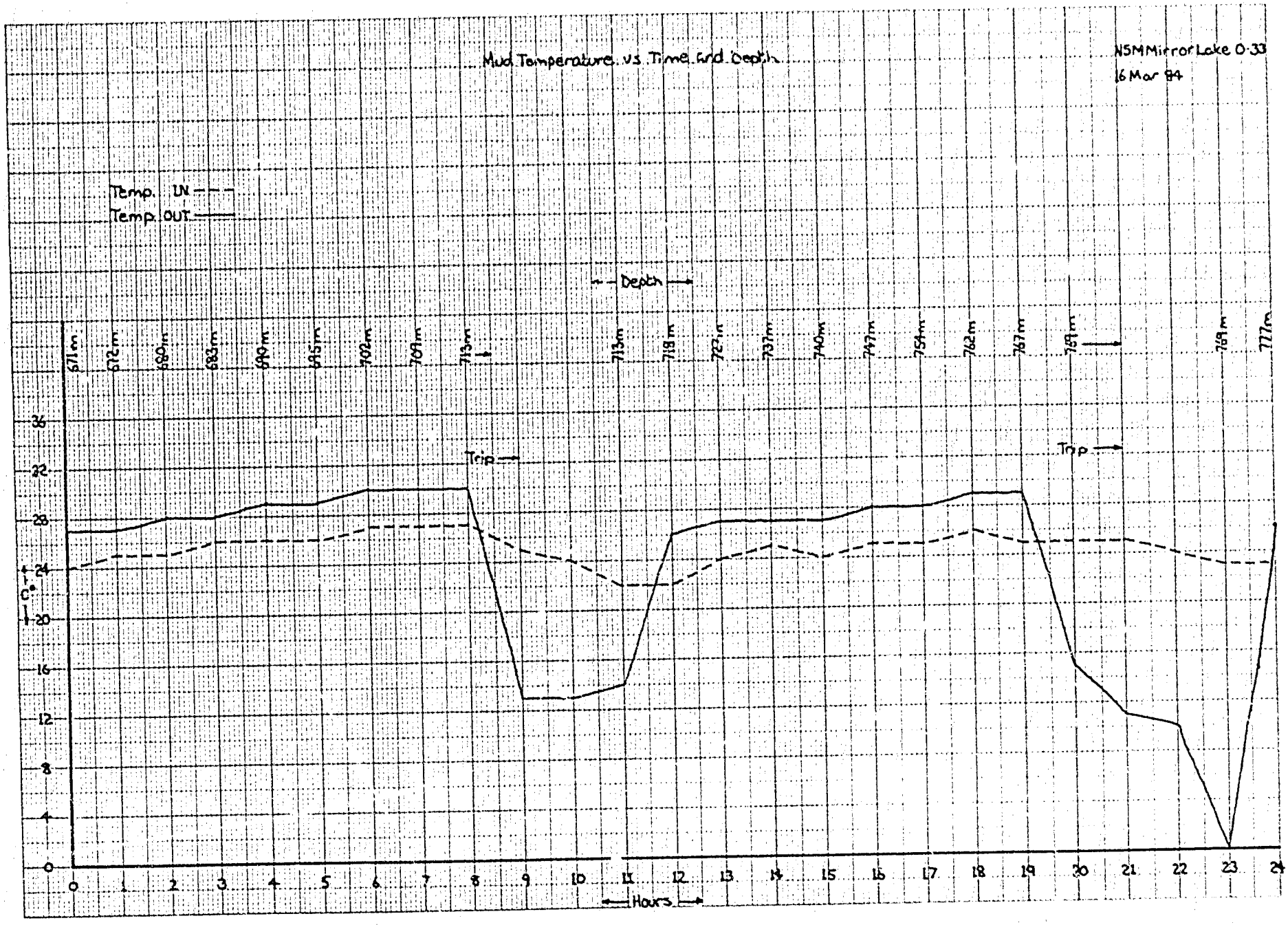


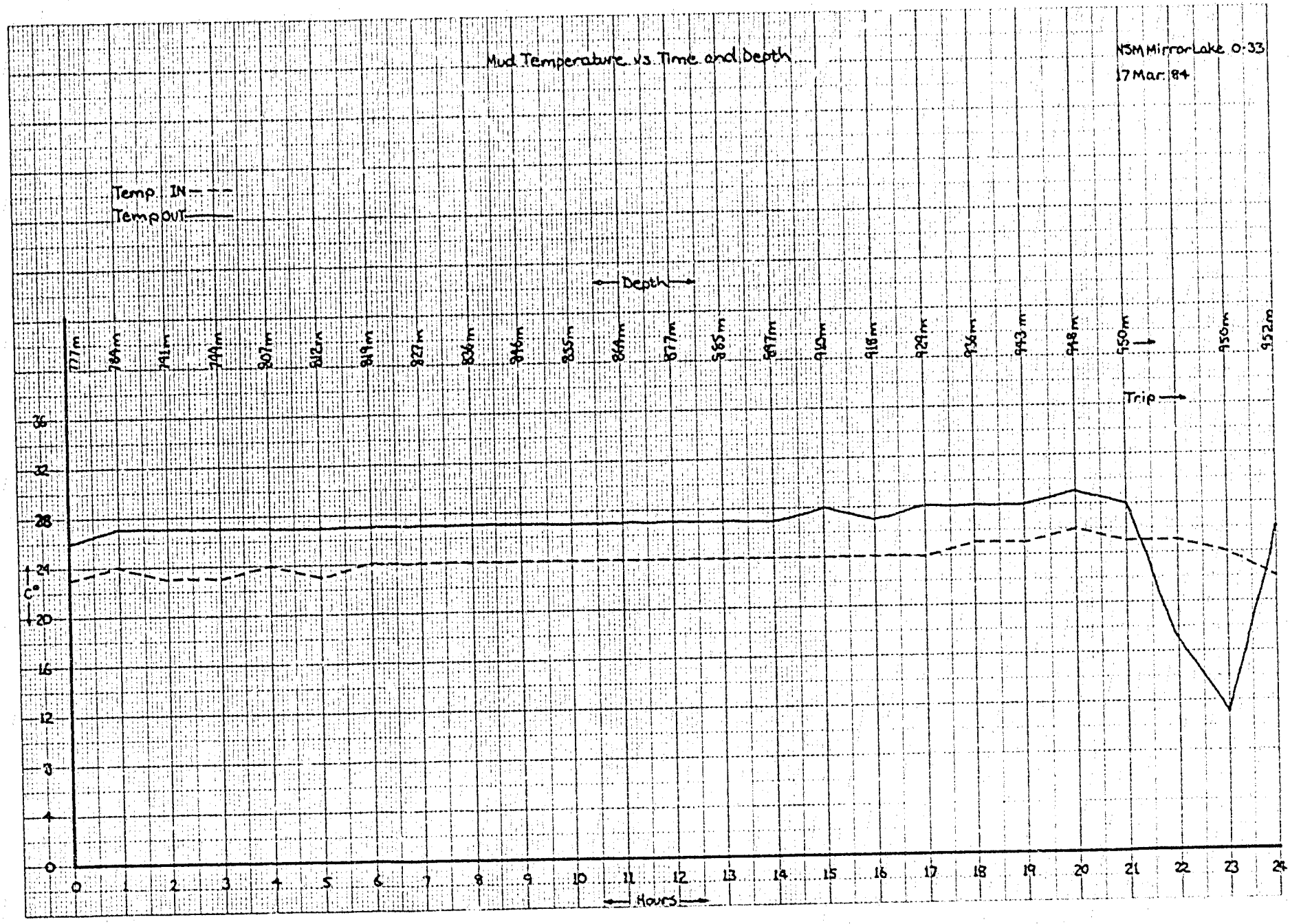


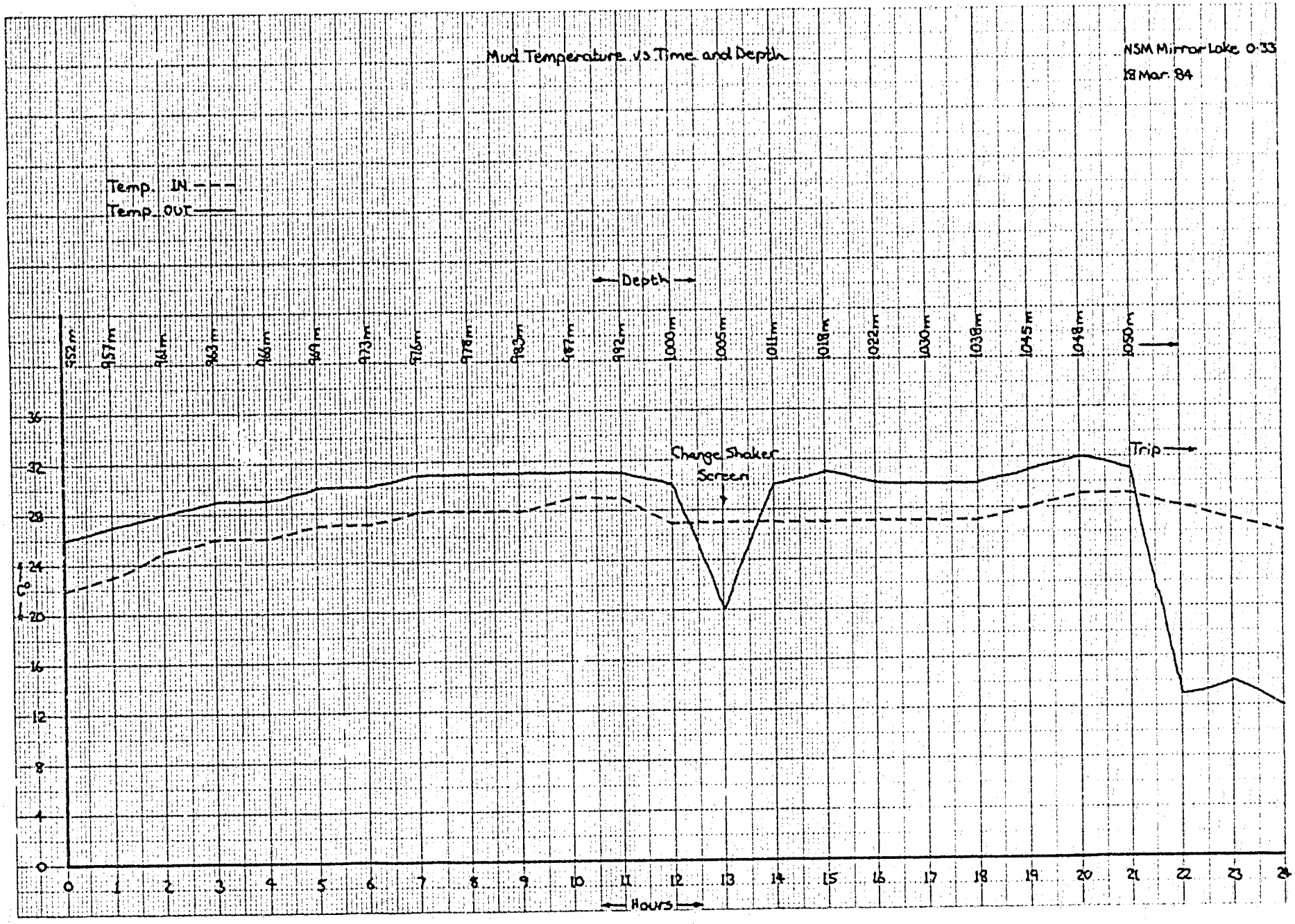


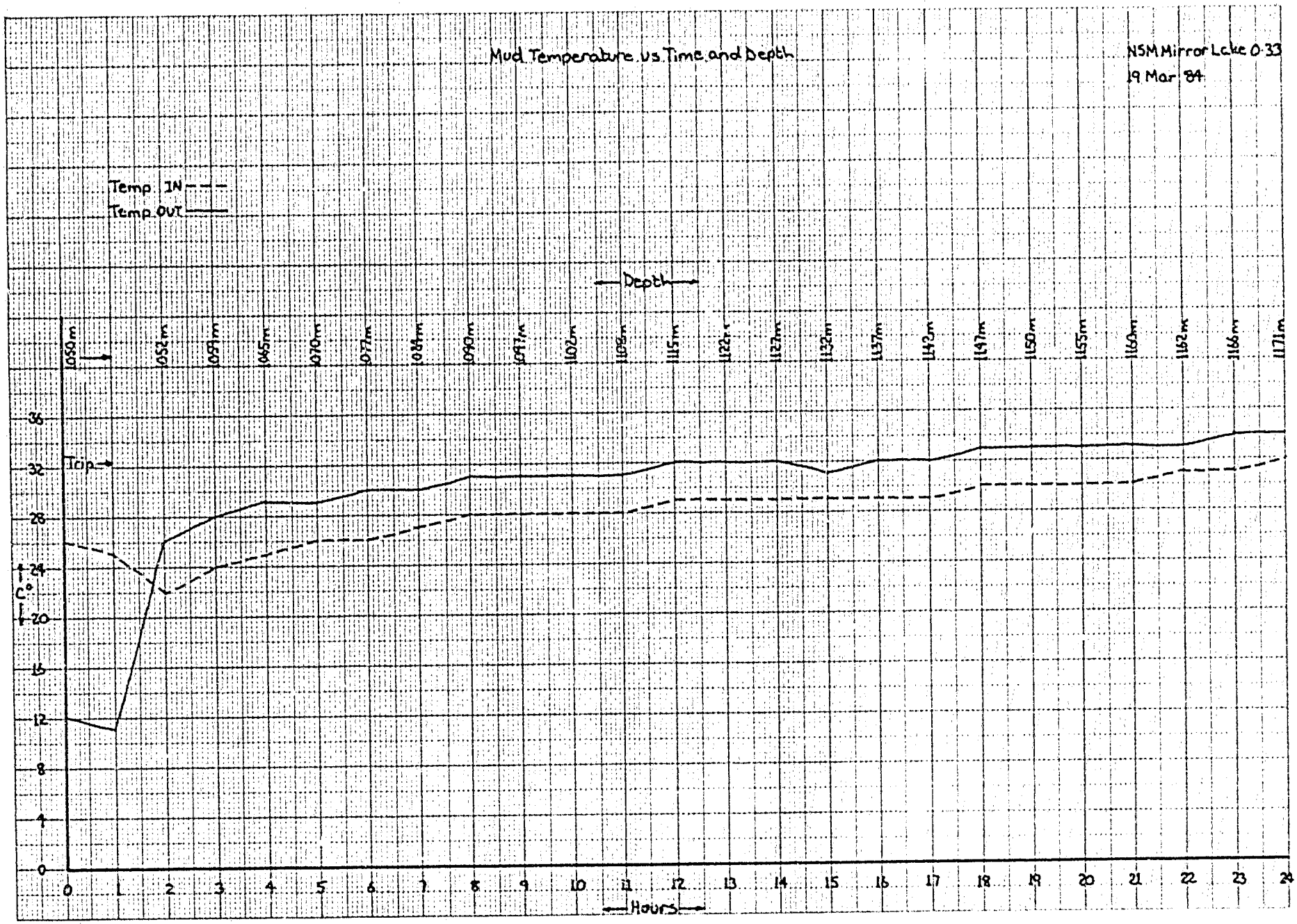


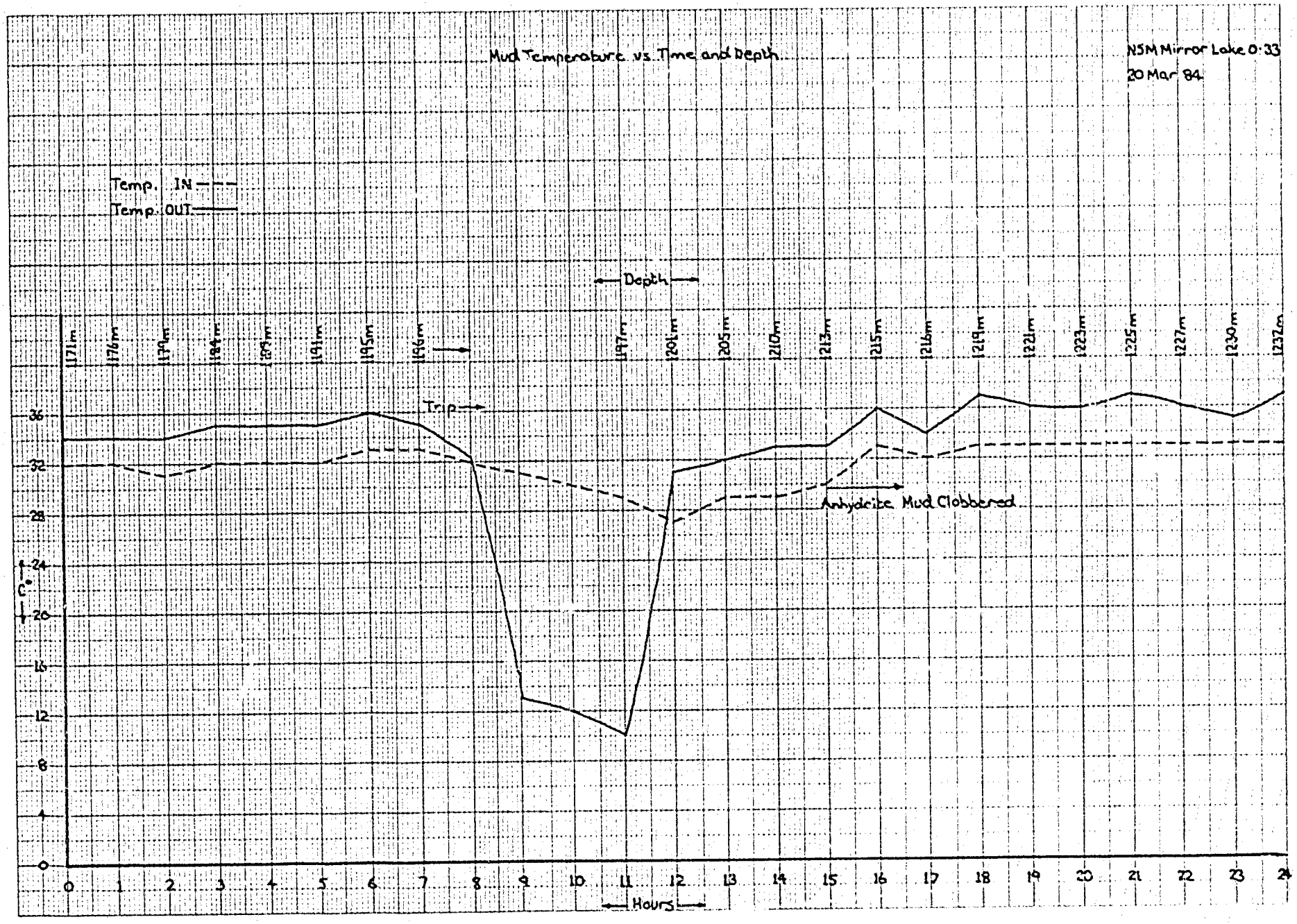


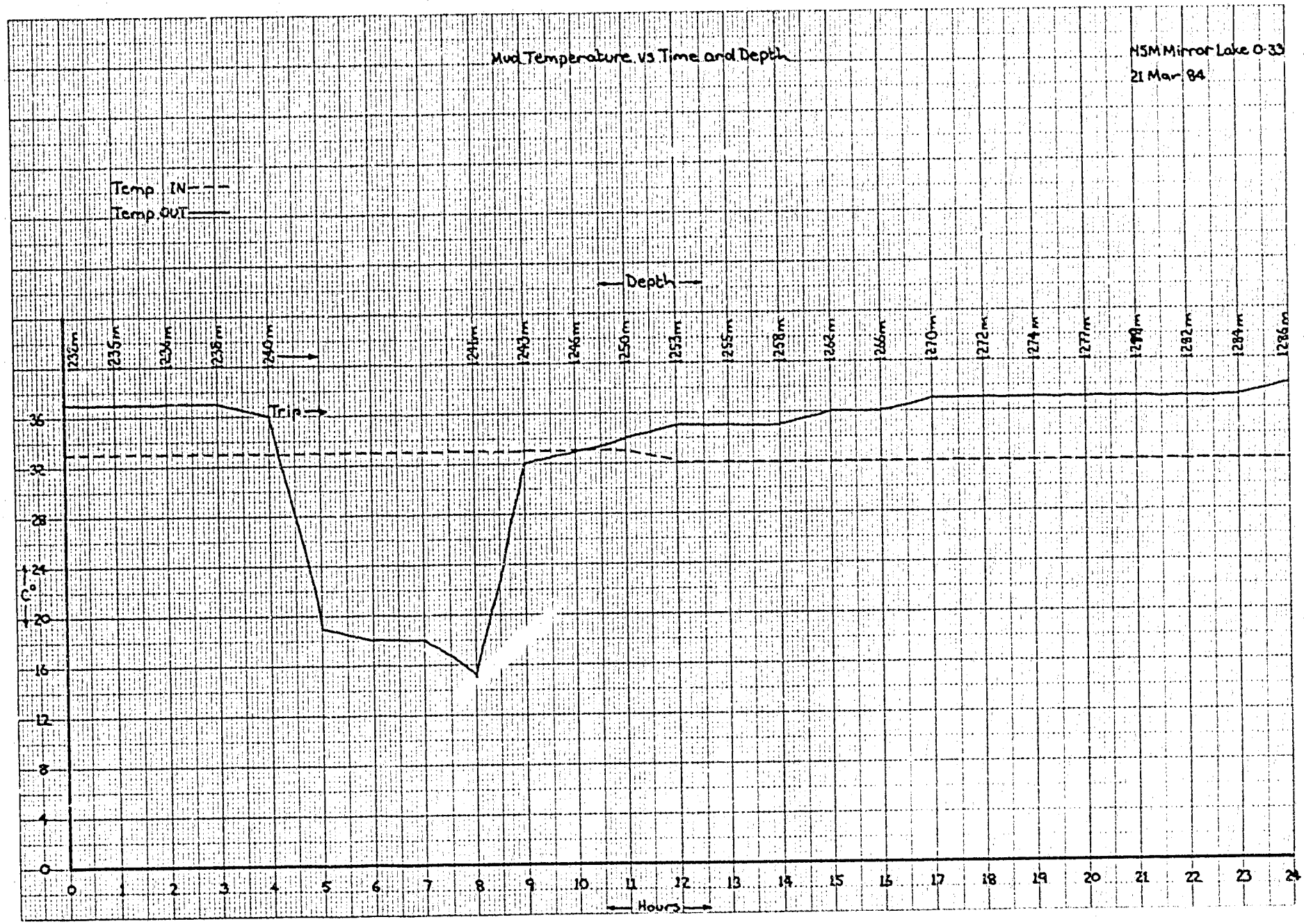


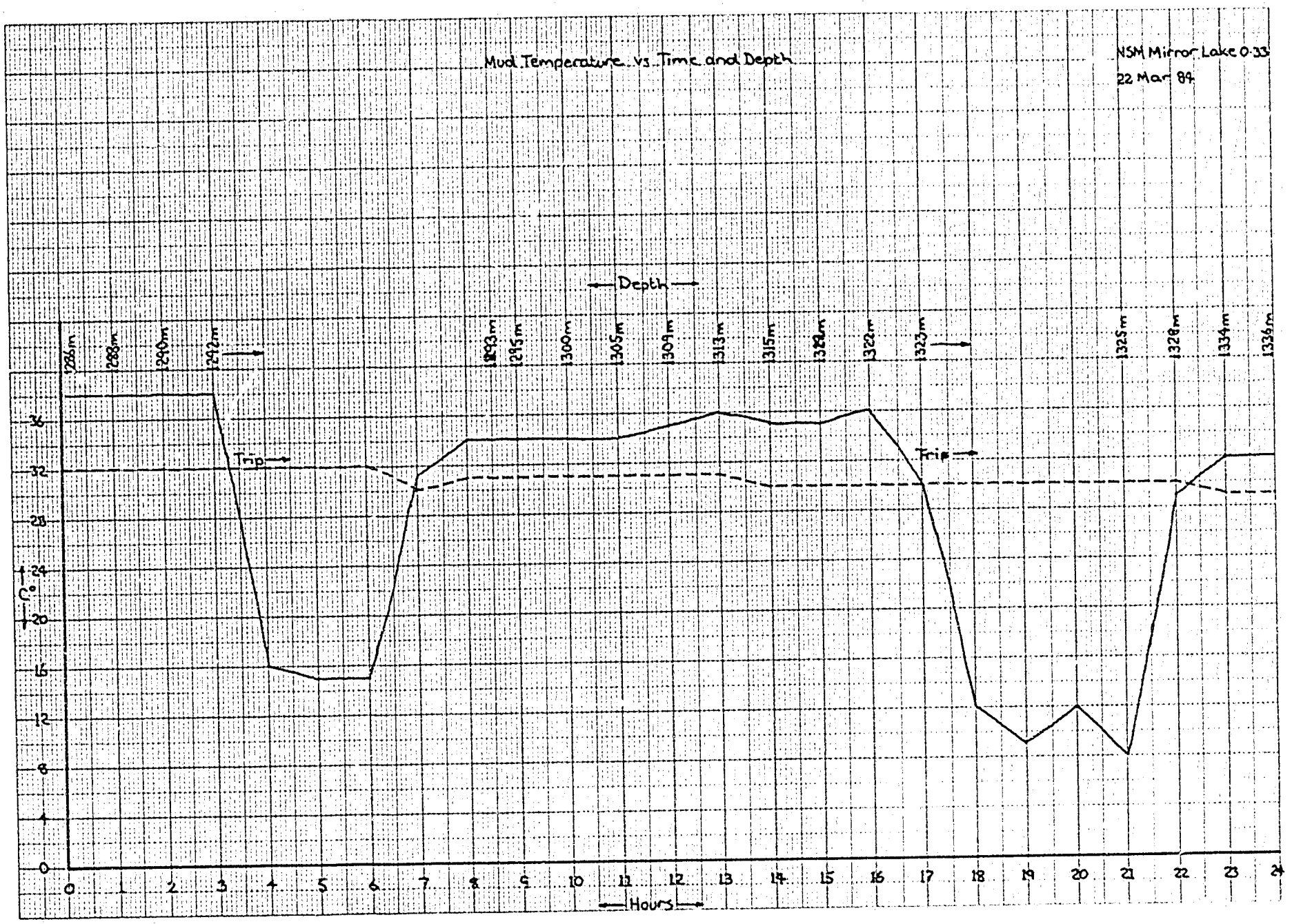


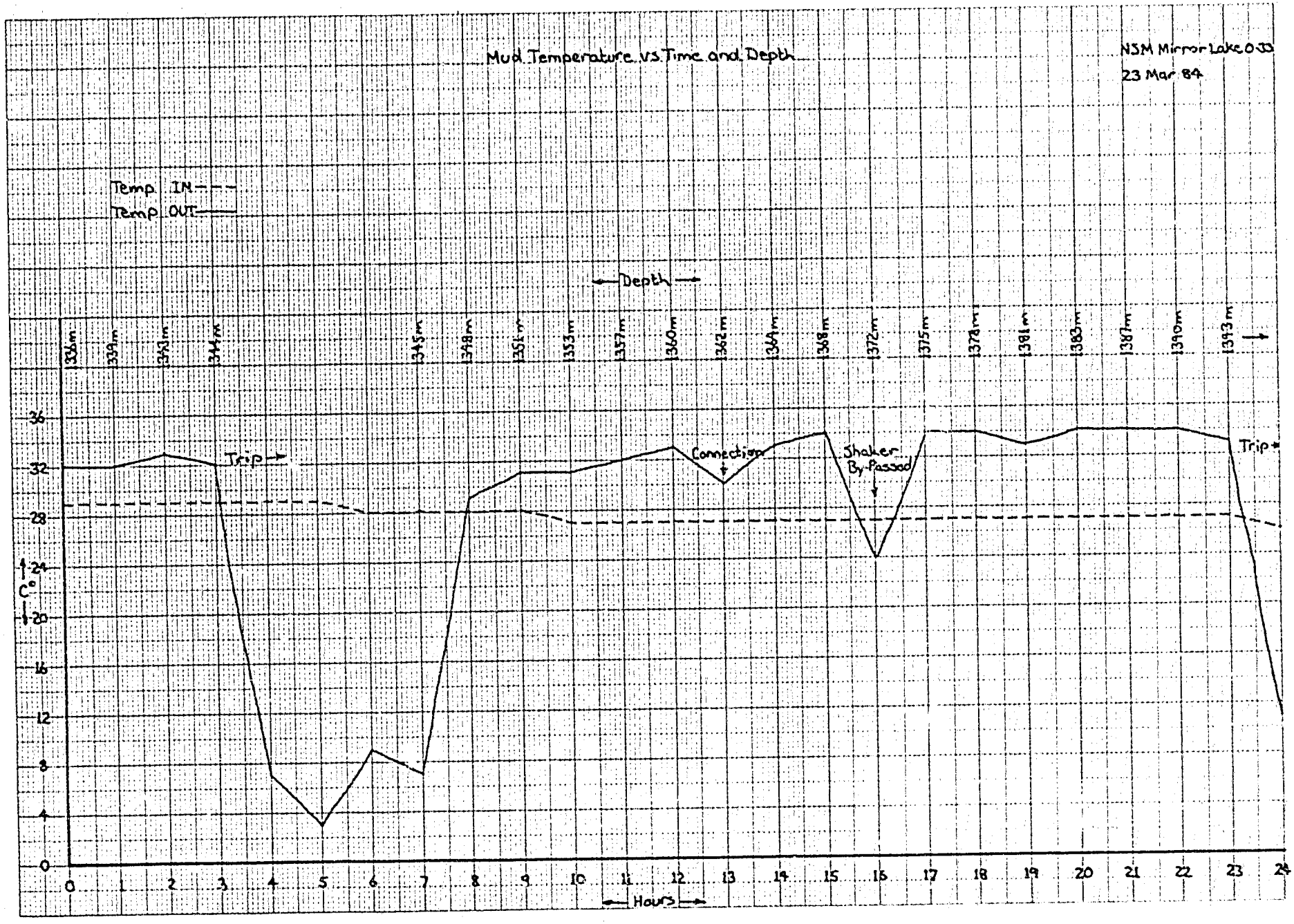


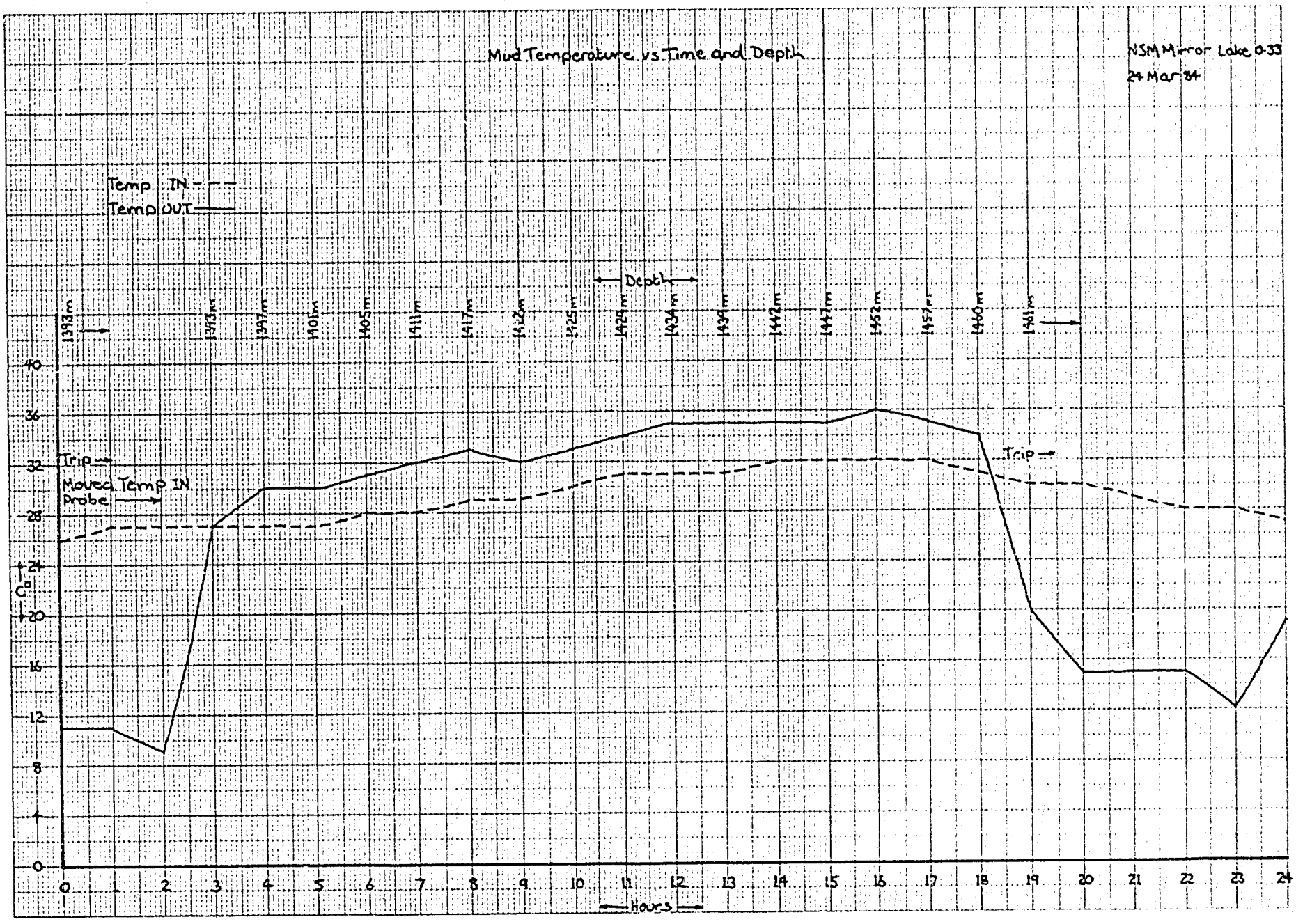


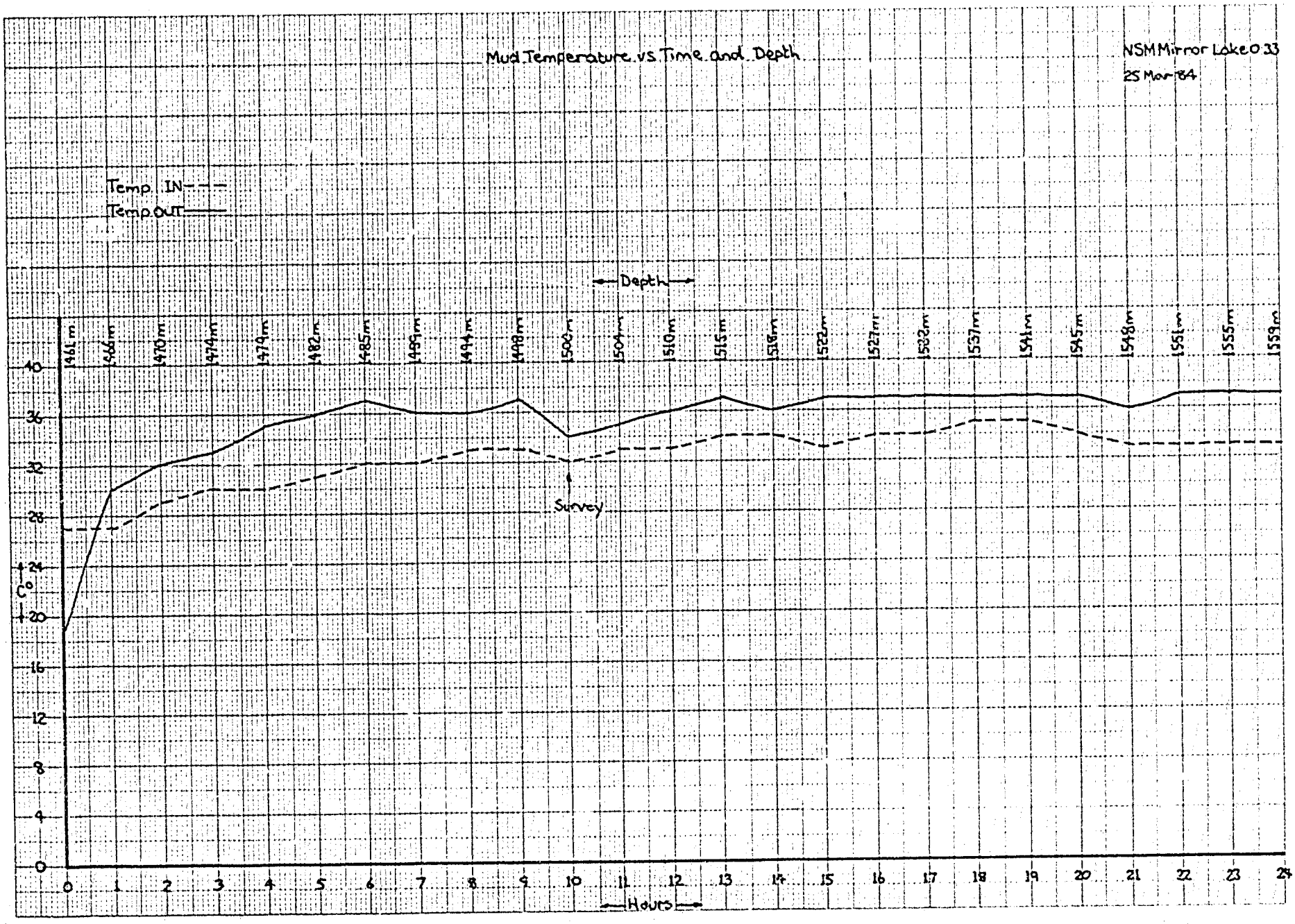


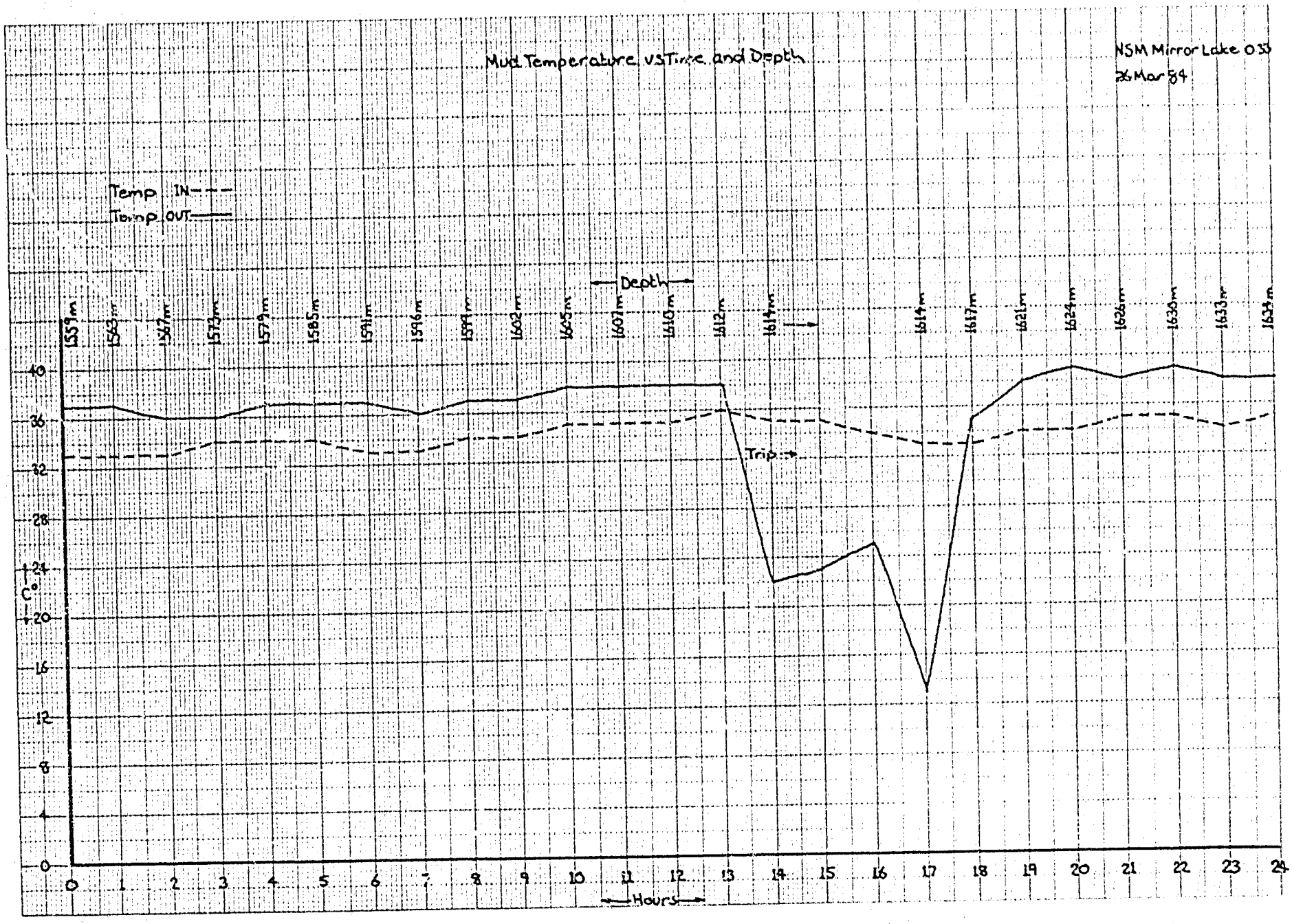











Mud Temperature vs Time and Depth
NSM Mirror Lake 033
26 Mar 84
Temp IN
Temp OUT
Depth
Trip
1559m
1563m
1567m
1573m
1579m
1585m
1591m
1596m
1599m
1602m
1605m
1607m
1610m
1612m
1614m
1614m
1617m
1621m
1624m
1628m
1630m
1633m
1634m
40
36
32
28
24
20
16
12
8
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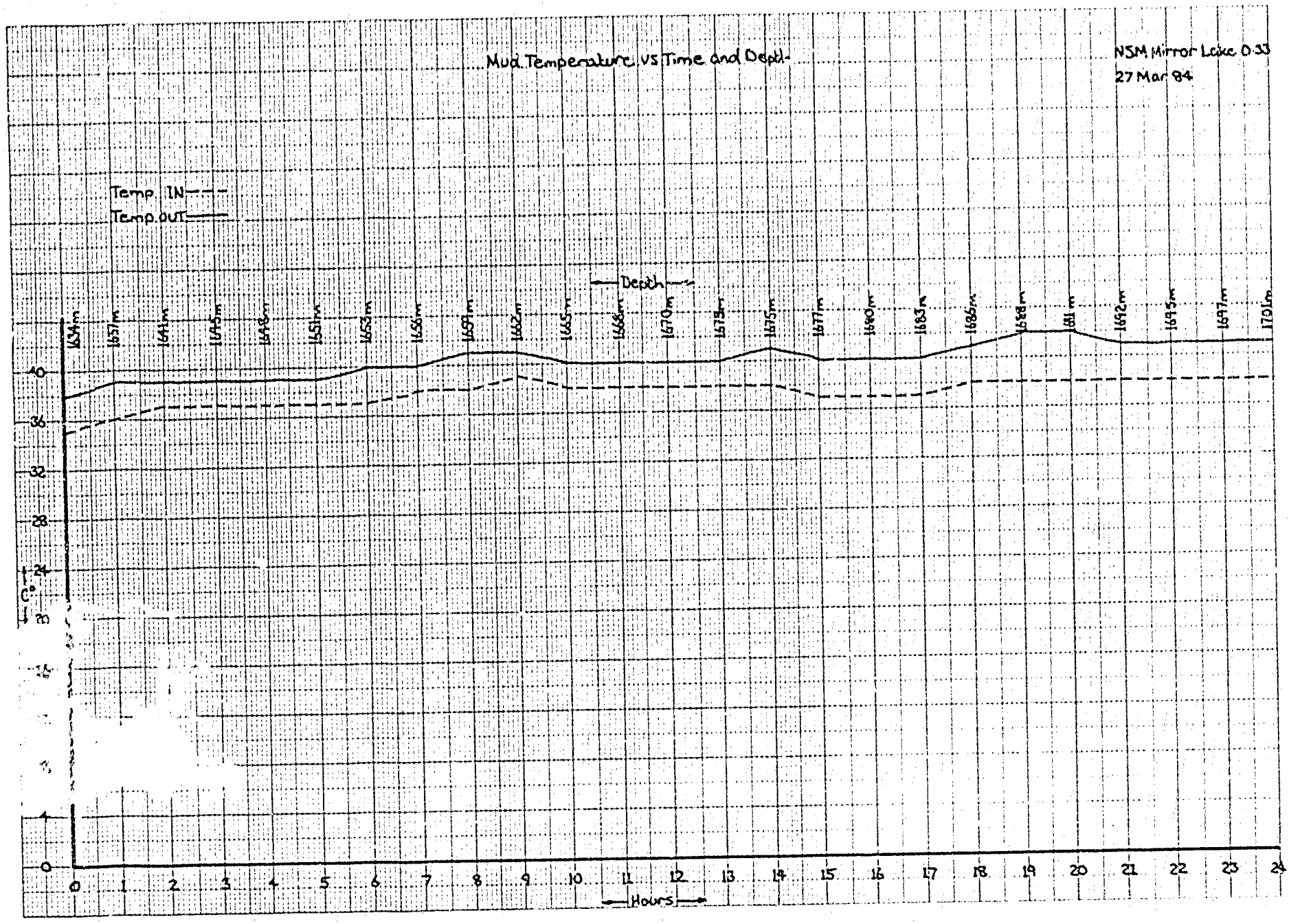
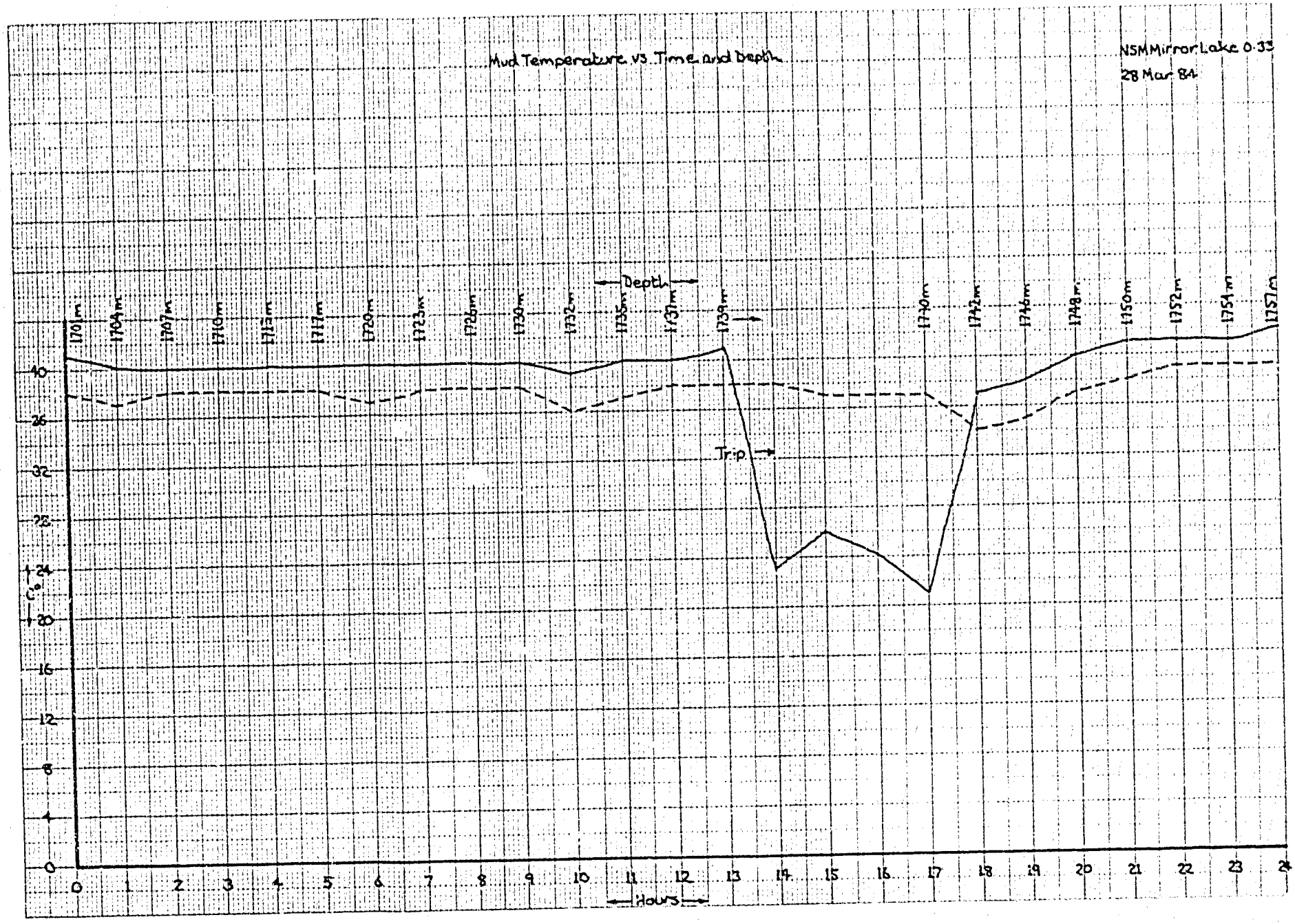
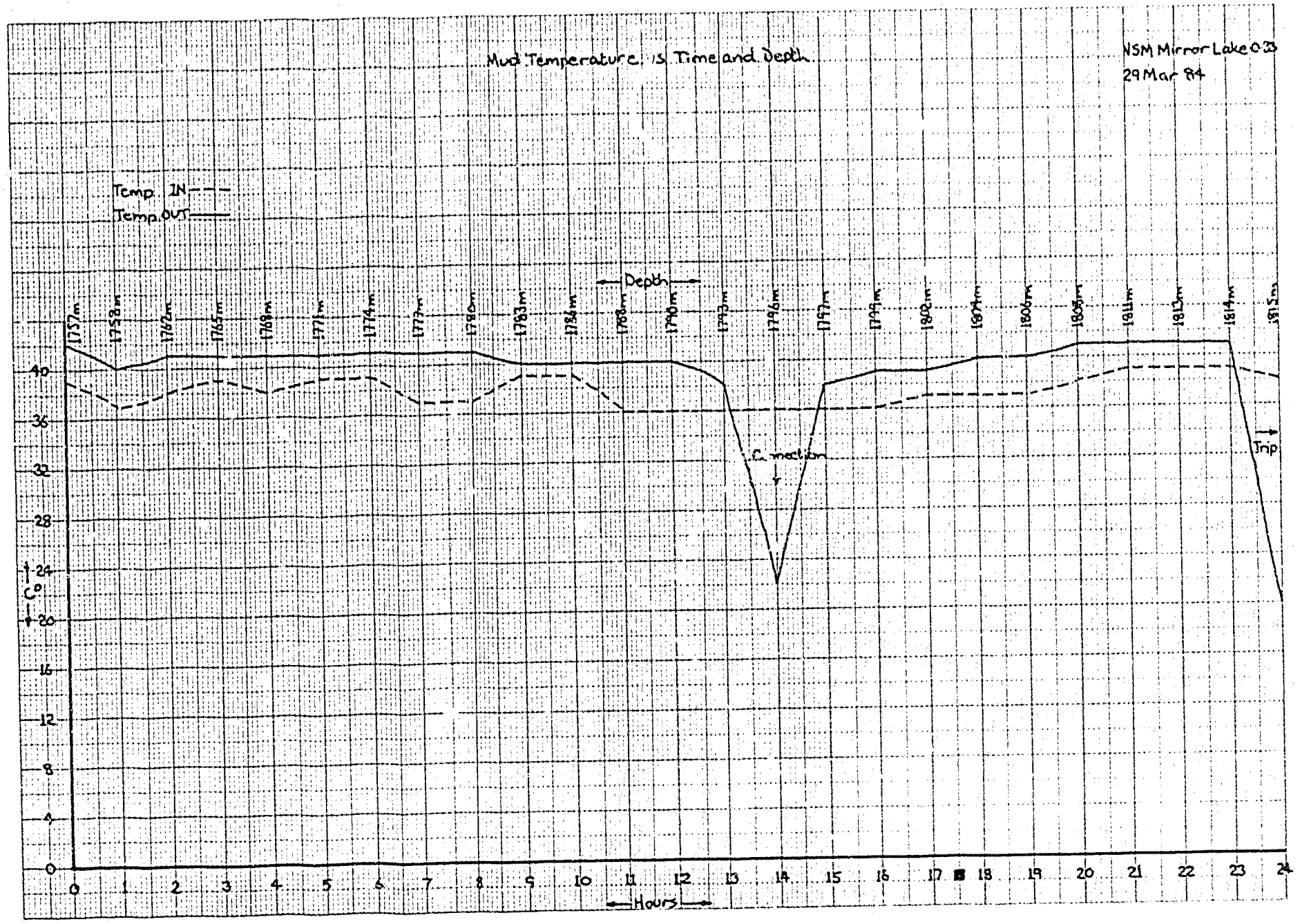
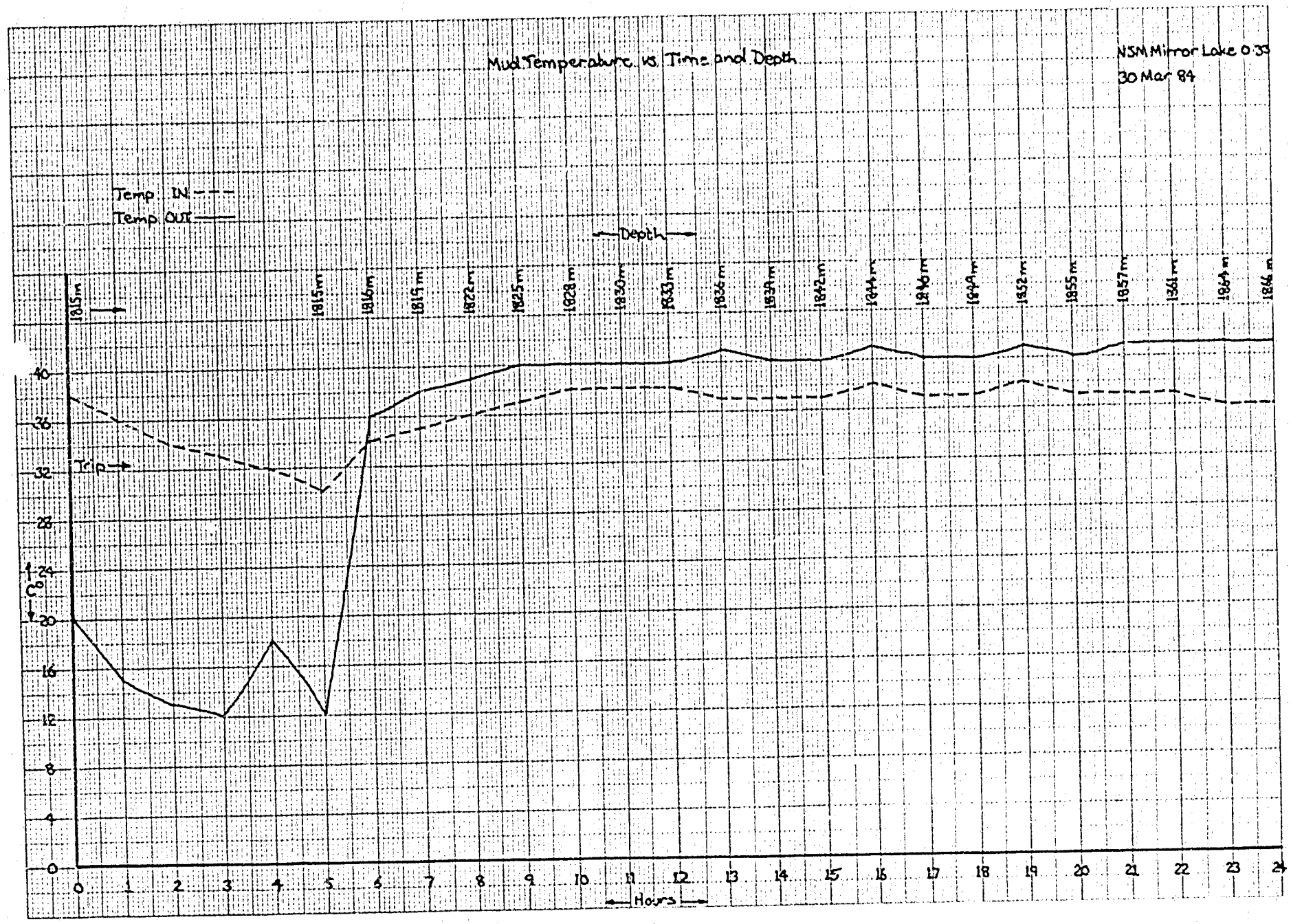
0
C°
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hours

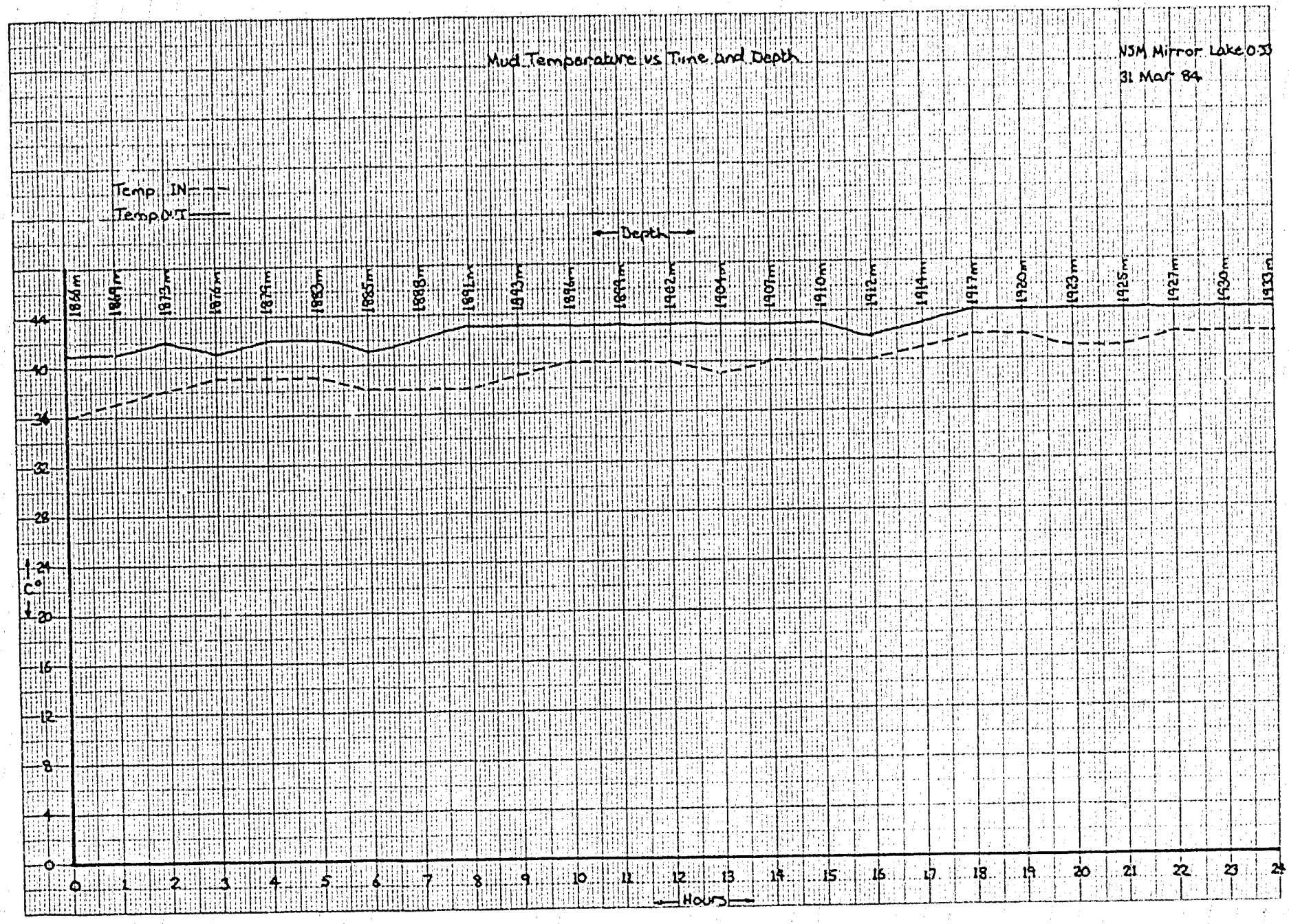


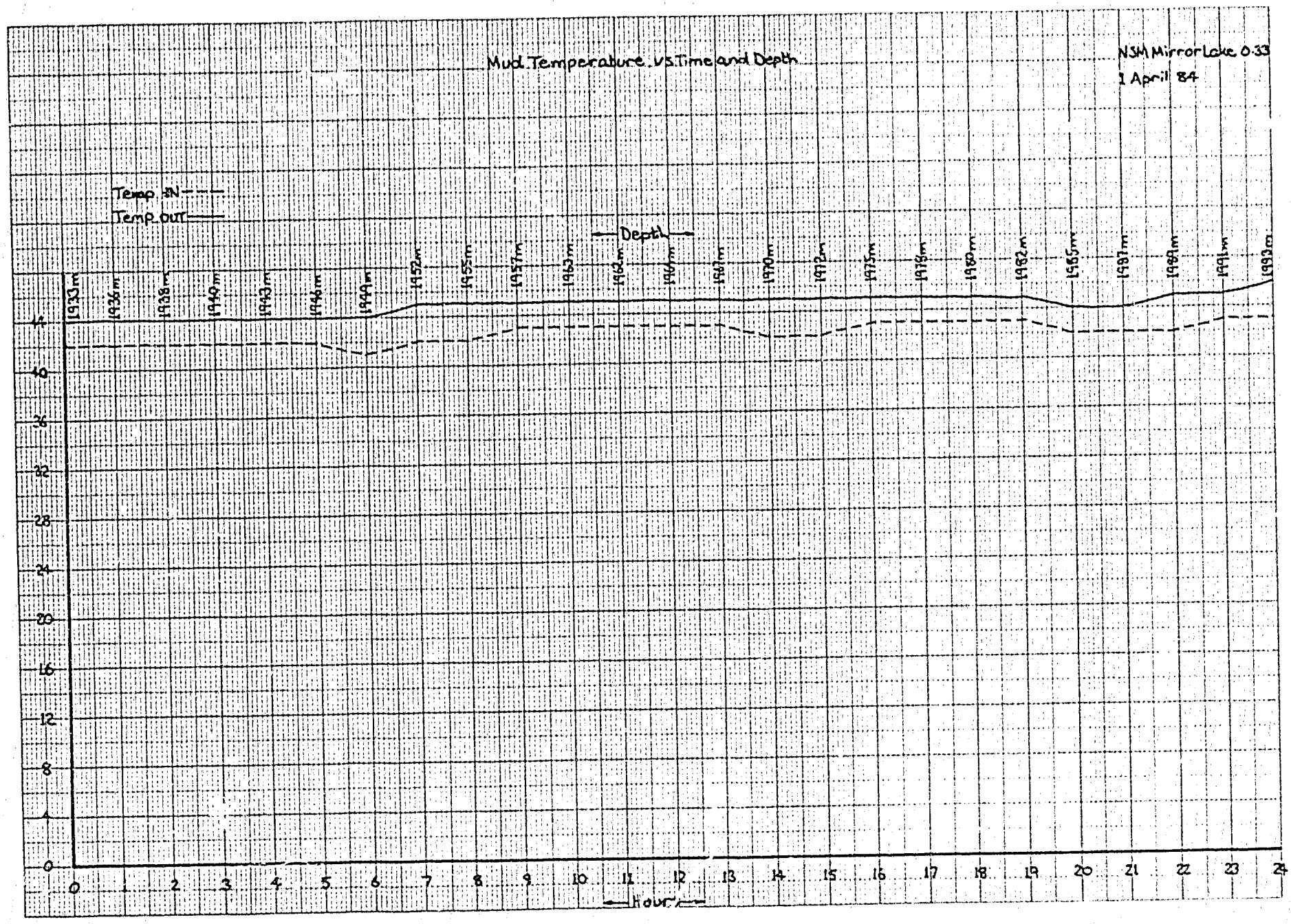






46 1510





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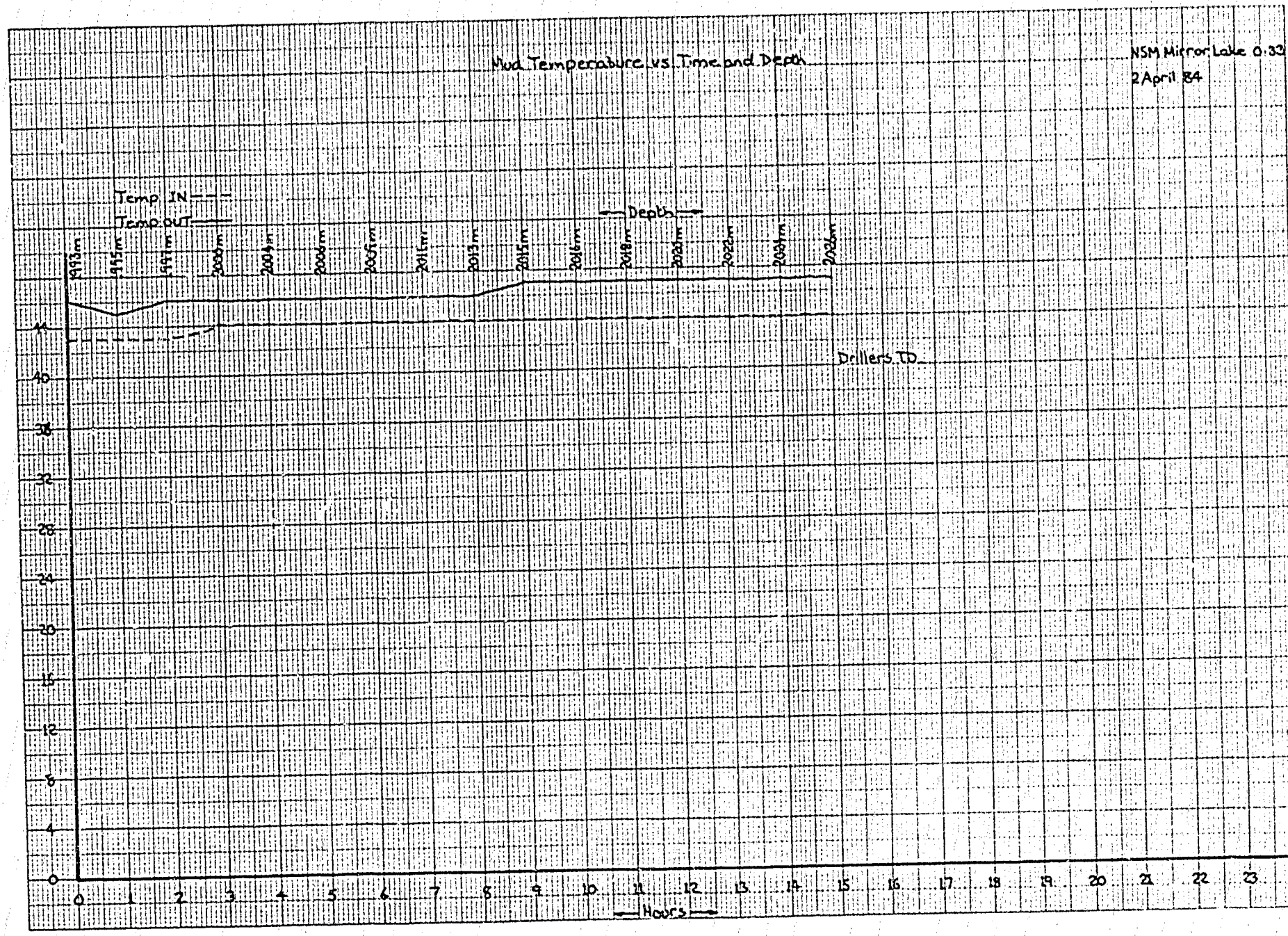

NSM

MIRROR LAKE

O-33

9211-N9-1-2 RE

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	☐

APPLICATION TO ALTER CONDITION OF A WELL

This application form is to be submitted in triplicate to the District Conservation Engineer at least 45 days before commencement of operations.

Well Name: NSM MIRROR LAKE O-33 Area: N.W.T. (Ft. Norman)

Coordinates: Lat: 64° 52' 46" N Long: 126° 51' 17" W

Operator: NSM RESOURCES LTD. Contractor: ROLL'N WELL SERVICING LTD.

Drilling Rig or Unit: RIG #53 (see Exhibit #1) Depth: 2026 mKB

Date ATDW Issued: 1983-12-23 Date of Last Operation 84-04-07

TYPE OF OPERATION

Well testing operation through casing and thereafter complete the well or abandon same in accordance with the regulations.

SUMMARY OF PROPOSED OPERATIONS

Begin operations following rig-release at Bluefish A-49 (approx. Dec, 15, 1984). by testing the well in the manner described in the attached program marked Exhibit #2. Testing operations including operations to complete or abandon the well is expected to take 20 days. See the attached map marked Exhibit #3 for the approximate location of this well.

Signed: [signature] Title: PRESIDENT

Date: September 11, 1984 Company: NSM RESOURCES LTD.

APPROVAL

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

Signed: [signature] Conservation Engineer

Date: 16 Oct 84

ATDW No: 1124 File: 9211-N9-1-2RE

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

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

D.A.# 1124

E.A. # 215

Northern Region

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

WELL TERMINATION RECORD

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

WELL DATA

Well Name: NSM Mirror Lake O-33 Area: North West Territories

Grid Area: 65-00-126-45 Field/Pool: Exploratory

Permit or Lease No.: 3788 Final Coordinates: Lat.: 64° 52' 45" N Long: 126° 51' 17" W

Drilling Unit: Roll'n Service Rig #53 Elevations-RT/KB: 285.2m SF/GL: 280m

Re-entry

Spud Date: January 2/85 Rig Released: January 15/85 Total Depth: 2026 mKb

CASING AND CEMENTING

O.D.:	Weight:	Grade:	Depth Set:	Cement and Additives:
339mm	81.1	K-55	145.6 MKB	22T Permafrost
244mm	53.6	K-55	552.4 MKB	31.5T CL'G' + 2% Gel
114mm	15.63	J-55	1603.6 MKB	82.5T CL'G' + 5% C-100+.2%C 102

PLUGGING PROGRAM

Approval of the following program was obtained by (person) ..... from

(person) ..... of the Canada Oil and Gas Lands Administration by means of

..... on ..... 19 .

Type of Plug:	Interval:	Felt:	Cement and Additives:
Bottom Cement	2026 - 1926 MKB	NO	7.5T CL'G' + 3%C 102
114mm Casing	ran & cemented	Not drilled out	

See Attached Supplement for Abandonment Plugs

Lost Circulation/Overpressure Zones: .....

Equipment left on Seafloor (Describe): .....

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

Cores: Type: ..... Intervals: .....

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: Consultant

Name: F.T. Nadir Date: 28/1/85

Acknowledged by: [signature]
Engineering Branch

Date: 7 Feb 85

File: 9211-N9-1-2

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

NSM MIRROR LAKE O-33 (Re-entry)

60 Degrees 58 Minutes 14 Seconds North
122 Degrees 52 Minutes 45 Seconds West

Northwest Territories

Prepared by: F. T. Nadir, P. Eng.
October 25, 1985

INDEX

NSM MIRROR LAKE O-33

SECTION I

SUMMARY OF WELL DATA

a)	Well Name:	NSM Mirror Lake O-33
b)	Permittee:	NSM Resources Ltd.
c)	Operator:	NSM Resources Ltd. 300, 555-4th Avenue S.W. Calgary, Alberta, T2P 3E7
d)	Location:	O-33-65-00-126-45 64 Degrees 52 Minutes 46 Seconds North 126 Degrees 51 Minutes 17 Seconds West UWI 300033650012645O
e)	Permit No.:	3788
f)	Service Rig Contractor:	Roll'n Well Servicing Rig No. 53
g)	Authority to Alter Condition:	File No. 9211-N9-1-2
h)	Classification:	Re-entry for testing
i)	Elevations:	Ground: 280.0 m KB: 285.2 m
j)	Re-entry Date:	2 January 1985
k)	Intervals Tested	Ronning 1475-1483 mKB 1487-1491 mKB Bear Rock 1202-1207 mKB Hume 1057-1063 mKB Hare Indian 1011-1015 mKB 1027-1032 mKB
l)	Completed Testing Date:	13 January 1985
m)	Total Depth:	TD: 2026 mKB PBTD: 1603 mKB
n)	Status:	Abandoned
o)	Rig Release:	15 January 1985
p)	Tubing size:	None
q)	Wellhead:	None

SECTION II

DAILY OPERATION SUMMARY

NSM MIRROR LAKE O-33

DATE	ZONE	DESCRIPTION OF OPERATION
31 December 1984		Moved service rig
1 January 1985		Rigged up service rig.
2 January 1985		Cut off casing. Install tubing spool and BOP's.
3 January 1985		Ran tubing, bit and scraper. Drilled ice plug to 51 mKB. Tagged PBTD @ 1525 mKB.
4 January 1985	Ronning	Ran CBL, GR, CCL Logs. Perforated 1475-1483 & 1487-1491 mKB.
5 January 1985	Ronning	Ran tubing. Acidized. Produced water 1% H2S.
6 January 1985	Ronning	Killed well. Ran bridge plug @ 1417 mKB. Dumped 10 meters of cement on top of bridge plug.
	Bear Rock	Perforated 1202-1207 mKB. Acidized.
7 January 1985	Bear Rock	Swabbed. Some water entry into well bore. Re-acidized. Swabbed. Recovered water. Salinity 18000-40000 ppm. H2S 5.3%.
8 January 1985	Bear Rock	Swabbed. Recovered water. Salinity 7700 ppm. H2S 14.2%. Ran Neutron-CCL log.
9 January 1985	Bear Rock	Swabbed. Recovered water. Salinity 7700 ppm. H2S 15%.
10 January 1985	Bear Rock	Squeezed 18 sacks cement into perforations. Set bridge plug @1167 mKB. Set 10 meters cement on top of plug.
	Hume	Perforated 1057-1063 mKB.
11 January 1985	Hume	Acidized. Swabbed. Very little fluid entry. Water salinity 19300, H2S 1.5%.
12 January 1985	Hare Indian	Squeezed cement into perforations. Set bridge plug @1050 mKB. Set 10 meters cement on top of bridge plug. Perforated 1011-1015 & 1027-1032 mKB. Acidized.
13 January 1985	Hare Indian	Swabbed. Recovered water. Salinity 32400 ppm. H2S 0.2%. Squeezed cement into formation. Ran bridge plug @ 990 mKB. Dumped 30 meters cement on top of plug. Displaced hole to diesel.
14 January 1985		Cleaned up lease.
15 January 1985		Rig released.

SECTION III

PRODUCTION TESTING SUMMARY

NSM MIRROR LAKE O-33

			PRODUCTION TOTAL	PRODUCTION AVERAGE DAILY
TEST	No. 1	Oil	0 cubic meters	0.0 cu. m./day
DATE	4-6 January 1985	Gas	0 cubic meters	0 cu. m./day
ZONE	Ronning	Water	10.7 cubic meters	85.2 cu. m./day
INTERVAL	1475-1483 & 1487-1491 mKB	Salinity	39300 ppm	
HOURS ON	3 Hours	H2S content	1.1%	
TEST	No. 2	Oil	0 cubic meters	0.0 cu. m./day
DATE	6-10 January 1985	Gas	0 cubic meters	0 cu. m./day
ZONE	Bear Rock	Water	8.6 cubic meters	10.3 cu. m./day
INTERVAL	1202-1207 mKB	Salinity	40000 ppm	
HOURS ON	20 Hours	H2S content	5.3%	
TEST	No. 3	Oil	0 cubic meters	0.0 cu. m./day
DATE	10-11 January 1985	Gas	0 cubic meters	0 cu. m./day
ZONE	Hume	Water	2.4 cubic meters	14.3 cu. m./day
INTERVAL	1057-1063 mKB	Salinity	19300 ppm	
HOURS ON	4 Hours	H2S content	1.5%	
TEST	No. 4	Oil	0 cubic meters	0.0 cu. m./day
DATE	12-13 January 1985	Gas	0 cubic meters	0 cu. m./day
ZONE	Hare Indian	Water	2.1 cubic meters	4.1 cu. m./day
INTERVAL	1011-1015 & 1027-1032 mKB	Salinity	32400 ppm	
HOURS ON	12 Hours	H2S content	0.2%	

SECTION IV

SECTION V

NSM RESOURCES LTD.
300 - 555 - 4th Ave. S.W.
CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: Jan. 15/85 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp -21°C 32 people in camp

Moving Rig & Equipment to Barge Site

Work performed last 24 hrs:

Dug out around well head & cut off same 1.5m below ground. Ran 10m cement inside casing stub. Welded cap on casing, standpipe on cap & well sign on standpipe 1.5m above ground. Level filled all sumps & levelled location.

FINAL REPORT

Cost - $737,507.

K. Price
Wellsite Supervisor

NSM RESOURCES LTD.
300 - 555 - 4th Ave. S.W.
CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: January 14/85 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp -15°C 27 people in camp

Moving Rig to Barge Site

Work performed last 24 hrs:

General cleanup & rigging out. Ripper cat filling in pits and ripping around well head to enable cutting off of same.

Cost - $720,282

K. Price
Wellsite Supervisor

NSM RESOURCES LTD.
300 - 555 - 4th Ave. S.W.
CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: January 13/85 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp -15°C 29 people in camp

Rigged out Service Rig

Work performed last 24 hrs:

Rigged & pulled 28 swabs. Recovered 10.8 m^3 (68 bbls) fluid. Hole capacity plus acid 55 bbls. Max. H_2S 200 ppm, min. chlorides 13,470 ppm. Last swab 32,400 ppm, PH - 6. Obtained gas sample. Killed well with water. Squeezed formation fluid into formation @ max pressure of 5170 kPA (750 psi). Cemented by Dowell with .6 m^3 cement. Spot cemented on perfs. Pulled 10 jts tubing. Squeezed .3m^3 to formation. Max 2 mPA (290 psi). Backwashed. No returns. Pulled tubing. Rigged up Jet Perforators & set Pengo bridge plug @ 990 mKB. Pressure tested to 7000 kPA (1000 psi). Held OK. Ran by dump bailer 30m cement on top of plug. Ran 200m tubing. Displaced hole to diesel fuel. Pulled out of hole & layed down tubing.

Cost - $653,512.

K Price
Wellsite Supervisor

NSM RESOURCES LTD.
300 - 555 - 4th Ave. S.W.
CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: January 12/85 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp -15°C 28 people in camp

Swabbing

Work performed last 24 hrs:

Took 2 gas samples off tubing. Killed well with KCl water. Rigged up Dowell. Mixed .6 m^3 cement. Spot cement over perfs. Pulled 9 jts tubing. Squeezed .5 m^3 to perfs. Maximum 7.5 mPA (Dowell truck broke down). Completed with rig pump. Ran in & backwashed @ 1054 mKB. Pulled tubing from hole. Ran gauge ring. Tagged cement top @ 1054 mKB. Ran bridge plug set @ 1050 mKB. Pressure tested to 7000 kPA. Held OK. Ran 10m cement plug on bridge plug by damp bailer. Perf intervals 1027 - 1032 mKB & 1011 - 1015 mKB with 3-1/8" casing gun 7 spm. No sign of gas at surface. Ran tubing as follows:

1 jt - 60.3mm tubing, 1 - 60.3mm PSN,

106 jts 60.3mm tubing.

Landed @ 1033.30mKB. Acidized by Dowell with 2000 litres 20% HCl + .4% A-200 + .2% F-75 + .5% W-35. Washed 1000 litres in 100 litres stages every 5 minutes. Max. back pressure 4 mPA (580 psi). Bled off to 3 mPA (435 psi). Squeezed 1000 litres @ rate of 3/4 BPM @ 5.5 mPA (800 psi). 15 min. shut in 3.5 mPA (510 psi). Backwashed acid. Rigged up swab equipment.

Cost - $636,759.

K. Price
Wellsite Supervisor

NSM RESOURCES LTD.
300 - 555 - 4th Ave. S.W.
CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: January 11, 1985 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp -15°C 25 people in camp

Swabbing

Work performed last 24 hrs:

Ran tubing as follows:

1 jt - 60.3mm tubing, 1 - 60.3mm PSN, 109 jts - 60.3mm tubing, 1 - 60.3mm x 6' pup

Tubing landed @ 1063.85 mKB. Rigged up Dowell and acidized with 2000 litres 20% HCl + .4% A-200 + .2% F-25 + .5% W-35. Washed 1000 litres in 100 litre stages every 5 min. Maximum back pressure 4 MPA (580 psi). Bled to 3 MPA (440 psi). Squeezed 1000 litres @ 10m/min (½ bbls/min). Max. squeeze pressure 6 MPA (865 psi). Decreased to 5 MPA (715 psi). 15 min. shut-in 3.5 MPA (510 psi). Backwashed acid. Rigged to swab. Pulled 23 swabs. Recovered 58.5 bbls. Well dry. Max H_2S-1.8%, chloride-30,400 ppm decreasing to 11,540 ppm. Ph - 7, casing pressure-100 psi, tubing - 0. Shut in @ 9:00 P.M. for pressure buildup till 6:00 A.M. Tubing-73 psi, casing-218 psi. Rigged to swab. Found fluid level 200' off of bottom. Pulled 2 swabs. Recovered 4 bbls water. Ph - 7, H_2S - 1.5%, chlorides - 19,300 ppm.

Cost - $622,420.

K. Price
Wellsite Supervisor

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CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: January 10/85 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp +4°C 25 people in camp

Running Tubing

Work performed last 24 hrs:

Shut in well 3 hrs for buildup. Tubing - 0, Casing - 117 psi. Took 4 gas samples from casing. Pulled 2 swabs. Recovered 10 bbls H_2O. Obtained 2 water samples. Bled off annulus. Killed well. Squeezed 156 bbls formation fluid into formation followed by fresh water. Max. pressure 7000 kPa @ rate of 1 BPM. Rigged up Dowell. Batch mixed 18 sacks cement plus 20 litres D108 (FLAC) + .5% D-65 (TIC). Displaced cement to perfs. Total slurry .6 cubes (3.8 bbls). Pulled 1 - 60.3mm pup, 9 jts - 60.3mm tubing. Squeezed .3 cubes (1.8 bbls) into formation. Max pressure 720 psi. 12 minute bleed off to 100 psi. Ran 1 jt tubing & backwashed. No returns. Circulated hole & mixed KCl to 8.4#/gal (23 sacks in 130 bbl system). Pulled out of hole with tubing. Rigged up Jet Perforators. Ran gauge ring. Tagged cement top @ 1175.3 mKB. Ran and set Pengo bridge plug @ 1167 mKB. Pressure tested to 7000 kPa. Held OK. Ran dump bailer and set 10m cement on top of bridge plus. Ran 3-1/8" casing gun & perforated 1057 - 1063 mKB with 7 spm. Rigged out Jet & rigged to run tubing.

Cost - $608,240.

K. Price
Wellsite Supervisor

NSM RESOURCES LTD.
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CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: Jan. 9/85 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp -16°C 26 people in camp

Preparing to Cement Squeeze

Work performed last 24 hrs:

Swabbed 191 bbls of water in 24 hrs. Hole capacity 58 bbls. Salinity decreased from 23,100 ppm to 7,700 ppm over swab period. PH - 7.

Max. H_2S - 15%

NOTE: Land use inspection by John Hayes OK

Cost - $594,990.

K. Price
Wellsite Supervisor

NSM RESOURCES LTD.
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CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: Jan. 8/85 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp +3°F 27 people in camp

Swabbing

Work performed last 24 hrs:

Shut in well. 3 hrs buildup. Tubing pressure 0 , casing 187 psi. Pulled to swab. Recovered 7 bbls water. Chlorides 7,700 ppm, H_2S 14.2%. Killed well with KCl water & pulled out of hole. Rigged up Jet perforators to run Neutron-CCL log. Ran Neutron CCL from 1210 - 900 mKB. Ran CCL from 1320 - 1088 mKB to log in perfs. Everything checked out OK. Ran tubing as follows:

1 jt - 60.3mm tubing 1 - 60.3mm PSN

124 jts - 60.3mm tubing 1 - 60.3mm x 6' pup.

Set @ 1207.88 mKB. Rigged to swab.

Cost to Date - $579,525.

K. Price
Wellsite Supervisor

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CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: Jan. 7/85 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp +5°F 26 people in camp

Swab & Evaluate Bear Dolomite

Work performed last 24 hrs:

Pulled 26 swabs. Recovered 59 bbls KCl water. Casing pressure gradually increased while swabbing to 66 psi. No indication of H_2S. Chlorides from min. 17,300 ppm to max. of 32,400 ppm. Bled off annulus. Circulated hole to KCl water. Rigged up Dowell and acidized with 2000 litres 20% HCl + .4% A200 + .2% F-75 + .5% W35. Washed 3¼ bbls acid past perfs in 5 wash 15 min. stages. Max. pressure 1450 psi. Bled off to 580 psi/ Squeezed 9.5 bbls acid @ rate of 1¼ BPM @ max of 1590 psi. Bled off to 720 psi in 16 minutes. Shut in well 30 min. Backwashed acid. Rigged to swab.

After 10 swabs recovered 53 bbls H_2S 5.3% casing 30 psi
" 17 swabs " 80 bbls " " casing 54 psi
" 42 swabs " 126 bbls " " casing 145 psi

Fluid level 3600' (1100m). Chlorides from 37,500 ppm to 17,000 ppm.

Shut in well @ 7:00 A.M. for pressure buildup

K. Price
Wellsite Supervisor

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DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: Jan. 6/85 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp +5°F 28 People in camp

Work performed last 24 hrs:

Killed well w/KCl water. Repaired rig pump 2 hrs. Pulled tubing out of hole. Rigged up Jet Perforators. Ran 4½" gauge ring to 1450 mKB. Ran bridge plug on wireline set @ 1417 mKB. Ran 10m of cement on plug with dump bailer. Pressure tested to 7000 kPA. Held OK. Ran neutron-CCL tool and tried to log. Neutron would not operate. Ran in and perforated 1202 - 1207 mKB with 3-1/8" casing gun 7spm. Ran tubing as follows: 1 jt 60.3mm tubing, 1 - 60.3mm PSN 124 jts - 60.3mm tubing, 1 - 60.3mm pup. Landed @ 1207.8 mKB. Circulated hole with KCl water. Rigged up Dowell and acidized with 1000 litres 20% HCl + .4% A200 + .2% F-75 + .5% W50. Washed 4.2 bbls in ½ bbl stages. Max. back pressure 290 psi. No bleed off. Squeezed 1.8 bbls @ 700 psi Bled to 440 psi. No breakdown. Shut in well. Rigged out Dowell. Backwashed acid. Rigged to swab.

Cost = $534,276.

Wellsite Supervisor

NSM RESOURCES LTD.
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CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: Jan. 5/85 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp +5°F 26 people in camp

Work performed last 24 hrs:

Ran tubing as follows: 1 jt 60.3mm tubing, 1 - 60.3mm PSN 54 jts 60.3mm tubing. Landed @ 1493.02mKB. Circulated hole 1 hr. Rigged up Dowell and acidized perfs with 4000 litres 20% HCl + .4% A-200 + .2% F-75 + .5% W50. Washed 6 bbls in 1.25 bbl increments in 5 min. stages. Maximum 725 psi. Bled off to 0 psi. Squeezed 19 bbls acid @ rate of 4 BPM @ 900 psi Shut in well for 30 min. Pressure bled off to 0 psi. Rigged up and backwashed. Lost 12 bbls KCl water to formation. Rigged up and pulled 4 swabs. Well flowed. Recovered 105 bbls water. Hole capacity 72 bbls. H_2S reading increased from 10 ppm to 1350 ppm over flow. Chlorides decreased 111,500 ppm to 37,500 ppm over same flow (4 hrs). Closed well in for 1 hr.Tubing pressure 2 psi. Casing 0 psi. Opened well to flow. Would r do so. Slight gas blow. Pulled 4 swabs. Recovered 19 bbls Well then flowed 15 bbls salt water in ½ hr. Samples taken for analysis. H_2S readings 900 - 1100 ppm. Chloride 33,900 - 39,300 ppm. Rigged to kill well. Squeezed 159 bbls recovered fluid back into formation. Mixed 3% KCl water & squeezed hole capacity to formation. Tried to kill well with KCl water. Weight 8.5# gal. When well shut in tubing pressure is 34 psi. Mixing additional KCl in kill fluid to increase weight to 8.7# gal.

Cost - $508,099.

K. Price
Wellsite Supervisor

NSM RESOURCES LTD.
300 - 555 - 4th Ave. S.W.
CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: January 4, 1985 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp +20°F 26 people in camp

Running in hole with tubing

Work performed last 24 hrs:

Rigged up Jet Perforators to log. 10 hrs repairing shorts in line and tools. Neutron would not operate. Ran GR-CCL Correlation log 1577.5 - 900 mKB. Ran Cement Bond Log 1560 - 900 mKB. Good bond to pipe. Poor bond to formation. Perf interval 1475 - 1483 mKB + 1487 - 1491 mKB with 3-1/8" casing gun 7 spm.

Nahanni Air - 1 trip Norman Wells to location with mechanic & supplies.

Komatsu - on road back to Bear Rock

Grader - broke down on access road between Mirror Lake & McKenzie River.

Cost - $453,461.

K. Price
Wellsite Supervisor

NSM RESOURCES LTD.
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CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: January 3, 1985 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp +20°F 21 people in camp

Rig to Log

Work performed last 24 hrs:

Test blind rams and casing to 14000 kPA. OK. Problems with boiler. Pick up tally & drift 2-3/8" tubing as follows:

1 - 3-7/8" bit + 4½" scraper + change over sub +

4 jts. tubing. Ice plug @ 42.29 mKB.

Rigged up and drilled ice plug to 51.29 mKB. Continued in hole with 155 jts tubing plus 8 pup joints to 1525.09 mKB. Mixed H_2O to 3% KCl. Pressure tested pipe rams to 14000 kPA. Held OK. Tested hydril to 7000 KPA. Held OK. Displaced hole to 3% KCl water. Pulled out of hole with tubing.

3 helicopter trips.

2 D-7 cats on access road

Komatsu on road to water hole.

Grader clearing air strip.

Cost - $438,696.

K. Price

Wellsite Supervisor

NSM RESOURCES LTD.
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CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: January 2/85 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp +6°F 26 people in camp

Mixing KCl & repairing boiler

Work performed last 24 hrs:

Rigged up service rig. Cut off casing. Install tubing spool. Pressure test seals to 14000 kpa. OK. Install BOP's. All equipment on location except Dowell unit. Komatsu working on location. Grader on access road.

Cost - $422,139.

K. Price
Wellsite Supervisor

NSM RESOURCES LTD.
300 - 555 - 4th Ave. S.W.
CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: January 1/85 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp +6°F 22 people in camp

Rigging up service rig.

Work performed last 24 hrs:

Moved in service rig. 2 Borek cats pulling trucks & working on road. Komatsu working on location. Grader working on access road.

4 hrs helicopter - transferring personnel and supplies.

2 loads left to move onto location.

Cost - $408,979.

K. Price
Wellsite Supervisor

NSM RESOURCES LTD.
300 - 555 - 4th Ave. S.W.
CALGARY, ALBERTA T2P 3E7

TELEPHONE (403) 261-5790

DAILY WORKOVER AND PRODUCTION REPORT

Well Name and Location: NSM Mirror Lake O-33

Status as of 0800 hrs: Dec. 31/84 (Todays date)

Tubing Pressure: _____, Casing Pressure: _____

Operation: Temp -36°F 30 people in camp

Move in service rig.

Work performed last 24 hrs:

First 3 loads arrived Mirror Lake after 36 hrs. Cat required for towing on McKenzie River Hill and Slater Creek.

Komatsu @ Mirror Lake location digging pit for camp and building pad. Water truck flooded ice bridge 4 km from McKenzie River. Service rig crew working on service rig.

Cost - $39[illegible],419.

K. Price
Wellsite Supervisor

SECTION VI

NSM MIRROR LAKE

0-33

Water Analysis

Prepared For

NSM RESOURCES LTD.

ORIGINAL

FILE 85-AS-5026

JAN. 23, 1985

tti GEOTECHnical resources ltd.

4500 - 5th STREET N.E. CALGARY, ALBERTA T2E 7C3 (403) 230-4128

tti GEOTECHnical resources ltd.

4500 - 5th STREET N.E., CALGARY, ALBERTA T2E 7C3

(403) 230-4128

GEOTECH Analytical

FILE NUMBER: 85AS5026

LABORATORY NUMBER: 5026-w1

CONTAINER IDENTITY:

WATER ANALYSIS

OPERATORS NAME: N.S.M. RESOURCES

SAMPLE LOCATION:

WELL NAME: N.S.M. MIRROR LAKE 0-33

ELEVATIONS KB: GRD:

FIELD OR AREA:

POOL OR ZONE:

NAME OF SAMPLER:

COMPANY: CENTRAL ALTA TESTING

TEST TYPE: NO.:

MULTIPLE RECOVERY:

TEST INTERNAL FROM:

TO:

PERFORATIONS FROM:

TO:

TEST RECOVERY: 5bbls.

SAMPLING POINT: flowtee

AMT. AND TYPE OF CUSHION:

MUD RESISTIVITY(Ω / m):

PUMPING: FLOWING: GAS LIFT: SWAB:

WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

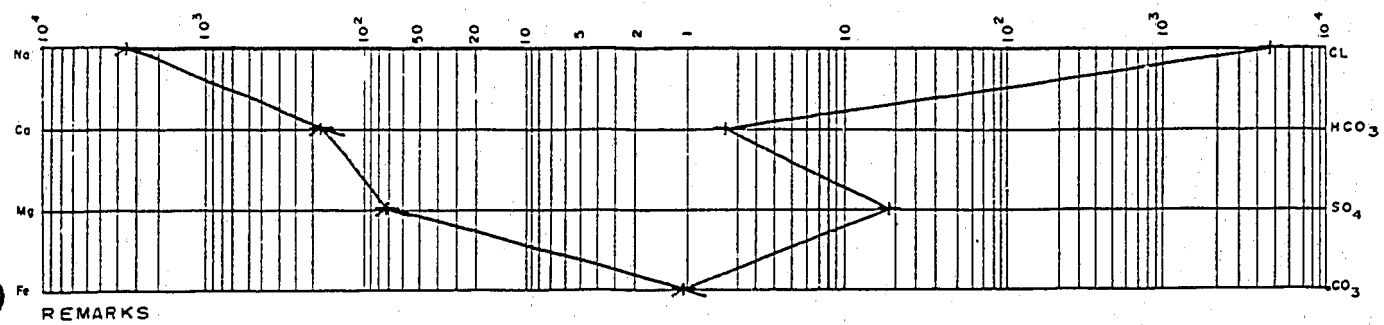
	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE k/Pa					
TEMPERATURE (°C)					

DATE SAMPLED Y – M – D , H:M	DATE RECEIVED Y – M – D	DATE ANALYZED Y – M – D	ANALYST
85-01-07	85-01-09	85-01-15	KW/DF

SUMMARY DATA

TOTAL HARDNESS AS $CaCO_3$	6779	g/m^3
TOTAL ALKALINITY	731	g/m^3
SALINITY	1.97	%
SATURATION INDEX	*	
STABILITY INDEX	*	
CORROSION TENDENCY	21.09	

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS

* no temperature data

WATER ANALYSIS

DETAILED REPORT

GEOTECH Analytical

FILE NUMBER: 85AS5026

LABORATORY NUMBER: 5026-W1

OPERATOR'S NAME: N.S.M. RESOURCES

WELL NAME: N.S.M. MIRROR LAKE

LOCATION: 0-33

SAMPLING POINT: flowtee

CATIONS

ION	g/m³	MASS FRACTION	MEQ/L
Na	2850	0.15	124
K	1450	0.08	37
Ca	1879	0.10	94
Mg	485	0.03	40
Ba	21.7	0.00	0.3
Sr	42.1	0.00	1.0
Fe	15.2	0.00	0.8
Mn			
Al			
Si			
B	2.96		
U			
Th			

ANIONS

ION	g/m³	MASS FRACTION	MEQ/L
Cl	10925	0.59	308
Br			
I			
F			
HCO_3	892	0.05	15
CO_3	0	0.00	0
OH	0	0.00	0
SO_4	19.8	0.00	0.4
H_2S			
PO_4			

TOTAL SOLIDS (g/m³)

EVAPORATED AT 110°C	EVAPORATED AT 180°C
AT IGNITION	CALCULATED
	17939

SPECIFIC GRAVITY	REFRACTIVE INDEX (RI)
at 15°C	1.349 at 25°C
OBSERVED pH	RESISTIVITY (RW) Ω m
6.72 at 25°C	0.298 at 25°C
REDOX POTENTIAL (E_h)	DISSOLVED O_2
	g/m³

TOTAL METALS

METAL	g/m³
Fe	
Mn	

REMARKS:

tti GEOTECHnical resources ltd.

4500 - 5th STREET N.E., CALGARY, ALBERTA T2E 7C3

(403) 230-4128

GEOTECH Analytical

FILE NUMBER: 85AS5026

LABORATORY NUMBER: 5026-W2

CONTAINER IDENTITY:

WATER ANALYSIS

OPERATORS NAME: N.S.M. RESOURCES

SAMPLE LOCATION:

WELL NAME: N.S.M. MIRROR LAKE 0-33

ELEVATIONS KB: GRD:

FIELD OR AREA:

POOL OR ZONE:

NAME OF SAMPLER:

COMPANY: CENTRAL ALTA TESTING

TEST TYPE: NO.:

MULTIPLE RECOVERY:

TEST INTERNAL FROM:

TO:

PERFORATIONS FROM:

TO:

TEST RECOVERY: 57bbls.

SAMPLING POINT: SWAB 10

AMT. AND TYPE OF CUSHION:

MUD RESISTIVITY (Ω/m):

PUMPING: FLOWING: GAS LIFT: SWAB:

WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

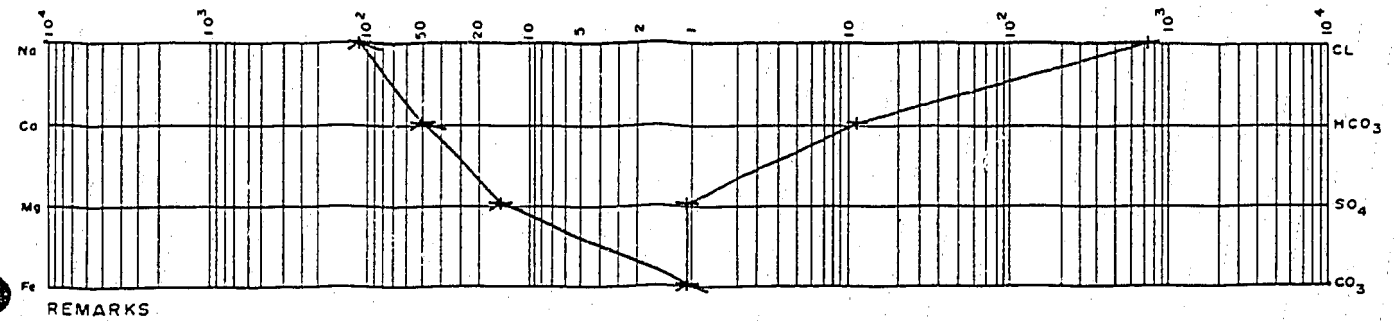
	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE k/Pa					
TEMPERATURE (°C)					

DATE SAMPLED Y – M – D H:M	DATE RECEIVED Y – M – D	DATE ANALYZED Y – M – D	ANALYST
85-01-07	85-01-09	85-01-15	KW/DF

SUMMARY DATA

TOTAL HARDNESS AS $CaCO_3$	2974	g/m^3
TOTAL ALKALINITY	581	g/m^3
SALINITY	4.87	%
SATURATION INDEX	*	
STABILITY INDEX	*	
CORROSION TENDENCY	65.44	

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS

* no temperature data

WATER ANALYSIS

DETAILED REPORT

GEOTECH Analytical

OPERATOR'S NAME	N.S.M. RESOURCES
WELL NAME	N.S.M. MIRROR LAKE
LOCATION	0-33
SAMPLING POINT	SWAB 10

FILE NUMBER: 85AS5026

LABORATORY NUMBER: 5026-W2

CATIONS

ION	g/m³	MASS FRACTION	MEQ/L
Na	2500	0.08	109
K	1340	0.04	34
Ca	890	0.03	44
Mg	177	0.01	15
Ba	23.5	0.00	0.3
Sr	4.90	0.00	0.11
Fe	0.090	0.00	0.005
Mn			
Al			
Si			
B	0.337		
U			
Th			

ANIONS

ION	g/m³	MASS FRACTION	MEQ/L
Cl	26958	0.82	760
Br			
I			
F			
HCO_3	709	0.02	12
CO_3	0	0.00	0
OH	0	0.00	0
SO_4	33.7	0.00	0.7
H_2S	3.58	0.00	0.22
PO_4			

TOTAL SOLIDS (g/m³)

EVAPORATED AT 110°C	EVAPORATED AT 180°C
AT IGNITION	CALCULATED
	32129

SPECIFIC GRAVITY	REFRACTIVE INDEX (RI)
at 15°C	1.352 at 25°C
OBSERVED pH	RESISTIVITY (RW) Ωm
6.02 at 25°C	0.151 at 25°C
REDOX POTENTIAL (E_h)	DISSOLVED O_2
	g/m³

TOTAL METALS

METAL	g/m³
Fe	
Mn	

REMARKS:

tti GEOTECHnical resources ltd.

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(403) 230-4128

GEOTECH Analytical

FILE NUMBER: 85AS5026

LABORATORY NUMBER: 5026-W3

CONTAINER IDENTITY:

WATER ANALYSIS

OPERATORS NAME: N.S.M. RESOURCES

SAMPLE LOCATION:

WELL NAME: N.S.M. MIRROR LAKE 0-33

ELEVATIONS KB: GRD:

FIELD OR AREA:

POOL OR ZONE:

NAME OF SAMPLER:

COMPANY: CENTRAL ALTA TESTING

TEST RECOVERY: 59 bbls.

TEST TYPE: NO.:

MULTIPLE RECOVERY:

TEST INTERNAL FROM:

TO:

PERFORATIONS FROM:

TO:

SAMPLING POINT: SWAB Z7

AMT. AND TYPE OF CUSHION:

MUD RESISTIVITY (Ω/m):

PUMPING: FLOWING: GAS LIFT: SWAB:

WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

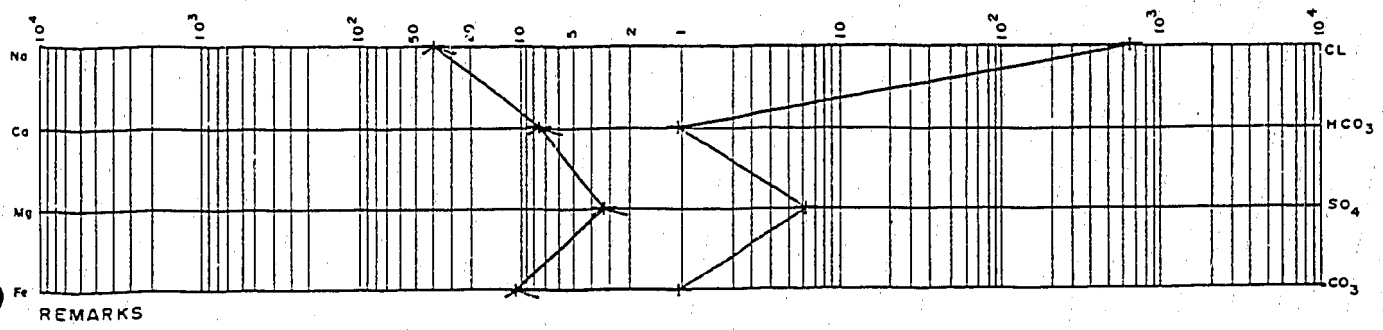
	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE kPa					
TEMPERATURE (°C)					

DATE SAMPLED Y – M – D H : M	DATE RECEIVED Y – M – D	DATE ANALYZED Y – M – D	ANALYST
85-01-07	85-01-09	85-01-15	KW/DF

SUMMARY DATA

TOTAL HARDNESS AS $CaCO_3$	881	g/m^3
TOTAL ALKALINITY	0	g/m^3
SALINITY	4.23	%
SATURATION INDEX	*	
STABILITY INDEX	*	
CORROSION TENDENCY	0.00	

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS

* no temperature data

WATER ANALYSIS

DETAILED REPORT

GEOTECH Analytical

OPERATOR'S NAME	N.S.M. RESOURCES
WELL NAME	N.S.M. MIRROR LAKE
LOCATION	0-33
SAMPLING POINT	SWAB 27

FILE NUMBER: 85AS5026

LABORATORY NUMBER: 5026-W3

CATIONS

ION	g/m³	MASS FRACTION	MEQ/L
Na	800	0.02	35
K	14850	0.37	380
Ca	150	0.00	7
Mg	36.6	0.00	3.0
Ba	0.192	0.00	0.003
Sr	0.546	0.00	0.012
Fe	198	0.00	11
Mn			
Al			
Si			
B	2.23		
U			
Th			

ANIONS

ION	g/m³	MASS FRACTION	MEQ/L
Cl	23398	0.60	659
Br			
I			
F			
HCO_3	0	0.00	0
CO_3	0	0.00	0
OH	0	0.00	0
SO_4	295	0.01	6
H_2S			
PO_4			

TOTAL . (g/m³)

EVAPORATED AT 110°C	EVAPORATED AT 180°C
AT IGNITION	CALCULATED
	39731

SPECIFIC GRAVITY	REFRACTIVE INDEX (RI)
at 15°C	1.351 at 25°C
OBSERVED pH	RESISTIVITY (RW) Ω m
4.00 at 25°C	0.157 at 25°C
REDOX POTENTIAL (E_h)	DISSOLVED O_2
	g/m³

TOTAL METALS

METAL	g/m³
Fe	
Mn	

REMARKS:

SECTION VII

DOWELL SCHLUMBERGER CANADA INC.

SERVICE REPORT

CUSTOMER NAME AND ADDRESS: N.S.M. Resources Ltd. 300, 555 - 4th Avenue S.W., Calgary, Alberta T2P 3E7	TREATMENT INVOICE NUMBER: 29-05-5133 DATE: January 01, 1985 DS DISTRICT: Nisku 805 DS OUTPOST: DS SUPERVISOR: Ken Shewchenko CUSTOMER REPRESENTATIVE: Ken Price TYPE SERVICE: Acidizing SERVICE NAME: Wash/Squeeze
SERVICE INSTRUCTIONS, REMARKS, MATERIALS: Perform Acid Wash/Squeeze using 4000 litres 20% HCl Acid with 0.4% A200, 0.2% F-75, 0.5% W35	WELL NAME: NSM Mirror Lake LOCATION: 0-33 PROVINCE: N.W.T. FORMATION: Ronning Lone-Mtn. RIG NAME: Roll'n TYPE OF WELL: OIL ☐ GAS ☐ INJ./DISP. ☐ OTHER ☐ AGE OF WELL: NEW ☒ REWORK ☐ PACKER TYPE: N/A PACKER DEPTH: TOTAL DEPTH: BHST/BHCT: FLOAT/STG. TYPE: FLOAT/STG. DEPTH: PERFORATED INTERVALS: TOP 1475 m – BOTTOM 1483 m, NO. OF HOLES LINER SIZE: FROM - TO: CASING SIZE: 114 mm TUBING SIZE: 60 mm 1478 – 1491 CASING DEPTH: TUBING DEPTH: 1493.02 mKB CASING/ANN. VOL: TUBING VOLUME: 3.0 m^3 ARRIVE LOCATION: LEAVE LOCATION:

TOTAL FLUID INJECTED OIL	WATER	AVG. PRESSURE	CEMENT TEMPERATURE
ACID 3.0 m^3	CEMENT	MAX. INJ. PRESSURE	WATER TEMPERATURE
OTHER (SPECIFY)		FINAL INJ. PRESSURE	SLURRY TEMPERATURE
AVG. INJECTION RATE		INST. SHUT IN PRESSURE	RETURNS TEMPERATURE
MAX. INJECTION RATE		WIPER PLUG PRESSURED TO	AVG. SLURRY DENSITY FILL
			TAIL-IN

TIME	PRESSURE TBG.	PRESSURE CSG.	INJ. RATE	VOLUME STAGE	VOLUME CUMM.	CHART REF.	SERVICE LOG DETAIL (PAGE 1 OF 2)
10:30	MPa	MPa	m^3/min	m^3	m^3		Conduct Pre-Job Safety Meeting
							Hold Full w/KCl Water
10:57							Press Test D.S. Lines to 23 MPa
11:00			0.4				Start Pump 20% HCl Holding 3 MPa Backpressure
11:08	3.0		0.4	3.2	3.2		Stop Pump 0.2 m^3 Acid at perfs
11:14	3.0						Start Wash
11:14	5.0			0.2	3.4		Stop Wash
11:20	4.0						Start Wash
11:21	5.0			0.2	3.6		Stop Wash
11:26	4.0						Start Wash
11:30	0			0.4	4.0		Stop Pump - Shut in Casing
							Well on Vaccum
11:34	0		0.2				Start Squeeze
11:35	0.3		0.5				Increase Rates to 0.5 m^3/minute.
11:36	2.3		0.6	1.0	5.0		Increase Rate to 0.6 m^3/minute

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Supplementary Service Log

TREATMENT NUMBER	WELL NAME	LOCATION	DATE	PAGE
29-05-5133	Mirror Lake	0-33	January 1, 1985	2 OF 2

TIME	PRESSURE TBG.	PRESSURE CSG.	INJ. RATE	VOLUME STAGE	VOLUME CUMM.	CHART REF.	SERVICE LOG DETAIL
	MPa		m^3/min	m^3	m^3		
11:40	6.0		0.6	2.0	3.0		Stop Pump
							ISIP @ 1 MPa
11:55	0.1						15 min SIP @ 0.1 MPa
							1 m^3 TOTAL WASH
							3 m^3 TOTAL SQUEEZE
							Rig to Backwash and Swab
							Release - Thank YOU

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DOWELL SCHLUMBERGER CANADA INC. — SERVICE REPORT

CUSTOMER NAME AND ADDRESS NSM RESOURCES LTD. 300, 555 - 4th Avenue S.W., Calgary, Alberta	TREATMENT INVOICE NUMBER 29-05-5134	DATE 1985-01-06
	DS DISTRICT Nisku 805	DS OUTPOST
	DS SUPERVISOR Ken Shewchenko	CUSTOMER REPRESENTATIVE Ambrose Gross
	TYPE SERVICE Acidizing Wash/Squeeze	SERVICE NAME
SERVICE INSTRUCTIONS, REMARKS, MATERIALS Perform Acid Wash/Squeeze Using 1,000 litres 20% HCl With 0.4% A200, 0.2% F75, 0.5% W35	WELL NAME Mirror Lake	
	LOCATION 0-33	PROVINCE N.W.T.
	FORMATION Bear Rock	RIG NAME Roll'n 53
	TYPE OF WELL OIL [X] GAS [ ] INJ./DISP. [ ] OTHER [ ]	AGE OF WELL NEW [X] REWORK [ ]
	PACKER TYPE N/A	PACKER DEPTH
	FLOAT/STG. TYPE	FLOAT/STG. DEPTH
	LINER SIZE	FROM - TO
	CASING SIZE 114 mm	TUBING SIZE 60 mm
	CASING DEPTH	TUBING DEPTH 1207.88 mkB
	CASING/ANN. VOL.	TUBING VOLUME 2.44 m^3
	ARRIVE LOCATION	
	LEAVE LOCATION	

TOTAL FLUID INJECTED OIL	WATER	AVG. PRESSURE	CEMENT TEMPERATURE
ACID 1 cu.m.	CEMENT	MAX. INJ. PRESSURE	WATER TEMPERATURE
OTHER (SPECIFY)		FINAL INJ. PRESSURE	SLURRY TEMPERATURE
AVG. INJECTION RATE		INST. SHUT IN PRESSURE	RETURNS TEMPERATURE
MAX. INJECTION RATE		WIPER PLUG PRESSURED TO	AVG. SLURRY DENSITY FILL
			TAIL-IN

PERFORATED INTERVALS TOP	BOTTOM	NO. OF HOLES
1202 m	1207 m	7 spm
—		
—		
—		
—		
—		

TIME	PRESSURE TBG.	CSG.	INJ. RATE	VOLUME STAGE	CUMM.	CHART REF.	SERVICE LOG DETAIL
	MPa		m^3/min	m^3	m^3		
01:00							Conduct Pre-Job Safety Meeting
01:10							Press. Test D.S. Lines to 7 MPa
01:12			0.3				Start 20% HCl Acid - Holding ~ 1 MPa Backpressure
01:15			0.3	1.0	1.0		End Acid
01:15							Start Spot w/KCl H_2O
01:21	2.0		0.3	1.54	2.54		Stop Pump - 0.1 m^3 Acid at perfs.
01:27	2.0						Start Wash
01:28	1.5		0.1	0.1	2.64		Stop Wash
01:34	1.5						Start Wash
01:34	1.5		0.1	0.1	2.74		Stop Wash
01:39	1.5						Start Wash
01:40	1.5		0.1	0.1	2.84		Stop Wash
01:45	1.5						Start Wash
01:46	1.8		0.1	0.1	2.94		Stop Wash
01:50	1.8						Start Wash
01:51	1.8		0.1	0.1	3.04		Stop Wash

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Supplementary Service Log

TREATMENT NUMBER	WELL NAME	LOCATION	DATE	PAGE
20-05-5134	Mirror Lake	0-33	January 6, 1985	2 OF 2

TIME	PRESSURE TBG.	PRESSURE CSG.	INJ. RATE	VOLUME STAGE	VOLUME CUMM.	CHART REF.	SERVICE LOG DETAIL
	MPa		m^3/min	m^3	m^3		
01:56	1.8						Start Wash
01:57	1.5			0.1	3.14		Stop Wash
02:04	1.5						Start Squeeze
02:05	4.5			0.04	3.18		Stop Pump
02:41	3.0						Start Wash by
02:42	3.5			0.04	3.22		Stop Wash
03:07	3.0						Start Wash by
03:08	4.5			0.05	3.27		Stop Wash
03:25	3.0						Start Squeeze
03:25	5.0			0.04	3.31		Stop Pump
03:48	3.0						Start Squeeze
03:48	5.0			0.04	3.35		Stop Pump
04:10	3.0						Start Squeeze
04:10	5.0			0.04	3.39		Stop Pump
04:34	3.0						Start Wash by
04:34	4.5			0.05	3.44		Stop Wash
05:05	3.0						Shut in and Bleed Off
							Rig to Backwash
							Rig to Swab
							0.7 m^3 Washed by in 1st Stage
							0.14 m^3 Washed by in 2nd Stage
							0.16 m^3 Squeeze in 2nd Stage
							1.0 m^3 TOTAL
							Max Pressure 5 mPa
							Released - Thank you

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DOWELL SCHLUMBERGER CANADA INC.

SERVICE REPORT

CUSTOMER NAME AND ADDRESS NSM RESOURCES LTD.	TREATMENT INVOICE NUMBER 29-05-5135	DATE 1985-01-06
300, 555 - 4th Avenue S.W.	DS DISTRICT Nisku 805	DS OUTPOST
Calgary, Alberta	DS SUPERVISOR Ken Shewchenko	CUSTOMER REPRESENTATIVE Ken Price
	TYPE SERVICE Acid Wash/Squeeze	SERVICE NAME
SERVICE INSTRUCTIONS, REMARKS, MATERIALS Perform Acid Wash/Squeeze Using 2,000 litres 20% HCl With 0.4% A200, 0.5% W35, 0.2% F75	WELL NAME Mirror Lake	
	LOCATION O-33	PROVINCE N.W.T.
	FORMATION Bear Rock	RIG NAME Roll'n
	TYPE OF WELL OIL ☐ GAS ☐ INJ./DISP. ☐ OTHER ☐	AGE OF WELL NEW ☒ REWORK ☐
	PACKER TYPE N/A	PACKER DEPTH
	FLOAT/STG. TYPE	FLOAT/STG. DEPTH
	LINER SIZE	FROM - TO
	CASING SIZE 114 mm	TUBING SIZE 60 mm
	CASING DEPTH	TUBING DEPTH 1207.88 m.
	CASING/ANN. VOL.	TUBING VOLUME 2.44 cu. m.
	ARRIVE LOCATION	
	LEAVE LOCATION	

TOTAL FLUID INJECTED OIL	WATER	AVG. PRESSURE	CEMENT TEMPERATURE
ACID 2 cu. m.	CEMENT	MAX. INJ. PRESSURE 0.2 cu. m./min.	WATER TEMPERATURE
OTHER (SPECIFY)		FINAL INJ. PRESSURE	SLURRY TEMPERATURE
AVG. INJECTION RATE		INST. SHUT IN PRESSURE	RETURNS TEMPERATURE
MAX. INJECTION RATE 11 mPa		WIPER PLUG PRESSURED TO	AVG. SLURRY DENSITY FILL
			TAIL-IN

PERFORATED INTERVALS TOP	BOTTOM	NO. OF HOLES
1202 m	1207 m	.7 spm
—		
—		
—		
—		
—		

TIME	PRESSURE TBG.	CSG.	INJ. RATE cu.m./min.	VOLUME STAGE cu.m.	CUMM. cu.m.	CHART REF.	SERVICE LOG DETAIL
							PAGE 1 OF 2
15:45	mPa						Conduct Pre-Job Safety Meeting
16:00							Pressure Test D.S. Lines to 21 mPa
16:03							Start 20% HCl Acid Holding 3.5 mPa B.P.
16:11				2.0	2.0		End Acid
16:15	3.0			0.54	2.54		End Water - Stop Pump 0.1 cu. m. Acid
							At Perforations
16:20	2.0						Start Wash
16:21	7.0			0.1	2.64		Stop Wash
16:25	3.0						Start Wash
16:26	8.0			0.1	2.74		Stop Wash
16:30	4.0						Start Wash
16:31	10.0			0.1	2.84		Stop Wash
16:43	3.5			0.1	2.94		Wash By 0.1 cu. m.
16:44	1.5		0.04				Start Squeeze
16:46	9.0		0.05	0.2	3.14		Pressure - Rates - Volumes Check (Feeding
16:50	9.0		0.08	0.3	3.44		" " "

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Supplementary Service Log

TREATMENT NUMBER	WELL NAME	LOCATION	DATE	PAGE
29-05-5135	Mirror Lake	0-33	1985-01-06	2 OF 2

TIME	PRESSURE TBG.	PRESSURE CSG.	INJ. RATE	VOLUME STAGE	VOLUME CUMM.	CHART REF.	SERVICE LOG DETAIL
	mPa		cu.m./min.	cu.m.	cu.m.		
16:53	8.2		0.08	0.2	3.64		Pressure - Rates - Volumes Check
16:55	11.0		0.2				Increase Rates to 0.2 cu.m./minute
16:58	11.0		0.2	0.8	4.44		Stop Pump
							ISIP 0 mPa
							15 Minute SIP 5 mPa
							0.5 cu. m. Total Wash
							1.5 cu. m. Total Squeeze
							Rig to Backwash & Swab
							Released - Thankyou

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DOWELL SCHLUMBERGER CANADA INC.

SERVICE REPORT

CUSTOMER NAME AND ADDRESS: NSM RESOURCES LTD. 300, 555 - 4th Avenue S.W., Calgary, Alberta	TREATMENT INVOICE NUMBER: 29-05-5137 DATE: 1985-01-09 DS DISTRICT: Nisku 805 DS OUTPOST: DS SUPERVISOR: Ken Shewchenko CUSTOMER REPRESENTATIVE: Ambrose Gross TYPE SERVICE: Cement Squeeze SERVICE NAME:
SERVICE INSTRUCTIONS, REMARKS, MATERIALS: ~~Perform Cement Squeeze using 0.72 tonnes O.W.G.~~ with 20 litres D-108 & 0.5% D65 TIC (FLAC)	WELL NAME: Mirror Lake LOCATION: 0-33 PROVINCE: N.W.T. FORMATION: Bear Rock RIG NAME: Roll'n TYPE OF WELL: OIL ☐ GAS ☐ INJ./DISP. ☐ OTHER ☐ AGE OF WELL: NEW ☒ REWORK ☐ PACKER TYPE: N/A PACKER DEPTH: TOTAL DEPTH: BHST/BHCT: FLOAT/STG. TYPE: FLOAT/STG. DEPTH: PERFORATED INTERVALS: TOP 1202 m – BOTTOM 1207 m, NO. OF HOLES 7 spm LINER SIZE: FROM - TO:

TOTAL FLUID INJECTED: Oil	WATER	AVG. PRESSURE	CEMENT TEMPERATURE	CASING SIZE: 114.3-mm	TUBING SIZE: 60 mm	–	
ACID	CEMENT: 0.6 cu. m.	MAX. INJ. PRESSURE	WATER TEMPERATURE: 29 degrees C	CASING DEPTH	TUBING DEPTH: 1208 m	–	
OTHER (SPECIFY)		FINAL INJ. PRESSURE	SLURRY TEMPERATURE: 24 degrees C	CASING/ANN. VOL.	TUBING VOLUME: 2,44 cu. m.	–	
AVG. INJECTION RATE		INST. SHUT IN PRESSURE	RETURNS TEMPERATURE	ARRIVE LOCATION		–	
MAX. INJECTION RATE		WIPER PLUG PRESSURED TO	AVG. SLURRY DENSITY: FILL 1890 kg/cu.m.	LEAVE LOCATION		–	
			TAIL-IN				

TIME	PRESSURE TBG.	PRESSURE CSG.	INJ. RATE	VOLUME STAGE	VOLUME CUMM.	CHART REF.	SERVICE LOG DETAIL
	MPa		m^3/min	m^3	m^3		
19:00							Pre-job Safety meeting
19:15							Start Batch Mix 0.72 tonne OWG
19:30							End Mix - 0.6 m^3 at 1890 kg/m^3
19:45							Start Pump Slurry - Holding 2 MPa B.P.
19:47				0.3	0.3		End Slurry
19:58				2.3	2.6		End Water
					-		Plug Balanced - Rig to pull 9 Jnts
20:33	0		0.1				Hole Full - Start Squeeze
20:34	3.0		0.1	0.2	0.2		Pressure - Rate - Volume Check
20:36	4.0		0.1	0.1	0.3		Stop Pump
20:48	0.5						12 min SIP 0.5 MPa
							Bleed Off - Rig to RIH 1 Jnt and Back Wash
							Released

PAGE 1 OF 1

CP 9/85

DOWELL SCHLUMBERGER CANADA INC.

SERVICE REPORT

CUSTOMER NAME AND ADDRESS N.S.M. Resources Ltd. 300, 555 - 4th Avenue S.W., Calgary, Alberta T2P 3E7	TREATMENT INVOICE NUMBER 29-05-5138 DS DISTRICT Nisku 805 DS SUPERVISOR Wade Walls TYPE SERVICE Acidize Wash/Squeeze	DATE January 10, 1985 DS OUTPOST CUSTOMER REPRESENTATIVE Ken Price SERVICE NAME
SERVICE INSTRUCTIONS, REMARKS, MATERIALS Perform Acid Wash and Squeeze using 2,000 litres of 20% HCl Acid with 0.4% A200, 0.2% F-75 0.5% W35	WELL NAME Mirror Lake LOCATION 0-33 FORMATION TYPE OF WELL OIL ☒ GAS ☐ INJ./DISP. ☐ OTHER ☐	PROVINCE N.W.T. RIG NAME Roll'n 53 AGE OF WELL NEW ☒ REWORK ☐

			PACKER TYPE N/A	PACKER DEPTH N/A	TOTAL DEPTH	BHST/BHCT	
			FLOAT/STG. TYPE N/A	FLOAT/STG. DEPTH N/A	PERFORATED INTERVALS TOP	BOTTOM	NO. OF HOLES
TOTAL FLUID INJECTED OIL / WATER	AVG. PRESSURE 3.25 MPa	CEMENT TEMPERATURE	LINER SIZE N/A	FROM - TO ----	1057 m	1063m	
ACID 202.0 m³ / CEMENT	MAX. INJ. PRESSURE 6.0 MPa	WATER TEMPERATURE	CASING SIZE 114 mm	TUBING SIZE 60 mm	—		
OTHER (SPECIFY)	FINAL INJ. PRESSURE 5.0 MPa	SLURRY TEMPERATURE	CASING DEPTH	TUBING DEPTH 1064 m	—		
AVG. INJECTION RATE 0.08 m³/min	INST. SHUT IN PRESSURE 4.5 MPa	RETURNS TEMPERATURE	CASING/ANN. VOL.	TUBING VOLUME 2.15 m³	—		
MAX. INJECTION RATE 0.100 m³/min	WIPER PLUG PRESSURED TO	AVG. SLURRY DENSITY FILL	ARRIVE LOCATION		—		
		TAIL-IN	LEAVE LOCATION		—		

TIME	PRESSURE TBG.	PRESSURE CSG.	INJ. RATE	VOLUME STAGE	VOLUME CUMM.	CHART REF.	SERVICE LOG DETAIL (PAGE 1 OF 2)
10:38	MPa		m³/min	m³	m³	1	Conduct Pre-Job Safety Meeting
11:02						2	Pressure Test D.S. Line to 10 MPa
11:04			0.2			3	Start 20% HCl Acid - Holding ≈ 2 MPa backpressure
11:13			0.2	2.0	2.0	4	End Acid
11:15						4	Start Spot with KCl Water
11:15	3.0		0.2	0.25	2.25	5	Stop Pump - 0.1 m³ Acid at Perfs.
11:21	2.0					6	Start Wash
11:22	4.0		0.1	0.1	2.35	7	Stop Wash
11:25	2.0					8	Start Wash
11:26	2.0		0.1	0.1	2.45	9	Stop Wash
11:30	2.0					10	Start Wash
11:31	3.0		0.1	0.1	2.55	11	Stop Wash
11:35	2.0					12	Start Wash
11:36	3.8		0.1	0.1	2.65	13	Stop Wash
11:43	3.0					14	Start Wash
11:45	4.0		0.1	0.1	2.75	15	Stop Wash

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Supplementary Service Log

TREATMENT NUMBER 29-05-5138	WELL NAME 0-33	LOCATION Mirror Lake	DATE January 10/85	PAGE 2 OF 2

TIME	PRESSURE TBG.	PRESSURE CSG.	INJ. RATE	VOLUME STAGE	VOLUME CUMM.	CHART REF.	SERVICE LOG DETAIL
	MPa		m^3/min	m^3	m^3		
11:50	3.0					16	Start Wash
11:53			0.05	0.1	2.85	17	Stop Wash
11:57	4.0					18	Start Wash
11:58	4.0		0.1	0.1	2.95	19	Stop Wash
12:02	3.0					20	Start Wash
12:03	4.0		0.1	0.1	3.05	21	Stop Wash
12:06	3.5					22	Start Wash
12:08	5.0		0.05	0.1	3.15	23	Stop Wash - Shut in Casing
12:13	6.0		0.1			24	Start Squeeze
12:24	5.0		0.1	1.0	4.15	25	Stop Pump - Shut in
							ISIP 4.5 MPa
							15 min SIP 3.5 MPa
							1.0 m^3 Total Wash 1.0 m^3 Total Squeeze
							Rig to Backwash - Swab

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DOWELL SCHLUMBERGER CANADA INC. — SERVICE REPORT

CUSTOMER NAME AND ADDRESS: N.S.M. Resources Ltd.	TREATMENT INVOICE NUMBER: 29-05-5139	DATE: January 12, 1985
300, 555 - 4th Avenue S.W.,	DS DISTRICT: Nisku 805	DS OUTPOST:
Calgary, Alberta T2P 3E7	DS SUPERVISOR: L. Trevor	CUSTOMER REPRESENTATIVE: Ambrose Gross
	TYPE SERVICE: Cement Squeeze	SERVICE NAME:
SERVICE INSTRUCTIONS, REMARKS, MATERIALS: Perform Cement Squeeze w/0.72 tonne of OW'G'	WELL NAME: Mirror Lake	
+ 20 litres D108 + 0.5% D-65 + 1 litre D47	LOCATION: 0-33	PROVINCE: N.W.T.
	FORMATION:	RIG NAME: Roll'n
	TYPE OF WELL: OIL ☐ GAS ☐ INJ./DISP. ☐ OTHER ☒	AGE OF WELL: NEW ☒ REWORK ☐
	PACKER TYPE: N/A / PACKER DEPTH:	TOTAL DEPTH: / BHST/BHCT:
	FLOAT/STG. TYPE: / FLOAT/STG. DEPTH:	PERFORATED INTERVALS: TOP / BOTTOM / NO. OF HOLES
TOTAL FLUID INJECTED: OIL / WATER; AVG. PRESSURE; CEMENT TEMPERATURE	LINER SIZE: / FROM - TO:	1011 – 1015mts
ACID / CEMENT; MAX. INJ. PRESSURE; WATER TEMPERATURE: 34°C	CASING SIZE: 114.3 mm / TUBING SIZE: 60.3 mm	1027 – 1032 mts
OTHER (SPECIFY); FINAL INJ. PRESSURE; SLURRY TEMPERATURE: 26°C	CASING DEPTH: / TUBING DEPTH: 1033.3 mts	– 63
AVG. INJECTION RATE; INST. SHUT IN PRESSURE; RETURNS TEMPERATURE	CASING/ANN. VOL.: / TUBING VOLUME: 2.0 m^3	–
MAX. INJECTION RATE; WIPER PLUG PRESSURED TO; AVG. SLURRY DENSITY: FILL 1890 kg/m^3	ARRIVE LOCATION:	–
TAIL-IN	LEAVE LOCATION:	–

TIME	PRESSURE TBG.	PRESSURE CSG.	INJ. RATE	VOLUME STAGE	VOLUME CUMM.	CHART REF.	SERVICE LOG DETAIL (PAGE 1 OF 1)
22:00							Pre Job Safety Meeting
22:10							Batch Mix 0.72 tonnes O.W.'G'
22:25							Slurry Yield 0.6 m^3 @ 1890 kg/m^3
22:27							Pump Slurry Downhole
22:40							Displace Slurry w/1.4 m^3 of Water
22:55							Pu 10 jts
23:20							Squeeze 0.3 m^3 slurry into formation
23:30							Reach max. squeeze press. of 2 MPa
23:32							Stop pumping press. bled to 0 MPa
23:47							Observe for 15 minutes
							Rig reverse circulated
							Released - Thank You

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DOWELL SCHLUMBERGER CANADA INC.

SERVICE REPORT

CUSTOMER NAME AND ADDRESS N.S.M. Resources Ltd.	TREATMENT INVOICE NUMBER 29-05-5142	DATE January 12, 1985
300, 555 - 4th Avenue S.W.,	DS DISTRICT Nisku	DS OUTPOST
Calgary, Alberta	DS SUPERVISOR R.A. Paranych	CUSTOMER REPRESENTATIVE Ken Price
T2P 3E7	TYPE SERVICE Acid	SERVICE NAME Wash & Squeeze

SERVICE INSTRUCTIONS, REMARKS, MATERIALS

Acidize well doing a 1.0 m^3 wash followed by a 1.0 m^3 squeeze using 20% HCl containing: 0.4% A200 0.2% F75 + 0.75% W35

WELL NAME Mirror Lake		
LOCATION 033	PROVINCE N.W.T.	
FORMATION	RIG NAME Roll'n 53	
TYPE OF WELL OIL ☐ GAS ☐ INJ./DISP. ☐ OTHER ☐	AGE OF WELL NEW ☐ REWORK ☐	
PACKER TYPE / PACKER DEPTH	TOTAL DEPTH / BHST/BHCT	
FLOAT/STG. TYPE / FLOAT/STG. DEPTH	PERFORATED INTERVALS TOP / BOTTOM / NO. OF HOLES	
LINER SIZE / FROM - TO	1011 m – 1015 m	
CASING SIZE 114 mm / TUBING SIZE 60.3 mm	1027 m – 1032 m	
CASING DEPTH / TUBING DEPTH 1033.3 m	–	
CASING/ANN. VOL. / TUBING VOLUME 2.09 m^3	–	
ARRIVE LOCATION	–	
LEAVE LOCATION	–	

TOTAL FLUID INJECTED OIL / WATER 2.57 m^3	AVG. PRESSURE 2.5 mPa	CEMENT TEMPERATURE
ACID 2.0 m^3 / CEMENT	MAX. INJ. PRESSURE 5.5 mPa	WATER TEMPERATURE
OTHER (SPECIFY)	FINAL INJ. PRESSURE 5.5 mPa	SLURRY TEMPERATURE
AVG. INJECTION RATE 0.1 m^3/minute	INST. SHUT IN PRESSURE	RETURNS TEMPERATURE
MAX. INJECTION RATE 0.2 m^3/minute	WIPER PLUG PRESSURED TO	AVG. SLURRY DENSITY FILL
		TAIL-IN

TIME	PRESSURE TBG.	PRESSURE CSG.	INJ. RATE	VOLUME STAGE	VOLUME CUMM.	CHART REF.	SERVICE LOG DETAIL
	MPa		m^3/min	m^3	m^3		
05:15							Pretreatment Safety & Procedure meeting
05:28	-		0.20			1	Start to establish circulation
05:30	-			0.3	0.3	2	Stop Pump
05:34	26.5					3	Pressure Test Treating Line
05:41	2.0		0.20			4	Start circulating acid
05:49	3.0		0.20	2.0	2.3	5	Start Water
05:51	3.5			0.4	2.7	6	Stop Pump - Close Annulus - 1st Wash
05:57	2.5			0.10		7	Start Pump
05:58	3.0			0.1	2.8	8	Stop Pump - Close Annulus - 2nd Wash
06:04	2.0		0.10			9	Start Pump
06:05	4.0			0.1	2.9	10	Stop Pump - Close Annulus - 3rd Wash
06:11	0.5		0.10			11	Start Pump (Rig Valve May have Leaked)
06:12	3.5			0.1	3.0	12	Stop Pump - Close Annulus - 4th Wash
06:17	0.5		0.10			13	Start Pump
06:19	2.5			0.15	3.15	14	Stop Pump - Close Annulus - 5th Wash

DOWELL

DOWELL OF CANADA
Division of Dow Chemical Canada Inc.

Supplementary Service Log

TREATMENT NUMBER	WELL NAME	LOCATION	DATE	PAGE
29-05-5142	Mirror Lake	033	January 12. 1985	2 OF 2

TIME	PRESSURE TBG.	PRESSURE CSG.	INJ. RATE	VOLUME STAGE	VOLUME CUMM.	CHART REF.	SERVICE LOG DETAIL
	MPa		m^3/min	m^3	m^3		
06:24	1.5		0.10			15	Start Pump²
06:26	3.0			0.12	3.27	16	Stop Pump - Close Annulus - 6th Wash
06:31	2.0		0.10			17	Start Pump
06:32	3.5			0.1	3.37	18	Stop Pump - Close Annulus - 7th Wash
06:37	2.5		0.10			19	Start Pump
06:37	3.0			0.1	3.47	20	Stop Pump - Close Annulus - 8th Wash
06:46	2.0		0.10			21	Start Pump
06:47	3.0			0.1	3.57	22	Stop Pump - Close Annulus - 9th Wash
06:54	2.5		0.08			23	Start Squeeze Acid
07:01	4.0		0.17	0.5	4.07	24	Increase Rate
07:06	5.5			0.5	4.57	25	Stop Pump - All Acid Squeezed
07:31	3.5					26	Shut in pressure after 25 minutes
07:31	-					27	Bleed Pressure off Line - Rig out

PLEASE PRESS FIRMLY - YOU ARE MAKING MULTIPLE COPIES - WRITE HARD ON SURFACE

9211-N9-1-2RE

GEOTECH Analytical

NSM MIRROR LAKE

0-33

Water and Gas Analysis

Prepared For

NSM RESOURCES LTD.

FILE 85-AS-5047

FEB. 01, 1985

tti GEOTECHnical resources ltd.
4500 - 5th STREET N.E., CALGARY, ALBERTA T2E 7C3 (403) 230-4128
TELEX 03-825879

tti GEOTECHnical resources ltd.

4500 - 5th STREET N.E., CALGARY, ALBERTA T2E 7C3

(403) 230-4128

GEOTECH Analytical

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-W1

CONTAINER IDENTITY:

WATER ANALYSIS

OPERATOR'S NAME: NSM RESOURCES LTD.

SAMPLE LOCATION:

WELL NAME: NSM MIRROR LAKE 0-33

KB ELEVATIONS: GRD:

FIELD OR AREA:

POOL OR ZONE:

NAME OF SAMPLER:

COMPANY: CENTRAL ALTA TESTING

TEST RECOVERY:

TEST TYPE: NO.:

MULTIPLE RECOVERY:

TEST INTERNAL FROM: TO:

PERFORATIONS FROM: TO:

SAMPLING POINT: FLOWTEE SWAB 25

AMT. AND TYPE OF CUSHION:

MUD RESISTIVITY (Ω/m):

PUMPING: FLOWING: GAS LIFT: SWAB:

WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

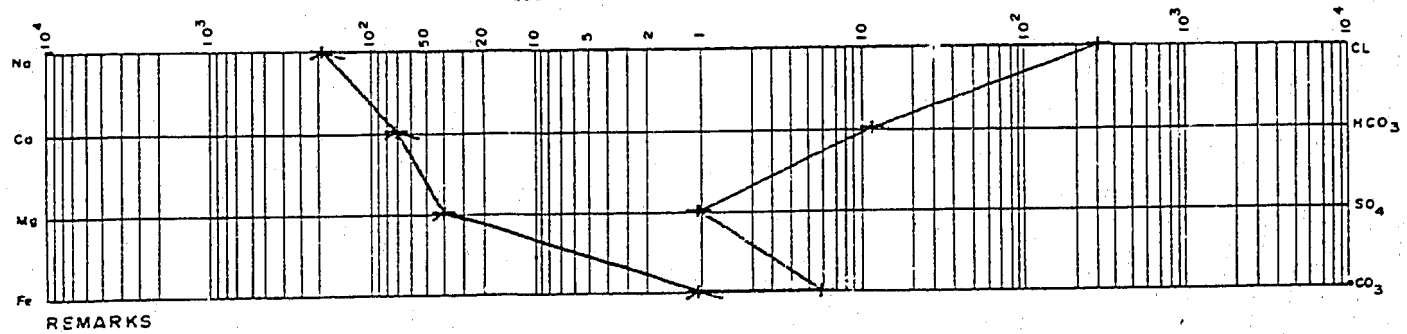
	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE kPa					
TEMPERATURE (°C)					

DATE SAMPLED Y – M – D H : M	DATE RECEIVED Y – M – D	DATE ANALYZED Y – M – D	ANALYST
85-01-08	85-01-25	85-01-28	KW

SUMMARY DATA

TOTAL HARDNESS AS $CaCO_3$	5710	g/m^3
TOTAL ALKALINITY	852	g/m^3
SALINITY	1.86	%
SATURATION INDEX	*	
STABILITY INDEX	*	
CORROSION TENDENCY	17.07	

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS

* No Temperature Data

WATER ANALYSIS

DETAILED REPORT

GEOTECH Analytical

OPERATOR'S NAME	NSM RESOURCES LTD.
WELL NAME	NSM MIRROR LAKE
LOCATION	0-33
SAMPLING POINT	FLOWTEE SWAB 25

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-W1

CATIONS

ION	g/m³	MASS FRACTION	MEQ/L
Na	4600	0.14	200
K	400	0.01	10
Ca	1390	0.04	69
Mg	432	0.01	35
Ba	545	0.02	7
Sr	54.3	0.00	1.2
Fe	1.54	0.00	0.08
Mn			
Al			
Si			
B	3.16		
U			
Th			

ANIONS

ION	g / m³	MASS FRACTION	MEQ/L
Cl	10200	0.74	290
Br			
I			
F			
HCO_3	697	0.02	11
CO_3	168	0.01	5
OH	0.000	0.00	0.000
SO_4	39.5	0.00	0.8
H_2S	345	0.01	21
PO_4			

TOTAL SOLIDS (g/m³)

EVAPORATED AT 110°C	EVAPORATED AT 180°C
AT IGNITION	CALCULATED
	18470

SPECIFIC GRAVITY	REFRACTIVE INDEX (RI)
at 15°C	1.349 at 25°C

OBSERVED pH	RESISTIVITY (RW) Ωm
6.81 at 25°C	0.323 at 25°C

REDOX POTENTIAL (E_h)	DISSOLVED O_2
	g/m³

TOTAL METALS

METAL	g/m³
Fe	
Mn	

REMARKS:

tti GEOTECHnical resources ltd.

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GEOTECH Analytical

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-W2

CONTAINER IDENTITY:

WATER ANALYSIS

OPERATORS NAME: NSM RESOURCES LTD.

SAMPLE LOCATION:

WELL NAME: NSM MIRROR LAKE 0-33

ELEVATIONS KD: GRD:

FIELD OR AREA:

POOL OR ZONE:

NAME OF SAMPLER:

COMPANY: CENTRAL ALTA TESTING

TEST RECOVERY:

TEST TYPE: NO.:

MULTIPLE RECOVERY:

TEST INTERNAL FROM:

TO:

PERFORATIONS FROM:

TO:

SAMPLING POINT: FLOWTEE SWAB 60

AMT. AND TYPE OF CUSHION:

MUD RESISTIVITY (Ω/m):

PUMPING: FLOWING: GAS LIFT: SWAB:

WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

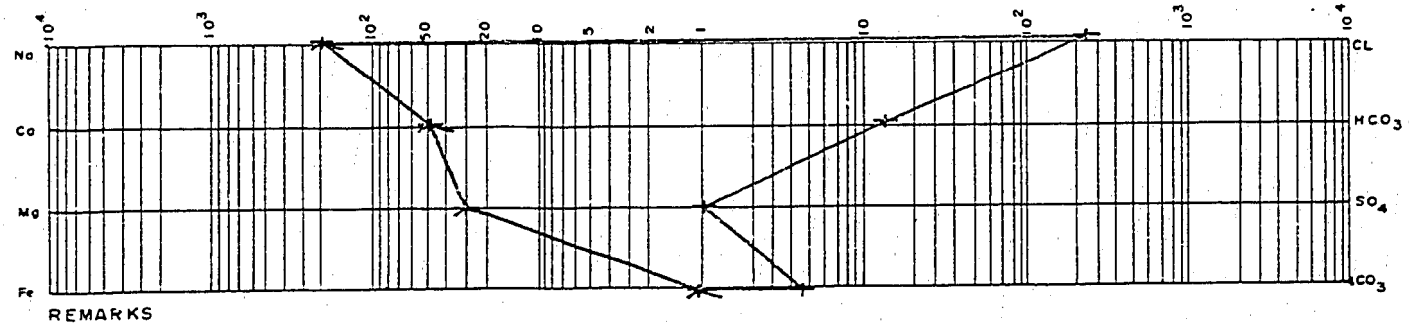
	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE k/Pa					
TEMPERATURE (°C)					

DATE SAMPLED Y - M - D H:M	DATE RECEIVED Y - M - D	DATE ANALYZED Y - M - D	ANALYST
85-01-09	85-01-25	85-01-28	KW

SUMMARY DATA

TOTAL HARDNESS AS $CaCO_3$	3968	g/m^3
TOTAL ALKALINITY	899	g/m^3
SALINITY	1.61	%
SATURATION INDEX	*	
STABILITY INDEX	*	
CORROSION TENDENCY	14.02	

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS

* No Temperature Data

WATER ANALYSIS

DETAILED REPORT

GEOTECH Analytical

OPERATOR'S NAME	NSM RESOURCES LTD.
WELL NAME	NSM MIRROR LAKE
LOCATION	0-33
SAMPLING POINT	FLOWTEE SWAB 60

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-W2

CATIONS

ION	g/m³	MASS FRACTION	MEQ/L
Na	4650	0.09	202
K	215	0.00	5
Ca	871	0.02	43
Mg	327	0.01	26
Ba	535	0.01	7
Sr	50.2	0.00	1.1
Fe	0.070	0.00	0.004
Mn			
Al			
Si			
B	3.36		
U			
Th			

ANIONS

ION	g/m³	MASS FRACTION	MEQ/L
Cl	8900	0.84	251
Br			
I			
F			
HCO_3	833	0.02	13
CO_3	129	0.00	4
OH	0.000	0.00	0.000
SO_4	51.8	0.00	1.1
H_2S	370	0.01	23
PO_4			

TOTAL SOLIDS (g/m³)

EVAPORATED AT 110°C	EVAPORATED AT 180°C
AT IGNITION	CALCULATED
	16344

SPECIFIC GRAVITY	REFRACTIVE INDEX (RI)
1.35 at 15°C	1.349 at 25°C
OBSERVED pH	RESISTIVITY (RW) Ωm
7.00 at 25°C	0.371 at 25°C
REDOX POTENTIAL(E_h)	DISSOLVED O_2
	g/m³

TOTAL METALS

METAL	g/m³
Fe	
Mn	

REMARKS:

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GEOTECH Analytical

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-W3

CONTAINER IDENTITY:

WATER ANALYSIS

OPERATOR'S NAME: NSM RESOURCES LTD.

SAMPLE LOCATION:

WELL NAME: NSM MIRROR LAKE 0-33

ELEVATIONS KB: GRD:

FIELD OR AREA:

POOL OR ZONE:

NAME OF SAMPLER:

COMPANY:

TEST RECOVERY: 58 bbls

TEST TYPE: NO.:

MULTIPLE RECOVERY:

TEST INTERNAL FROM:

TO:

PERFORATIONS FROM:

TO:

SAMPLING POINT: FLOWTEE SWAB ZZ

AMT. AND TYPE OF CUSHION:

MUD RESISTIVITY (Ω/m):

PUMPING: FLOWING: GAS LIFT: SWAB:

WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

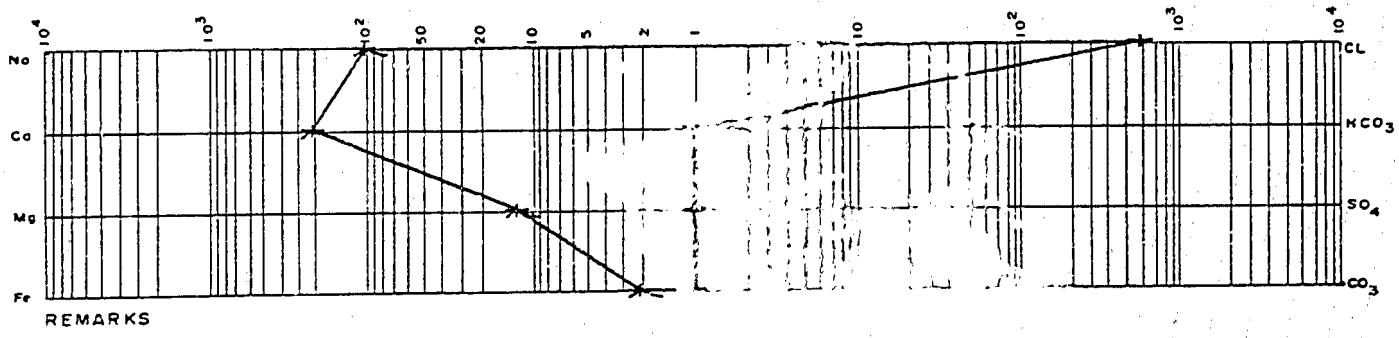
	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE kPa					
TEMPERATURE (°C)					

DATE SAMPLED Y-M-D H:M	DATE RECEIVED Y-M-D	DATE ANALYZED Y-M-D	ANALYST
85-01-10	85-01-25	85-01-28	KW

SUMMARY DATA

TOTAL HARDNESS AS $CaCO_3$	12018	g/m^3
TOTAL ALKALINITY	37	g/m^3
SALINITY	3.65	%
SATURATION INDEX	*	
STABILITY INDEX	*	
CORROSION TENDENCY	762.17	

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS

* No Temperature Data

WATER ANALYSIS

DETAILED REPORT

GEOTECH Analytical

OPERATOR'S NAME	NSM RESOURCES LTD.
WELL NAME	NSM MIRROR LAKE
LOCATION	0-33
SAMPLING POINT	FLOWTEE SWAB 22

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-W3

CATIONS

ION	g/m³	MASS FRACTION	MEQ/L
Na	2400	0.03	104
K	3640	0.05	93
Ca	4460	0.06	222
Mg	154	0.00	12
Ba	157	0.00	2
Sr	40.7	0.00	0.9
Fe	41.6	0.00	2.2
Mn			
Al			
Si			
B	1.15		
U			
Th			

ANIONS

ION	g/m³	MASS FRACTION	MEQ/L
Cl	20200	0.86	569
Br			
I	2.09	0.00	0.02
F			
HCO_3	45.6	0.00	0.7
CO_3	0.000	0.00	0.000
OH	0.000	0.00	0.000
SO_4	16.3	0.00	0.3
H_2S	0.00		
PO_4			

TOTAL SOLIDS (g/m³)

EVAPORATED AT 110°C	EVAPORATED AT 180°C
AT IGNITION	CALCULATED
	31130

SPECIFIC GRAVITY	REFRACTIVE INDEX (RI)
at 15°C	1.351 at 25°C
OBSERVED pH	RESISTIVITY (RW) Ωm
6.69 at 25°C	0.183 at 25°C
REDOX POTENTIAL (E_h)	DISSOLVED O_2
	g/m³

TOTAL METALS

METAL	g/m³
Fe	
Mn	

REMARKS:

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(403) 230-4128

GEOTECH Analytical

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-W4

CONTAINER IDENTITY:

WATER ANALYSIS

OPERATORS NAME: NSM RESOURCES LTD.

SAMPLE LOCATION:

WELL NAME: NSM MIRROR LAKE 0-33

ELEVATIONS KB: GRD:

FIELD OR AREA:

POOL OR ZONE:

NAME OF SAMPLER:

COMPANY:

TEST RECOVERY: 71 bbl

TEST TYPE: NO.:

MULTIPLE RECOVERY:

TEST INTERNAL FROM:

TO:

PERFORATIONS FROM:

TO:

SAMPLING POINT: FLOWTEE SWAB 25

AMT. AND TYPE OF CUSHION:

MUD RESISTIVITY (Ω/m):

PUMPING: FLOWING: GAS LIFT: SWAB:

WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE k/Pa					
TEMPERATURE (°C)					

DATE SAMPLED Y - M - D H : M: 85-01-11

DATE RECEIVED Y - M - D: 85-01-25

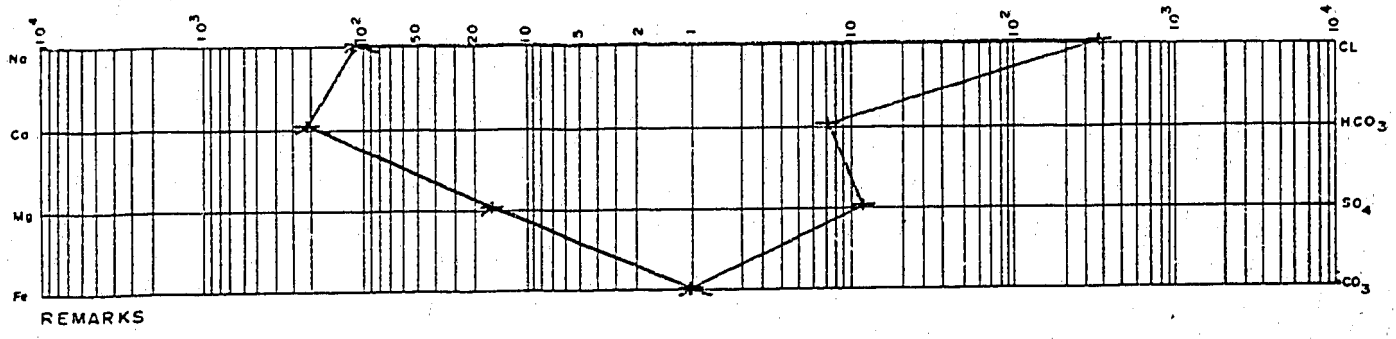
DATE ANALYZED Y - M - D: 85-01-28

ANALYST: KW

SUMMARY DATA

TOTAL HARDNESS AS $CaCO_3$	12386	g/m^3
TOTAL ALKALINITY	351	g/m^3
SALINITY	2.15	%
SATURATION INDEX	*	
STABILITY INDEX	*	
CORROSION TENDENCY	49.29	

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS

* No Temperature Data

WATER ANALYSIS

DETAILED REPORT

GEOTECH Analytical

OPERATOR'S NAME	NSM RESOURCES LTD.
WELL NAME	NSM MIRROR LAKE
LOCATION	0-33
SAMPLING POINT	FLOWTEE SWAB 25

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-W4

CATIONS

ION	g/m³	MASS FRACTION	MEQ/L
Na	2550	0.03	110
K	117	0.00	2
Ca	4490	0.04	224
Mg	196	0.00	16
Ba	413	0.00	6
Sr	55.0	0.00	1.3
Fe	2.15	0.00	0.12
Mn			
Al			
Si			
B	1.32		
U			
Th			

ANIONS

ION	g/m³	MASS FRACTION	MEQ/L
Cl	11800	0.92	334
Br			
I	< 1.00		
F			
HCO_3	428	0.00	7
CO_3	0.000	0.00	0.000
OH	0.000	0.00	0.000
SO_4	555	0.01	11
H_2S	0.00		
PO_4			

TOTAL SOLIDS (g/m³)

EVAPORATED AT 110°C	EVAPORATED AT 180°C
AT IGNITION	CALCULATED
	20382

SPECIFIC GRAVITY	REFRACTIVE INDEX (RI)
at 15°C	1.350 at 25°C

OBSERVED pH	RESISTIVITY (RW) Ω m
6.00 at 25°C	0.372 at 25°C

REDOX POTENTIAL (E_h)	DISSOLVED O_2
	g/m³

TOTAL METALS

METAL	g/m³
Fe	
Mn	

REMARKS:

tti GEOTECHnical resources ltd.

4500 - 5th STREET N.E., CALGARY, ALBERTA T2E 7C3

(403) 230-4128

GEOTECH Analytical

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-W5

CONTAINER IDENTITY:

WATER ANALYSIS

OPERATOR'S NAME: NSM RESOURCES LTD.

SAMPLE LOCATION	WELL NAME	ELEVATIONS KB	ELEVATIONS GRD
	NSM MIRROR LAKE O-33		

FIELD OR AREA	POOL OR ZONE	NAME OF SAMPLER	COMPANY
	HARE INDIAN		CENTRAL ALTA TESTING

TEST TYPE: NO.:

MULTIPLE RECOVERY:

TEST INTERNAL FROM:

TO:

PERFORATIONS FROM: 1011

TO: 1015

TEST RECOVERY: 68 bbl

SAMPLING POINT	AMT. AND TYPE OF CUSHION	MUD RESISTIVITY (Ω/m)
FLOW-TEE SWAB 28		

PUMPING: FLOWING: GAS LIFT: SWAB:

WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

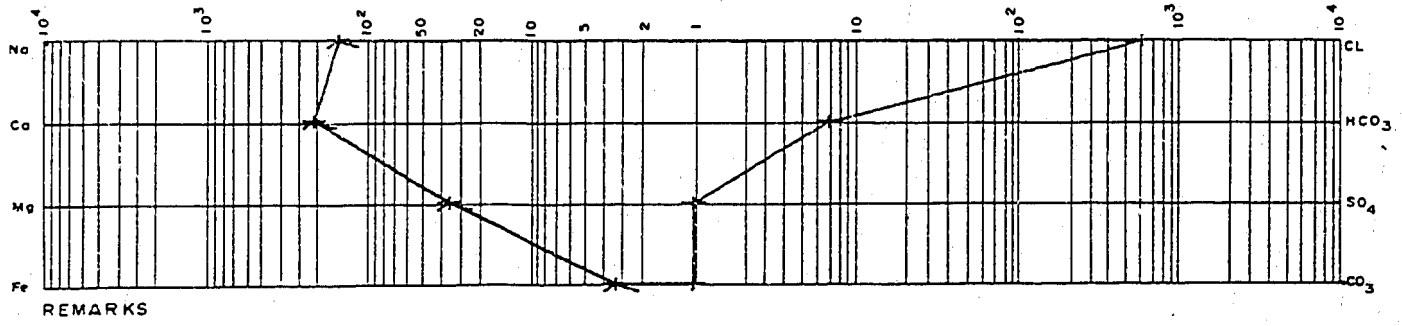
	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE kPa					
TEMPERATURE (°C)					

DATE SAMPLED Y - M - D H : M	DATE RECEIVED Y - M - D	DATE ANALYZED Y - M - D	ANALYST
85-01-12	85-01-25	85-01-28	KW

SUMMARY DATA

TOTAL HARDNESS AS $CaCO_3$	13101	g/m^3
TOTAL ALKALINITY	343	g/m^3
SALINITY	3.86	%
SATURATION INDEX	*	
STABILITY INDEX	*	
CORROSION TENDENCY	87.78	

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS

* No Temperature Data

WATER ANALYSIS

DETAILED REPORT

GEOTECH Analytical

OPERATOR'S NAME	NSM [illegible] RCES LTD.
WELL NAME	NSM [illegible]ROR LAKE
LOCATION	0-33
SAMPLING POINT	FLOW-TEE SWAB 28

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-W5

CATIONS

ION	g/m³	MASS FRACTION	MEQ/L
Na	3600	0.03	156
K	795	0.01	20
Ca	4440	0.03	221
Mg	387	0.00	31
Ba	327	0.00	4
Sr	71.8	0.00	1.6
Fe	56.7	0.00	3.0
Mn			
Al			
Si			
B	1.56		
U			
Th			

ANIONS

ION	g/m³	MASS FRACTION	MEQ/L
Cl	21300	0.93	602
Br			
I			
F			
HCO_3	419	0.00	6
CO_3	0.000	0.00	0.000
OH	0.000	0.00	0.000
SO_4	14.8	0.00	0.3
H_2S	9.57	0.00	0.60
PO_4			

TOTAL SOLIDS (g/m³)

EVAPORATED AT 110°C	EVAPORATED AT 180°C
AT IGNITION	CALCULATED
	31200

SPECIFIC GRAVITY	REFRACTIVE INDEX (RI)
at 15°C	1.351 at 25°C

OBSERVED PH	RESISTIVITY (RW) Ωm
6.08 at 25°C	0.209 at 25°C

REDOX POTENTIAL(E_h)	DISSOLVED O_2
	g/m³

TOTAL METALS

METAL	g/m³
Fe	
Mn	

REMARKS:

ttl GEOTECHnical resources ltd.

4500 - 5th STREET N.E., CALGARY, ALBERTA T2E 7C3

(403) 230-4128

GEOTECH Analytical

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-G1

CONTAINER IDENTITY: 5800

GAS ANALYSIS

OPERATOR'S NAME: NSM RESOURCES LTD.

SAMPLE LOCATION:

WELL NAME: NSM MIRROR LAKE 0-33

ELEVATIONS: KB: GRD:

FIELD OR AREA:

POOL OR ZONE:

NAME OF SAMPLER:

COMPANY: CENTRAL ALBERTA TESTING

TEST RECOVERY:

TEST TYPE: NO.:

MULTIPLE RECOVERY:

TEST INTERNAL FROM:

TO:

PERFORATIONS FROM:

TO:

SAMPLING POINT: CASING

AMT. AND TYPE OF CUSHION:

MUD RESISTIVITY (Ω/m):

PUMPING: FLOWING: GAS LIFT: SWAB:

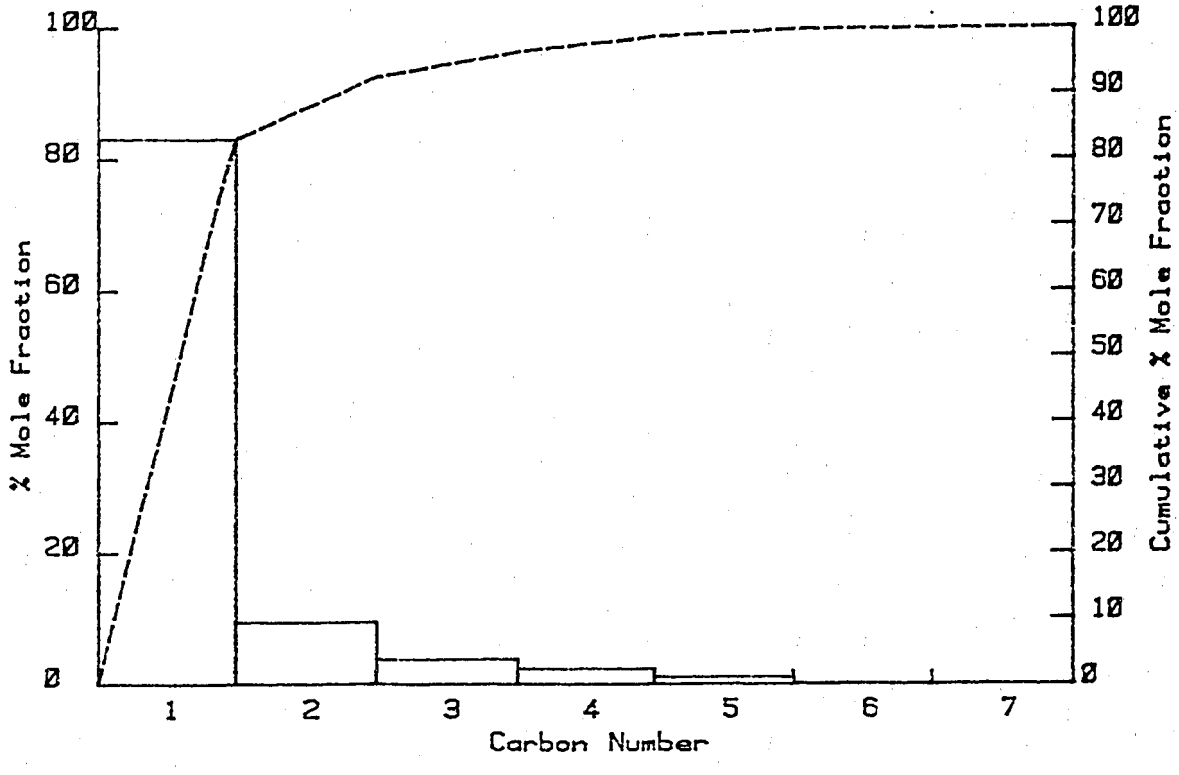
WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE kPa				75	315
TEMPERATURE (°C)					50

DATE SAMPLED Y-M-D H:M	DATE RECEIVED Y-M-D	DATE ANALYZED Y-M-D	ANALYST
85-01-09	85-01-25	85-01-25	DF

Cumulative % ———

Carbon Number Distribution



Weighted Average Carbon Number : 1.3

GAS ANALYSIS

DETAILED REPORT

GEOTECH Analytical

OPERATOR'S NAME	NSM RESOURCES LTD.
WELL NAME	NSM MIRROR LAKE
LOCATION	0-33
SAMPLING POINT	CASING

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-G1

COMPOSITION

COMP.	MOLE FRACTION AIR FREE AS RECEIVED	MOLE FRACTION AIR FREE ACID GAS FREE	PETROLEUM LIQUID CONTENT mL/m³
H_2	0.0018	0.0020	
He	TRACE	TRACE	
N_2	0.0148	0.0164	
CO_2	0.0994	0.0000	
H_2S	0.0005	0.0000	
C_1	0.7338	0.8153	
C_2	0.0832	0.0925	
C_3	0.0333	0.0369	122.1
IC_4	0.0089	0.0099	38.8
NC_4	0.0117	0.0130	49.1
IC_5	0.0052	0.0058	25.4
NC_5	0.0043	0.0048	20.8
C_6	0.0017	0.0019	9.3
C_7 +	0.0014	0.0015	16.7
C_8			
C_9			
C_{10}+			
TOTAL	1.0000	1.0000	274.2

CALCULATED GROSS HEATING VALUE

MJ/m³ at 15°C + 101.325 kPa

MOISTURE FREE	MOISTURE & ACID GAS FREE
45.53	41.00

VAPOUR PRESSURE

PENTANES PLUS: 100.62 kPa

RELATIVE DENSITY

MOISTURE FREE		ACID GAS FREE		DENSITY
MEASURED	CALCULATED	MEASURED	CALCULATED	MOISTURE FREE
	0.785		0.703	0.960

CALCULATED PSEUDO CRITICAL PROPERTIES

MOISTURE FREE		ACID GAS FREE	
ppc (abs)	pTc	ppc(abs)	pTc
4834.3 kPa	224.6 °K	4551.5 kPa	215.7 °K

RELATIVE MOLECULAR MASS

MOISTURE FREE	C_7^+
22.72	101.21

H_2S g/m³: 0.76

REMARKS:

1000 HRS. ANALYSIS PERFORMED TO C10+.
TRACE IS DEFINED AS LESS THAN 0.0001 MOLE FRACTION.

tti GEOTECHnical resources ltd.

4500 - 5th STREET N.E., CALGARY, ALBERTA T2E 7C3

(403) 230-4128

GEOTECH Analytical

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-G2

CONTAINER IDENTITY: 5618

GAS ANALYSIS

OPERATORS NAME: NSM RESOURCES LTD.

SAMPLE LOCATION:

WELL NAME: NSM MIRROR LAKE 0-33

ELEVATIONS KB: GRD:

FIELD OR AREA:

POOL OR ZONE:

NAME OF SAMPLER:

COMPANY:

TEST RECOVERY:

TEST TYPE: NO.:

MULTIPLE RECOVERY:

TEST INTERNAL FROM:

TO:

PERFORATIONS FROM:

TO:

SAMPLING POINT:

AMT. AND TYPE OF CUSHION:

MUD RESISTIVITY(Ω/m):

PUMPING: FLOWING: GAS LIFT: SWAB:

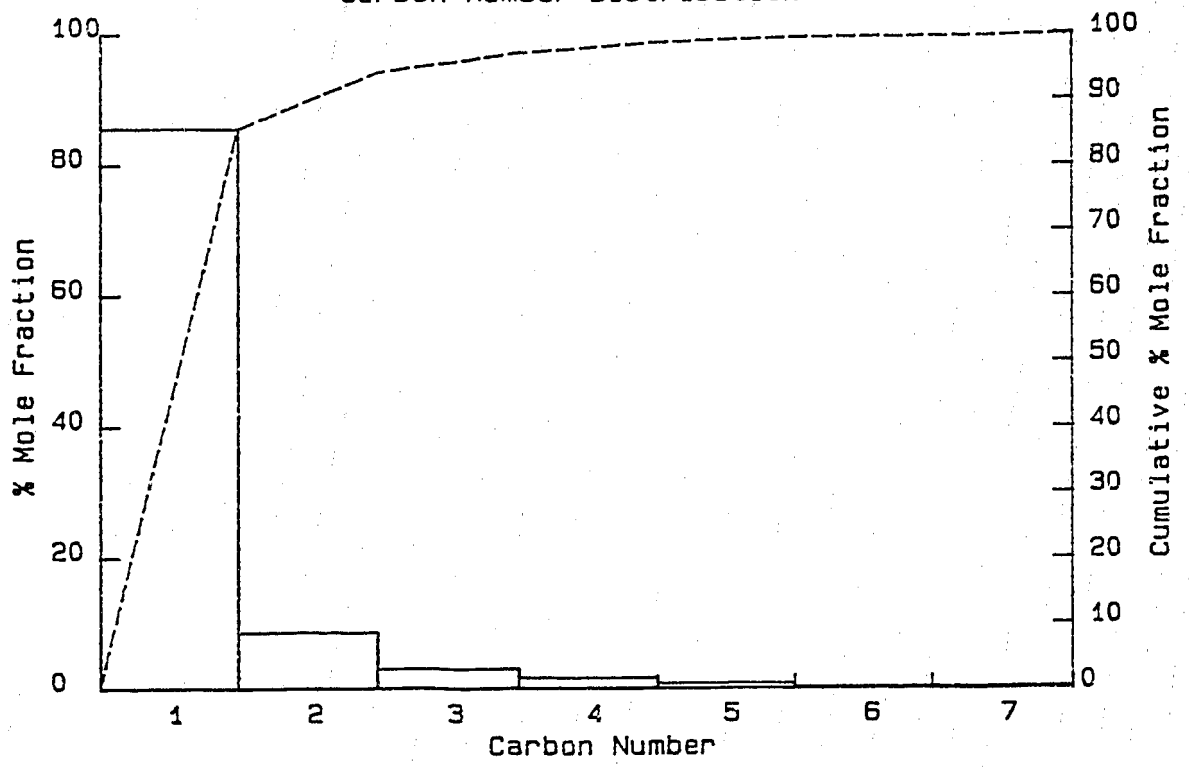
WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE k/Pa				<7	40
TEMPERATURE (°C)					50

DATE SAMPLED Y-M-D H:M	DATE RECEIVED Y-M-D	DATE ANALYZED Y-M-D	ANALYST
85-01-09	85-01-25	85-01-25	DF

Cumulative % _____

Carbon Number Distribution



Weighted Average Carbon Number : 1.25

GAS ANALYSIS

DETAILED REPORT

GEOTECH Analytical

OPERATOR'S NAME	NSM RESOURCES LTD.
WELL NAME	NSM MIRROR LAKE
LOCATION	0-33
SAMPLING POINT	

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-G2

COMPOSITION

COMP.	MOLE FRACTION AIR FREE AS RECEIVED	MOLE FRACTION AIR FREE ACID GAS FREE	PETROLEUM LIQUID CONTENT mL/m^3
H_2	0.0017	0.0024	
He	TRACE	TRACE	
N_2	0.0261	0.0361	
CO_2	0.2336	0.0000	
H_2S	0.0433	0.0000	
C_1	0.5957	0.8239	
C_2	0.0594	0.0821	
C_3	0.0205	0.0283	75.2
IC_4	0.0046	0.0064	20.0
NC_4	0.0063	0.0086	26.5
IC_5	0.0027	0.0038	13.2
NC_5	0.0023	0.0032	11.1
C_6	0.0013	0.0018	7.1
C_7+	0.0025	0.0034	24.4
C_8			
C_9			
C_{10}^+			
TOTAL	1.0000	1.0000	169.5

CALCULATED GROSS HEATING VALUE

MJ/m^3 at 15°C + 101.325 kPa

MOISTURE FREE	MOISTURE & ACID GAS FREE
43.28	32.34

VAPOUR PRESSURE

PENTANES PLUS: 78.46 kPa

RELATIVE DENSITY

MOISTURE FREE MEASURED	MOISTURE FREE CALCULATED	ACID GAS FREE MEASURED	ACID GAS FREE CALCULATED
	0.902		0.685

DENSITY

MOISTURE FREE: 1.103

CALCULATED PSEUDO CRITICAL PROPERTIES

MOISTURE FREE ppc (abs)	MOISTURE FREE pTc	ACID GAS FREE ppc(abs)	ACID GAS FREE pTc
5313.0 kPa	238.8°K	4534.2 kPa	209.5 °K

RELATIVE MOLECULAR MASS

MOISTURE FREE	C_7^+
26.11	108.62

H_2S g/m^3 65.88

REMARKS:

SWAB NO. 2, 1045 HRS. ANALYSIS PERFORMED TO C10+. TRACE IS DEFINED AS LESS THAN 0.0001 MOLE FRACTION.

tti GEOTECHnical resources ltd.

4500 - 5th STREET N.E., CALGARY, ALBERTA T2E 7C3

(403) 230-4128

GEOTECH Analytical

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-G3

GAS ANALYSIS

CONTAINER IDENTITY: 1097

OPERATORS NAME: NSM RESOURCES LTD.

SAMPLE LOCATION:

WELL NAME: NSM MIRROR LAKE 0-33

ELEVATIONS KB: GRD:

FIELD OR AREA:

POOL OR ZONE:

NAME OF SAMPLER:

COMPANY: CENTRAL ALBERTA TESTING

TEST RECOVERY:

TEST TYPE: NO.:

MULTIPLE RECOVERY:

TEST INTERNAL FROM: 1057

TO: 1063

PERFORATIONS FROM:

TO:

SAMPLING POINT: FLOW-TEE

AMT. AND TYPE OF CUSHION:

MUD RESISTIVITY (Ω/m):

PUMPING: FLOWING: GAS LIFT: SWAB:

WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE k/Pa				<7	70
TEMPERATURE (°C)					50

DATE SAMPLED Y – M – D H : M: 85-01-11

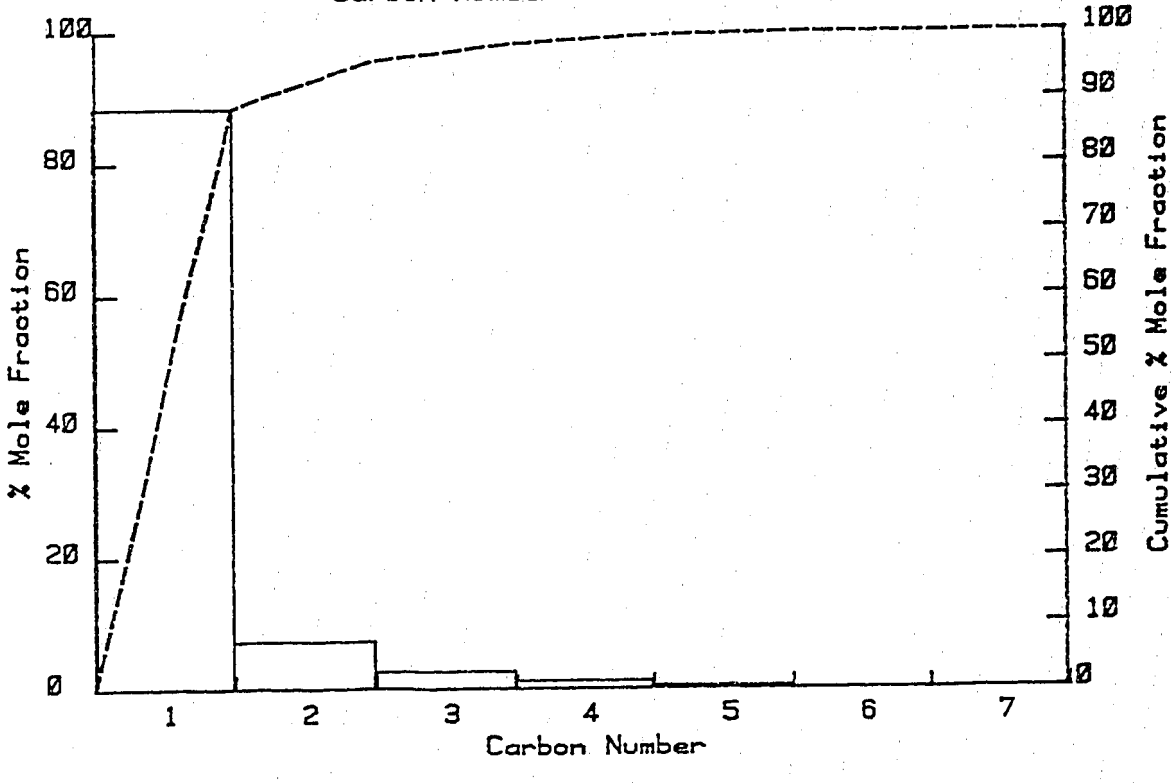
DATE RECEIVED Y – M – D: 85-01-23

DATE ANALYZED Y – M – D: 85-01-28

ANALYST: DF

Cumulative % ———

Carbon Number Distribution



Weighted Average Carbon Number : 1.19

GAS ANALYSIS

DETAILED REPORT

GEOTECH Analytical

OPERATOR'S NAME	NSM RESOURCES LTD.
WELL NAME	NSM MIRROR LAKE
LOCATION	0-33
SAMPLING POINT	FLOW-TEE

FILE NUMBER: 85AS5047

LABORATORY NUMBER: 5047-G3

COMPOSITION

COMP.	MOLE FRACTION		PETROLEUM
	AIR FREE AS RECEIVED	AIR FREE ACID GAS FREE	LIQUID CONTENT mL/m^3
H_2	0.0012	0.0014	
He	TRACE	TRACE	
N_2	0.0121	0.0139	
CO_2	0.1258	0.0000	
H_2S	0.0005	0.0000	
C_1	0.7607	0.8705	
C_2	0.0618	0.0707	
C_3	0.0225	0.0258	82.5
IC_4	0.0057	0.0066	24.8
NC_4	0.0046	0.0053	19.3
IC_5	0.0030	0.0035	14.6
NC_5	0.0008	0.0009	3.9
C_6	0.0003	0.0003	1.6
C_7^+	0.0010	0.0011	12.0
C_8			
C_9			
C_{10}^+			
TOTAL	1.0000	1.0000	153.1

CALCULATED GROSS HEATING VALUE

MJ/m^3 at 15°C & 101.325 kPa

MOISTURE FREE	MOISTURE & ACID GAS FREE
42.48	37.13

VAPOUR PRESSURE

PENTANES PLUS: 103.67 kPa

RELATIVE DENSITY

MOISTURE FREE		ACID GAS FREE		DENSITY
MEASURED	CALCULATED	MEASURED	CALCULATED	MOISTURE FREE
	0.758		0.648	0.927

CALCULATED PSEUDO CRITICAL PROPERTIES

MOISTURE FREE		ACID GAS FREE	
pPc (abs)	pTc	pPc(abs)	pTc
4929.6 kPa	218.9 °K	4574.7 kPa	206.6 °K

RELATIVE MOLECULAR MASS

MOISTURE FREE	C_7^+
21.95	103.01

H_2S g/m^3 0.76

REMARKS:

ANALYSIS PERFORMED TO C10+. TRACE IS DEFINED AS LESS THAN 0.0001 MOLE FRACTION.