Open File Report: 1982-9

FOR REFERENCE USE ONLY
DO NOT REMOVE FROM LIBRARY

OFR 1982

SCOLLARD MEMBER COAL, ALIX AREA.

DRILLING REPORT, 1981

by
Andrew Bosman
1982

Alberta Dept. of Energy Library Services
0 1632 1009 3288

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

ANK-6045

ALBERTA RESEARCH COUNCIL LIBRARY
5th FLOOR, TERRACE PLAZA
4445 CALGARY TRAIL SOUTH
EDMONTON, ALBERTA, CANADA
T6H 5R7

INTRODUCTION

The Alberta Geological Survey, a department of the Alberta Research Council (ARC), in its third year of a five year contract with the Alberta Energy and Natural Resources (AENR), investigated the coal resources and related stratigraphy of the Scollard Member in the Alix area northeast of the city of Red Deer (Figs. 1 and 2).

This report discusses methods of preparations and operations (drilling and logging) which are similar to those used in previous years. Also included are cost analysis of the drilling program and a drill graph for each of the twenty-nine test holes drilled.

Drilling operations started on June 1 and were completed on July 7. During this period twenty-nine test holes were successfully completed in twenty-three working days. Good weather, competent drilling personnel and excellent drilling equipment contributed greatly to a very successful drilling season.

METHODS OF PREPARATIONS

SELECTION OF DRILLING LOCATIONS

Data on the same general area, obtained from 1974 and 1978 ARC drilling programs, were utilized to determine locations of thirty test holes between townships 38 and 41, ranges 23 and 26, W4M (Fig. 3). This drilling pattern resulted in locating approximately two test holes per township. Considerations of drift thickness, physiographic features and coal mines contributed to locating of test holes. The Battle Formation was used as a marker for determining the "total depth" for each test hole.

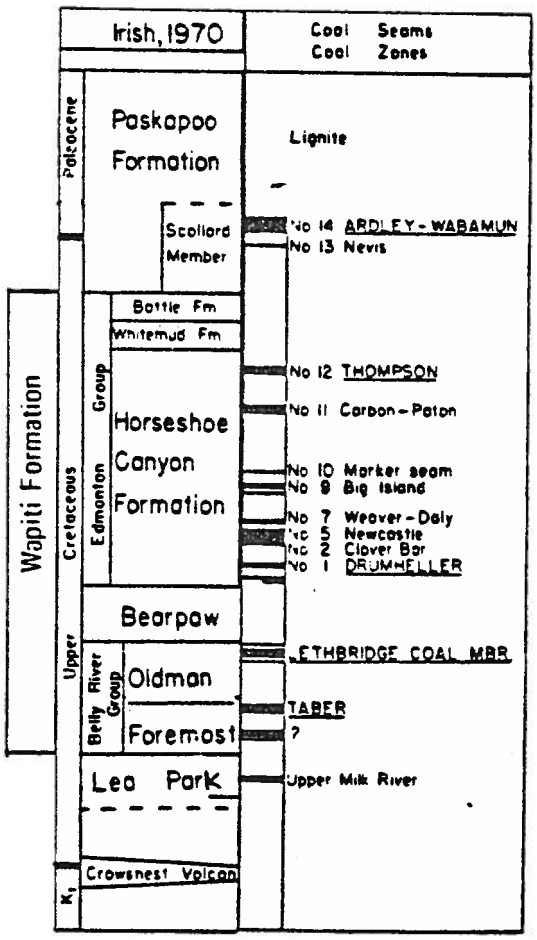


FIGURE 1

Table of Formations and Coal Zones

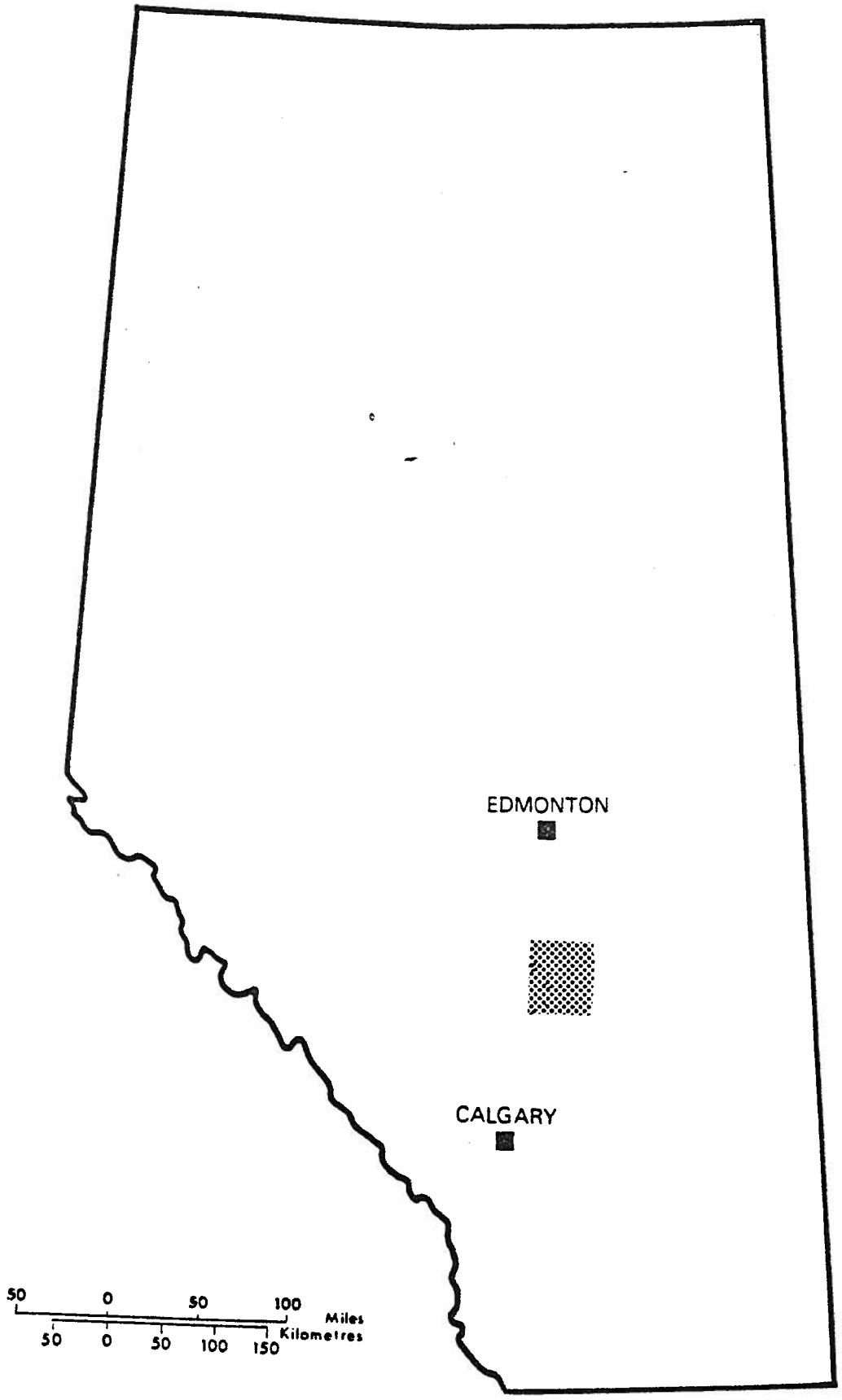


FIGURE 2 Area of Study

SCOLLARD FORMATION COAL

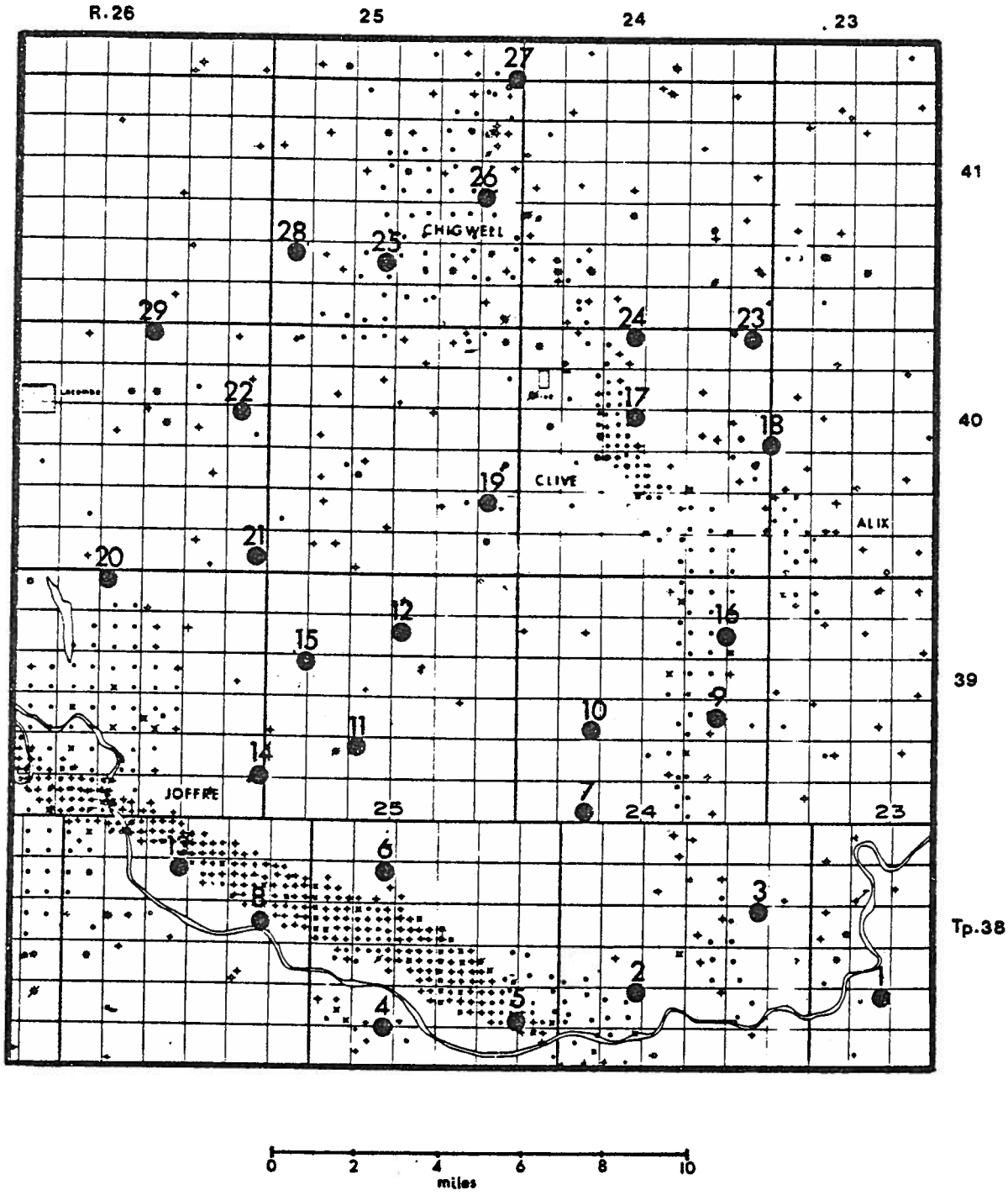


FIGURE 3

Location of Test Holes

TENDERS

Tenders for drilling and geophysical logging were invited through the Edmonton Journal and the Calgary Herald on April 3 and 4, 1981, and the contracts were awared on April 30, to M & M Drilling of Strathmore (drilling) and to BPB Instruments of Calgary (geophysical logging). For details of contracts see Appendixes A and B.

GOVERNMENT CLEARANCE

An application for an Exploration Approval for the 1981 program was submitted to the Energy Resources Conservation Board (ERCB), on January 28, 1981. Approval was received on March 13, and only the standard operational terms and conditions were appended to the 1981 Exploration Approval.

An application for Deep Drilling Permit was also submitted to the ERCB on January 28, 1981. The Permit, without any special conditions attached was received on April 9, 1981. The counties of Red Deer and Lacombe, in which drilling operations were to be conducted, were informed in writing of the exploration work to be done. Neither county expressed any objection.

A geophysical license and permit, required to conduct exploration work in the province of Alberta, was obtained from AENR.

PERSONNEL

The following three permanent employees of ARC participated in the drilling program:

R.A. Rahmani	Project Manager
J.R. Nurkowski	Geologist
A. Bosman	Operational Manager

Because drill samples were not to be dried or extensively examined in the field, only two geology university students were hired for the program. Both students were assigned to regular drill site duties.

A field working schedule of one student on a 12 hour day or night shift, over a 5-day period, followed by two days off, was used.

VEHICLES AND COMMUNICATIONS

Five vehicles were obtained through the Alberta Government Service Vehicle Pool and employed as follows:

- one sedan, used by the project manager
- one sedan, used by the operational manager
- one half ton truck, used by the geologist
- one half ton truck, used for crew shift changes
- one Econoline Van, with a mobile telephone, used as a drill site office unit.

METHODS OF OPERATIONS

DRILLING LOCATIONS

The use of a smaller mud pit for drilling made it possible to utilize considerably smaller drill sites. Of 29 test holes drilled, 15 drill sites were located on crown land (road allowances) and 14 drill sites on private land. For the latter, permit arrangements were made with the landowners.

In the field, exact hole locations were obtained by measuring the distance from the nearest northeast section corner to the drill site, and ground elevations of the test holes were obtained from N.T.S. 1:50,000 scale topographic maps.

DRILLING

Six bids were received for the 1981 drilling program, and after careful consideration of all factors, the second lowest bid, submitted by M & M Drilling of Strathmore was accepted. The equipment provided for the program by the contractor consisted of the following:

One Cyclone drill rig model TH60R-1979, equipped with two 5 x 6 inch Gardner Denver mud pumps, an air compressor and a Geolograph. One 1400 gallon water truck, a medium size mud pit, a light plant and a welder.

A 4-passenger aircraft, which was normally used to fly drilling personnel back and forth on weekends, was on several "rush" occasions used to expedite drill parts and personnel, thereby reducing drill stand-by time considerably.

The Drilling rig was operated by a driller and two helpers per shift, and supervised by a toolpush. A "Daily Drilling Report" was kept by the driller recording all events and times as related to his shift.

Twenty-nine holes were successfully completed for a total depth of 6033 metres. All holes were 12.7 cm in diameter, and all drilling was done with mud serving as the circulation medium.

The loss of drilling mud into the formation in low pressure zones caused slight problems in eight holes, and more serious problems in six other holes. Consequently, a great deal of drilling material was required to complete these holes.

The only incident which resulted in drilling time being lost (20 hours) occurred when the sand line broke, which caused the drill stem string to fall to the bottom of the hole. After several attempts, however, the string was successfully recovered by means of an overshot device.

SAMPLING

Samples were neither dried nor examined under a microscope as was done in previous years. Instead, samples were described when still wet, to form the basis for a written litholog, after which the samples were bagged to be retained for future reference.

GEOPHYSICAL LOGGING

Three logging bids were received and the lowest bid, as submitted by BPB Instruments Ltd. of Calgary, was accepted. Gamma-density-caliper-neutron and focussed electric logs were to be obtained from each test hole (see Appendix E). In addition, ARC requested that, from one test hole a dipmeter log and a sonic log be obtained. All logs were to be recorded on tape and all final log copies were to be recorded on the North American metric standard (i.e., metric numbers on inch-divided paper).

CEMENTING

After logging, all test holes were cemented off from total depth to surface without difficulties. An arrangement was made with a bulk cement dealer to have ready mixed cement delivered to each drill site. On arrival, the cement was pumped with a minimum amount of effort from the cement truck directly into the hole.

RECLAMATION

After the 1981 drilling operations were completed a contract agreement for drill site reclamation work was reached with J & R Drilling of Mirror, Alberta. A front-end loader and a 12-yard dump truck with a 2-man crew were supplied by the contractor, to remove all drill cuttings from each drill site. The drill cuttings were disposed of in approved land fill sites. The reclamation work was carried out during July, and all sites were inspected and approved in September by an inspector from the Department of Environment, a representative of each county, and a representative of ARC.

SUBMISSION OF DATA

In compliance with the Coal Conservation Act, all specified information derived from the 1981 program was submitted to the ERCB in September.

GENERAL

Certain test hole data from programs 1974 to 1981, which include, exact drill hole locations, types of logs run, and coal analysis done, are now on computer. Any information can now be quickly and selectively retrieved upon request.

During the past year, the coal group handled thirty-one requests for coal related information, from private industry.

PROGRAM EVALUATION AND RECOMMENDATIONS

DRILLING SITES

Because a smaller mud pit was used for drilling, it was possible to drill eight test holes in the legal portion of developed road ditches. An additional benefit of the smaller mud pit was that, when drilling was completed a much smaller amount of drilling mud was left behind each drilling site.

For fourteen drilling sites which were drilled on privately owned land, permission had to be obtained from the landowners. The kind cooperation of the landowners in this respect is acknowledged.

In locating drilling sites it is essential to remember, that a legal distance must be maintained between the actual drilling site and gas lines, power lines, telephone cables, residences, water wells, public buildings, survey monuments and public roads. In respect to gas lines, which are not always adequately marked, it is most important that their locations be established exactly before any drilling sites are staked out.

DRILLING

The Cyclone TH60 drill, and all supporting equipment was well suited for the 1981 program. The Cyclone drill is well designed, is versatile and has a low noise level. No breakdowns occurred and the rig performed well. Personnel assigned to the rig were very well qualified and the day to day drilling supervision was excellent.

In all previous years (1974-80) the costs of drill bits, cementing each hole (excluding cement), and of driving time from hole to hole, were all included in the "per foot" bid price. Under the 1981 contract terms, however, these three items became "extras" e.g. chargeable. The costs of these extra items were calculated upon completion of the 1981 program and were: drilling bits $0.22 per foot, cementing of holes $0.60 per foot, and driving time $0.09 per foot. Adding these costs to the original 1981 bid price of $3.50 per foot, the comparable price per foot for 1981 became $4.41.

The reasons for most contractors not to include certain items in the footage rate are, (1) the amount of materials and time required for the project may vary greatly and are therefore difficult to estimate and (2) the cost of materials may change considerably from the time the bid is submitted to the time of contract completion.

All other contract terms proved to be workable and provided the required flexibility to the program as well. For drilling statistics and cost analysis see Appendixes C and D.

GEOPHYSICAL LOGGING

All logs requested by ARC were provided by the logging contractor, and log quality was consistently good. No time was lost due to instrument failure and logging time schedules were met regularly throughout the summer.

Besides the standard suite of logs, a neutron log was run in each hole as well, during 1981. The neutron log, basically a porosity log, will be used for correlating sandstone beds. The results of a dipmeter log and a sonic log obtained from test hole no. 26 will be evaluated to determine if these logs should be run in future programs.

All 1981 logging data have been transferred from the cassette type field tapes, to nine track computer tapes by BPB, and these tapes were recently delivered to ARC.

CEMENTING

All 1981 test holes, regardless of total depth, were cemented off from total depth to surface in accordance with the regulations of the ERCB. The cementing of holes was greatly simplified in 1981, by having the ready mixed cement delivered directly to each drill site. Because the mixing of cement on site is slow, labour intensive and disliked by the drilling crews, it is suggested that ready mixed cement be used in future programs whenever possible.

RECLAMATION

Only three days were required for J & R Drilling to carry out the 1981 drill site reclamation work. The work was done in a very satisfactory manner, and a Reclamation Certificate of approval was received in October from the Department of Environment.

VEHICLES AND COMMUNICATIONS

The five vehicles received from the Government Service Vehicle Pool for the 1981 program were in good condition and performed well throughout the summer. Only the Econoline Van, which is at all times stationed at the drilling site, was equipped with a mobile telephone. The one mobile telephone proved adequate for the relatively small 1981 program.

PHOTOGRAPHING CORE

All core obtained from each program is eventually photographed for the purposes of study, publication and record. Core which is photographed indoors, and well after it has been cored, does not enhance the quality of photographs. It is suggested that, in future programs, the core be photographed in the field at the time of coring, when core is fresh and natural light can be utilized. This would likely result in better quality photographs and considerable time and work would be saved as well. However, in the field the core has not yet been slabbed.

GOVERNMENT CLEARANCE

In a letter received March 1981, the ERCB requests that in future applications for Exploration Approvals and Board Permits be labelled "Private and Confidential" and marked "Attention Mr. R.G. Patterson, Manager, Coal Department" ERCB.

APPENDIX A

DRILLING CONTRACT

Six bids for drilling were received for the 1981 drilling program. The bid of M & M Drilling of Strathmore, Alberta was accepted. The main terms of the contract read as follows:

Drilling rate per foot*	$ 3.50
Cementing rate per foot	$ 0.60 (excluding cement)
Day rate drilling per hour	$90.00
Moving rate per hour	$90.00

The bid price of $3.50 per foot included the first two hours spent on each hole where circulation or gravel problems were encountered. Drilling bits, cement, lost circulation and hole conditioning materials were to be paid by the client, including transportation cost and a 10 percent handling charge.

Standby rates were in effect during third party geophysical logging, and during any delays not caused by the contractor.

The drilling contractor was to be responsible for the condition of the hole until the geophysical contractor reached the bottom of the hole for the first time.

The client agreed to pay the contractor $30.00 per working day per man towards living allowances. The working schedule was to consist of two shifts of twelve hours each per day for five days, followed by two days off. The number of men per rig-crew was to be three, plus one toolpush.

Drilling equipment to consist of the following:

1. One rotary type Cyclone drill, model TH60R, equipped with two 5 x 6 inch Gardner Denver mud pumps, an air compressor, a hydraulic top drive rotary system and a Geolograph.

---

* 1981 Drilling Contract was submitted in British Units.

2. One 1400 gallon water truck.
3. 1000 feet of drilling pipe with trailer.

The contractor to provide and maintain adequate insurance including:

(a) Comprehensive General Liability insurance.
(b) Automobile insurance.
(c) Equipment insurance.

The contractor shall comply with the provisions of the Workers' Compensation Act and the Occupational Health and Safety Act.

Locating drilling sites was to be the responsibility of the client, drilling sites being large enough to accommodate the required equipment.

It was agreed to commence drilling on June 1, 1981.

APPENDIX B

GEOPHYSICAL LOGGING CONTRACT

Three geophysical logging bids were received, and the bid submitted by BPB Instruments Canada Ltd. of Calgary was accepted. The terms of the contract read as follows:

BPB is to supply the following three geophysical logs of each test hole: density gamma ray, caliper, neutron, and focussed electric.

The contract cost of $29,600.00 was for a total continuous logging period not to exceed 40 days from the date of initial mobilization, plus $52.00 per diem per man for meals and accommodation. The contract is to cover the cost of one 4x4 logging truck, with mobile telephone, field digitisation of all logs, mobilization and mileage charges, one engineer and provision of all logs on 600:1 and 240:1 depth scales (North American Metric), and coal quality and seam thickness logs on a detail scale over coal seams. In addition, 3 blueline copies of each log were to be provided along with the original. The price also included the replaying of the gamma ray log alongside the neutron log and the focussed electric log, and the presentation of a coal bulk density log and a rock density log together with the gamma ray and caliper logs as the coal lithology presentation.

For any extension beyond the 40 day contract period each additional day would be charged at $735.00 per day, plus accommodation, subsistence and mileage charges.

BPB Instruments was willing to provide free of charge one dipmeter survey, including computation and run a Sonic log on one borehole as a demonstration.

Extra services such as computer processing, and additional logging tools would be available at an extra charge upon request.

APPENDIX C

DRILLING STATISTICS

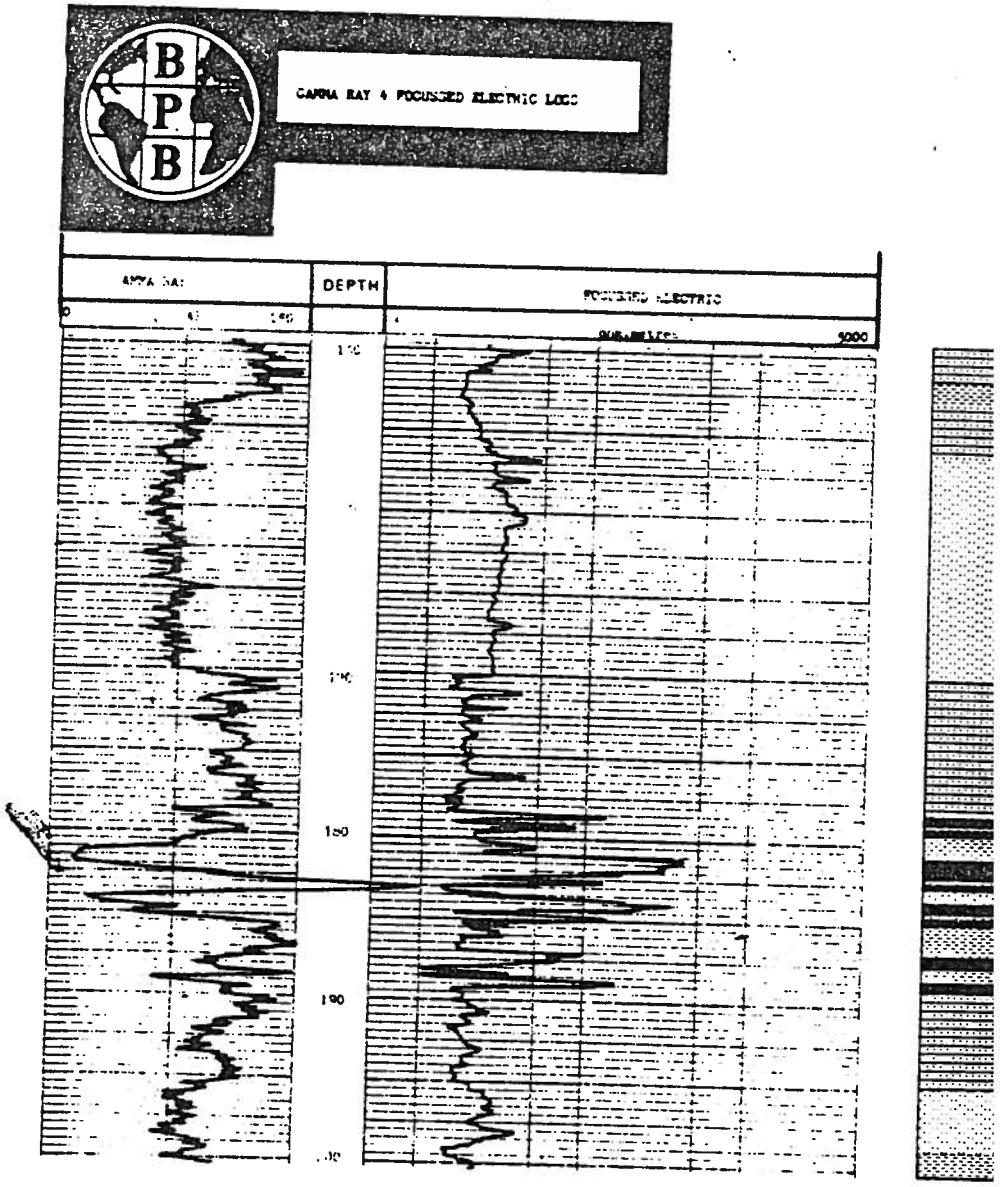
Total number of test holes drilled (total depth)	29 (6033 m)
Total standby time (logging, standby, etc.)	91 3/4 hours
Total dayrate time (washing out holes, etc.)	39 1/4 hours
Total driving time	21 3/4 hours
Total amount of drilling material used:	
Insert drilling bits -	32
Rock drilling bits	8
Drilling mud	117 bags
Bran	217 bags
Liquid drilling mud	100 gallons
Cement	70740 lbs

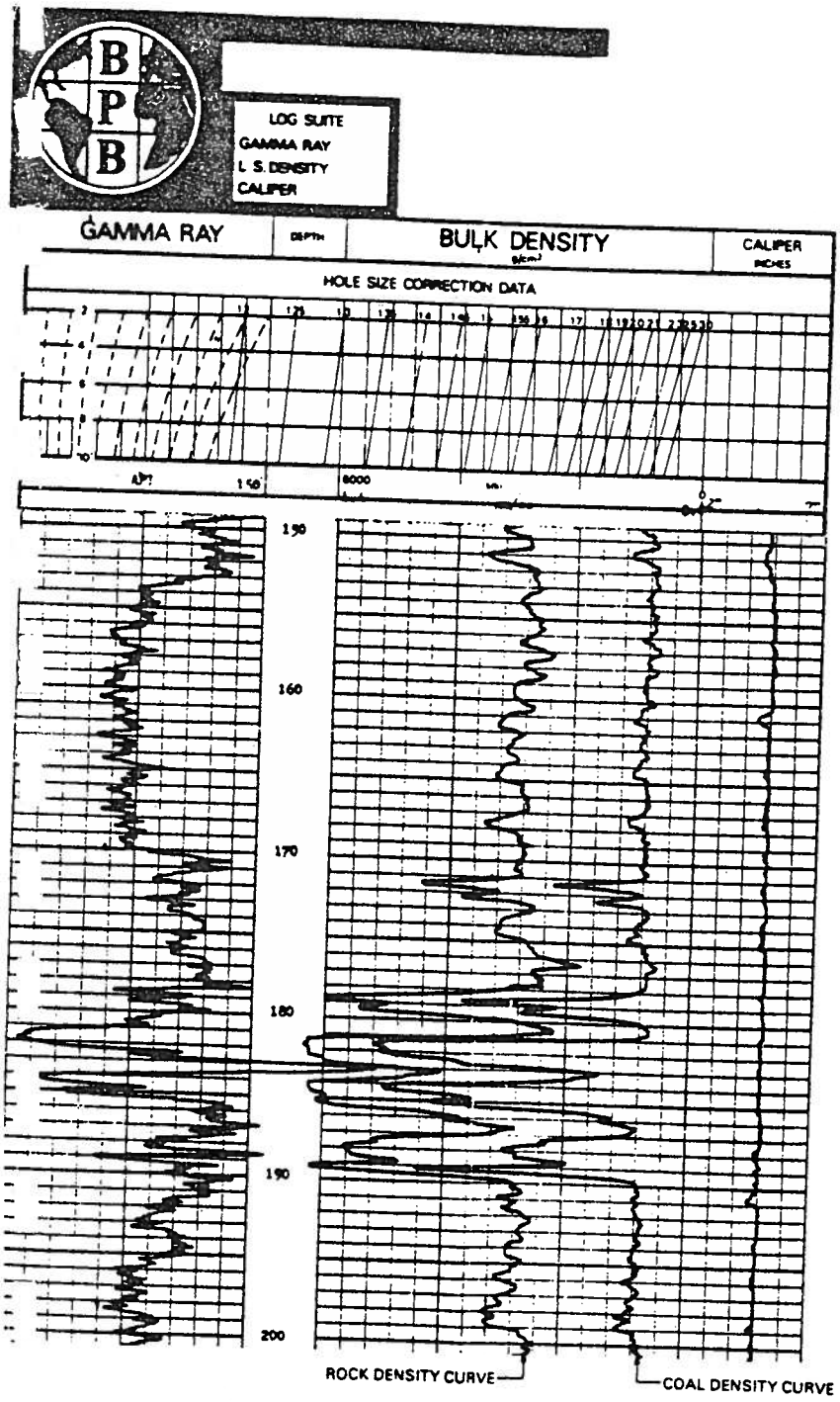
Average hole depth	208 m
Average logging time per hole	3 1/4 hours
Average cementing time per hole	1 3/4 hours
Average driving time per hole	3/4 hour
Average drilling time per hole including driving, logging and cementing time	17 hours
Average drilling time only, per hole	11 1/4 hours

APPENDIX D

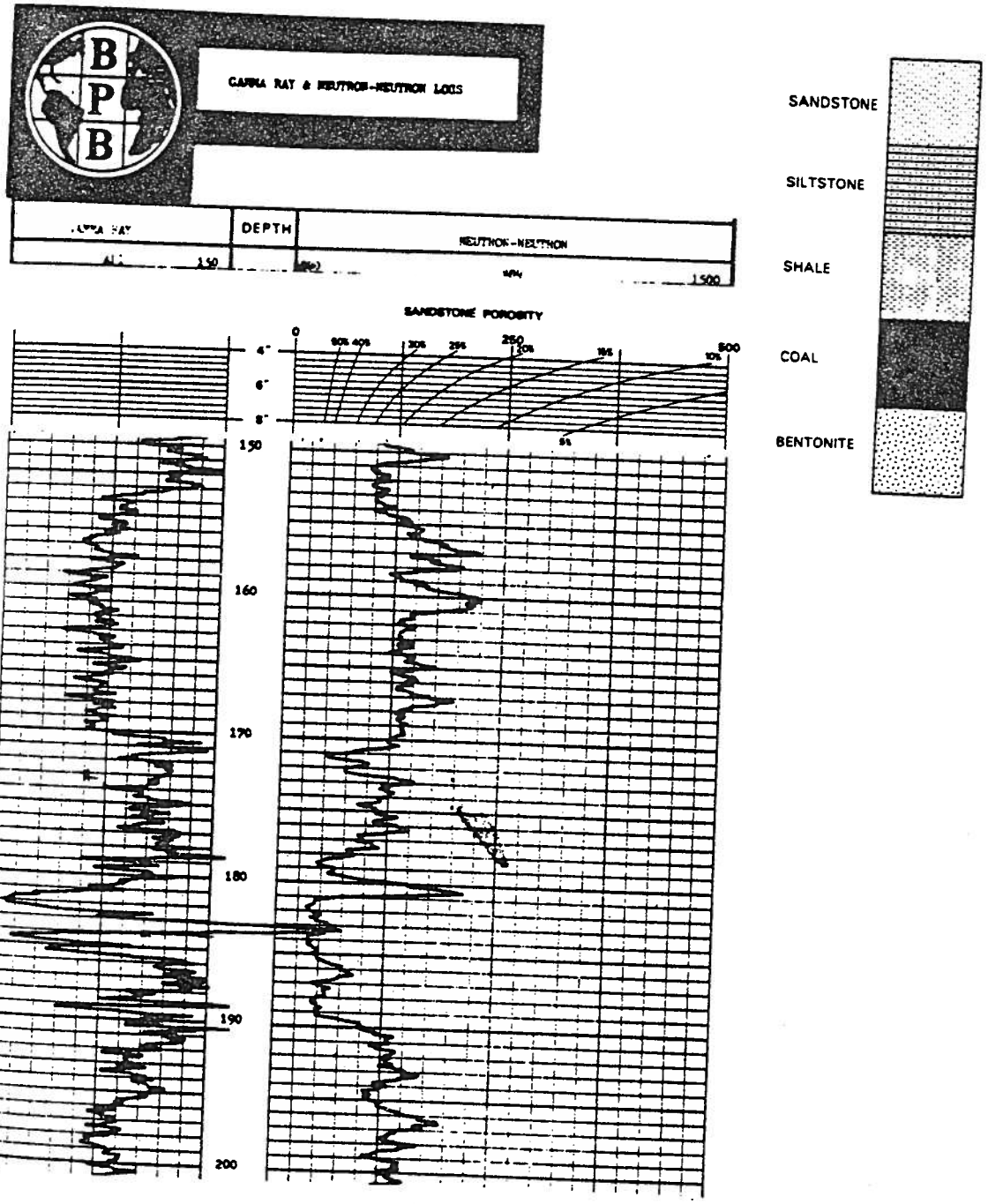
COST ANALYSIS

M & M Drilling		
Total feet drilled 19790 @ $3.50	$ 69,265.00	
Total standby hours 91 3/4 @ $90.00	$ 8,257.50	
Total dayrate hours 39 1/4 @ $90.00	$ 3,532.50	
Total driving hours 21 3/4 @ $90.00	$ 1,957.50	
Cost of drilling materials	$ 7,215.30	
Cost of drilling bits	$ 4,388.36	
Cost of cementing 28 holes	$ 18,243.39	
Man days subsistence 175 @ $30.00	$ 5,250.00	
Subtotal	$118,109.55	$118,109.55
BPB Instruments, field work		$ 30,463.00
BPB Instruments, computer services		$ 7,515.00
Materials and supplies		$ 1,498.84
Technical services		$ 8,236.75
Vehicle rental and operational costs		$ 6,878.20
Drilling permits land owners		$ 1,750.00
Telephone costs		$ 309.00
Personal expenses, Council Personnel		$ 4,068.03
Total cost of 1981 coal drilling program		$178,828.37


B
P
B
GAMMA RAY & FOCUSSED ELECTRIC LOGS
DEPTH
FOCUSSED ELECTRIC
5000
150
190


B
P
B
LOG SUITE
GAMMA RAY
L. S. DENSITY
CALIPER
GAMMA RAY
DEPTH
BULK DENSITY
CALIPER
INCHES
HOLE SIZE CORRECTION DATA
150
160
170
180
190
200
ROCK DENSITY CURVE
COAL DENSITY CURVE

1981

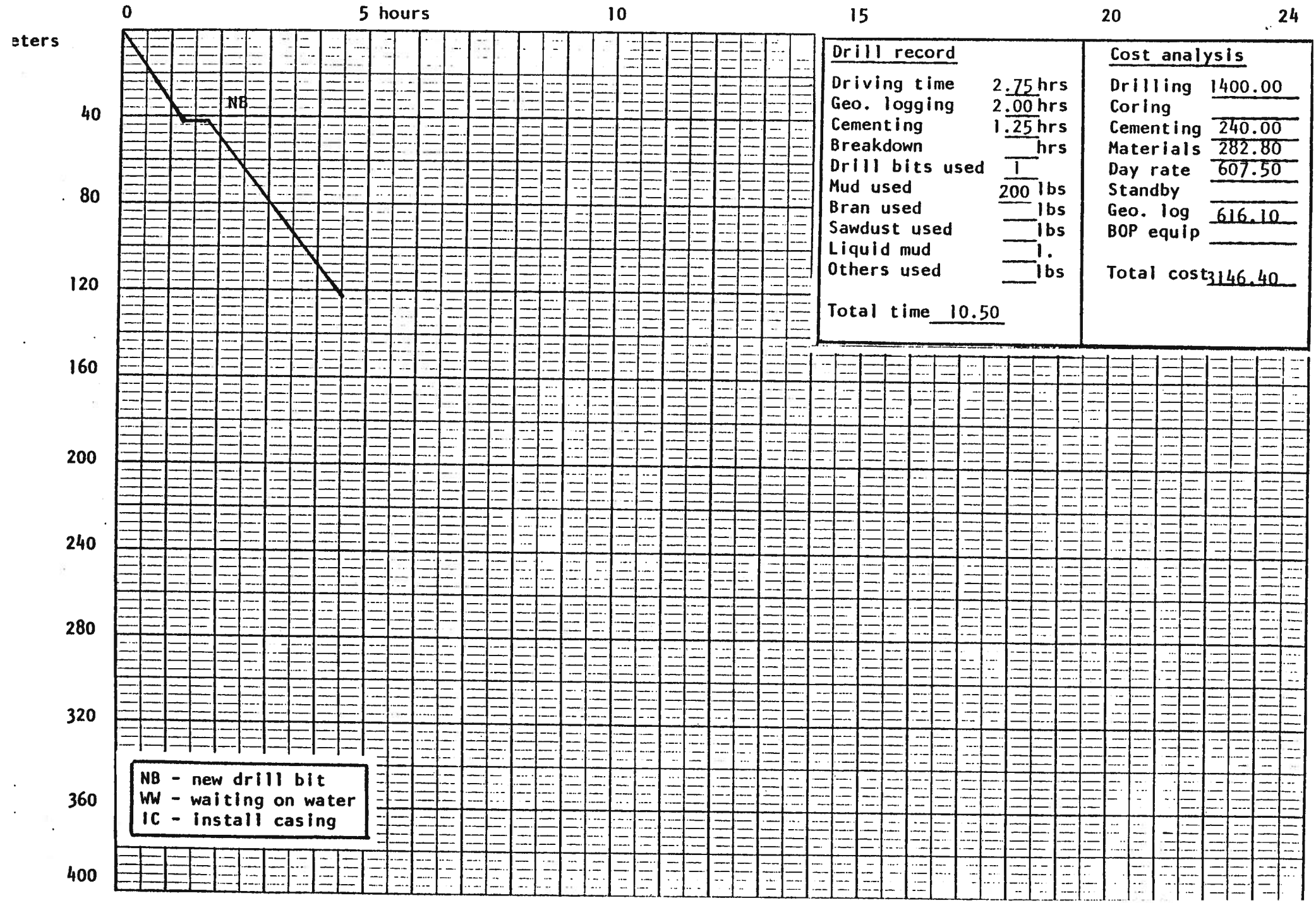


APPENDIX E

APPENDIX F

PERFORMANCE GRAPHS OF INDIVIDUAL TESTHOLES

TH ____ N, ec ____ ____ 23 W4



Drill record

Driving time	2.75 hrs
Geo. logging	2.00 hrs
Cementing	1.25 hrs
Breakdown	hrs
Drill bits used	1
Mud used	200 lbs
Bran used	lbs
Sawdust used	lbs
Liquid mud	l.
Others used	lbs

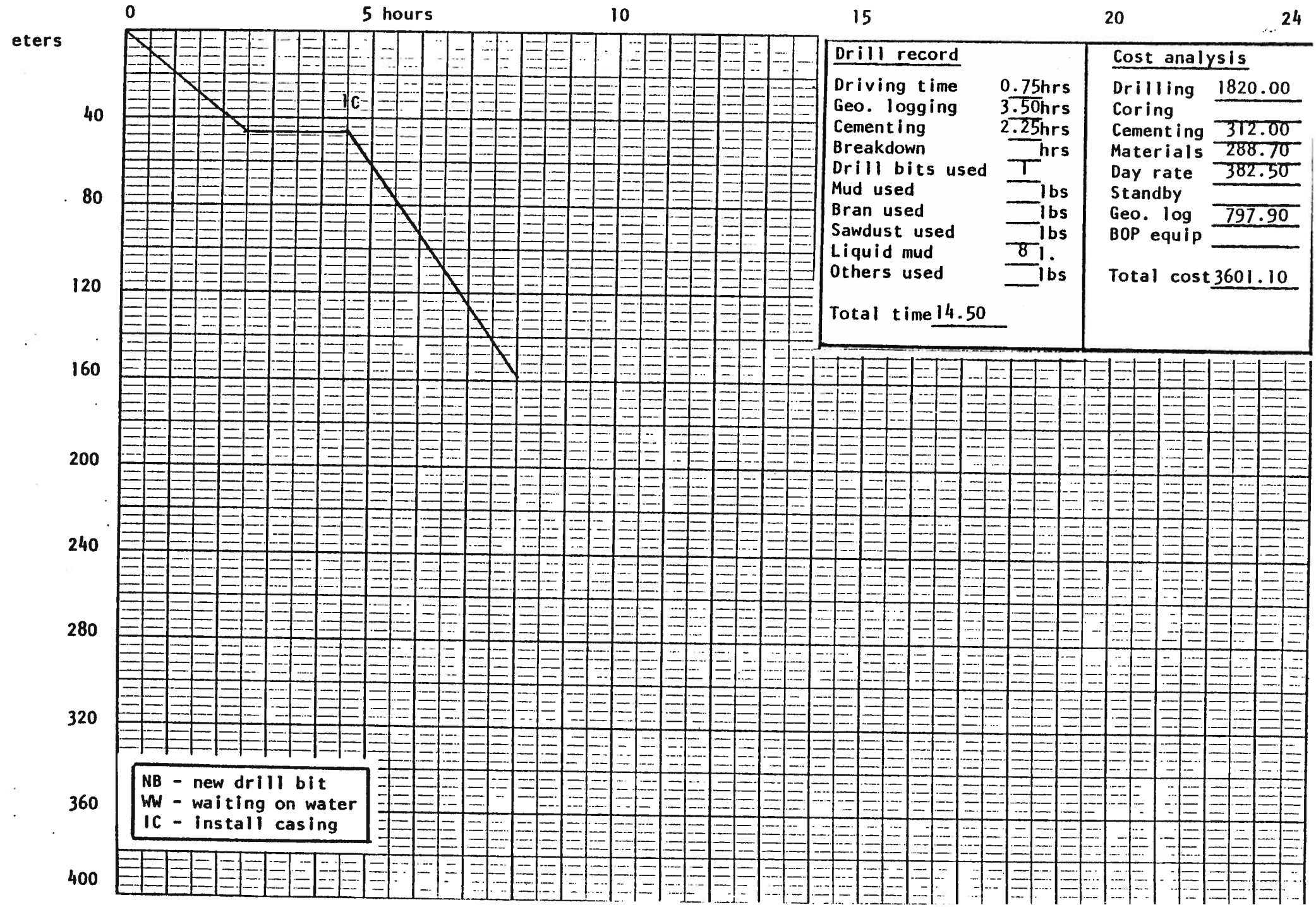
Total time 10.50

Cost analysis

Drilling	1400.00
Coring	
Cementing	240.00
Materials	282.80
Day rate	607.50
Standby	
Geo. log	616.10
BOP equip	

Total cost 3146.40

Tl 2- N. Sec 3 R 24 W4



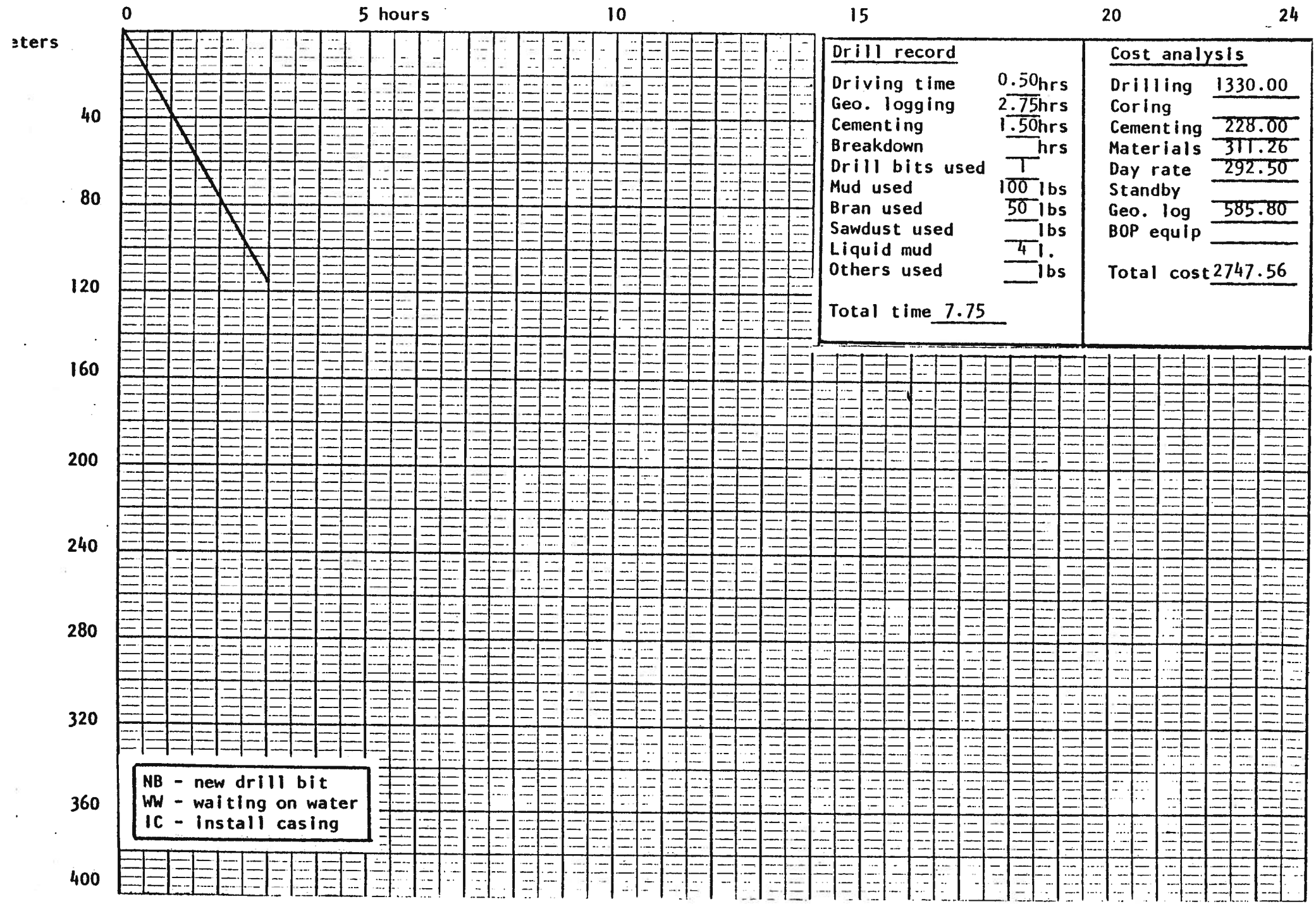
Drill record

Driving time	0.75hrs
Geo. logging	3.50hrs
Cementing	2.25hrs
Breakdown	hrs
Drill bits used	1
Mud used	lbs
Bran used	lbs
Sawdust used	lbs
Liquid mud	8 l.
Others used	lbs
Total time	14.50

Cost analysis

Drilling	1820.00
Coring	
Cementing	312.00
Materials	288.70
Day rate	382.50
Standby	
Geo. log	797.90
BOP equip	
Total cost	3601.10

TH ___ N, ec ___ ___ .. 24 W4



Drill record

Driving time	0.50 hrs
Geo. logging	2.75 hrs
Cementing	1.50 hrs
Breakdown	hrs
Drill bits used	1
Mud used	100 lbs
Bran used	50 lbs
Sawdust used	lbs
Liquid mud	4 l.
Others used	lbs

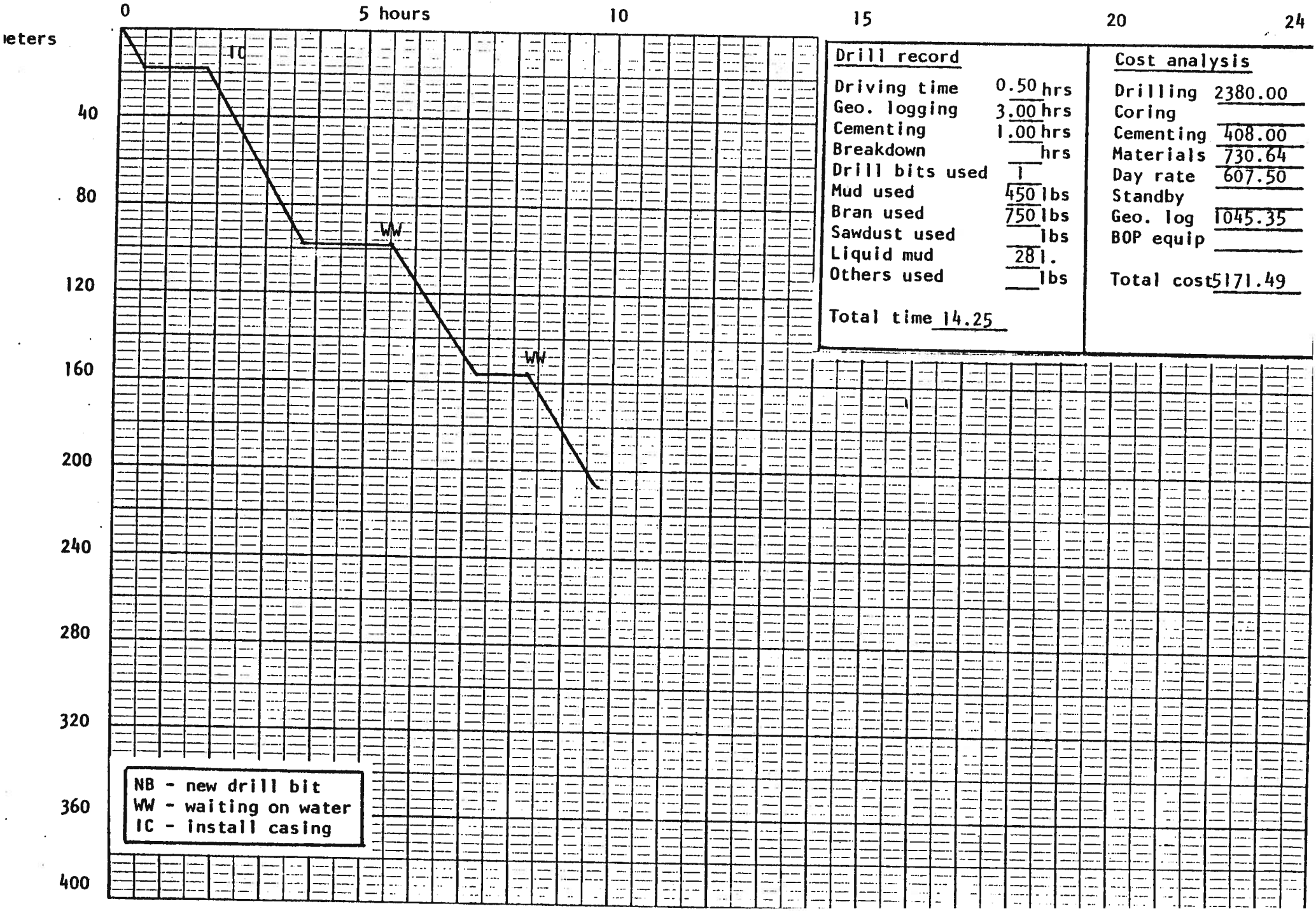
Total time 7.75

Cost analysis

Drilling	1330.00
Coring	
Cementing	228.00
Materials	311.26
Day rate	292.50
Standby	
Geo. log	585.80
BOP equip	

Total cost 2747.56

Tl 4- 1 N Sec 5 Rg 25 W4



Drill record

Driving time	0.50 hrs
Geo. logging	3.00 hrs
Cementing	1.00 hrs
Breakdown	hrs
Drill bits used	1
Mud used	450 lbs
Bran used	750 lbs
Sawdust used	lbs
Liquid mud	281.
Others used	lbs

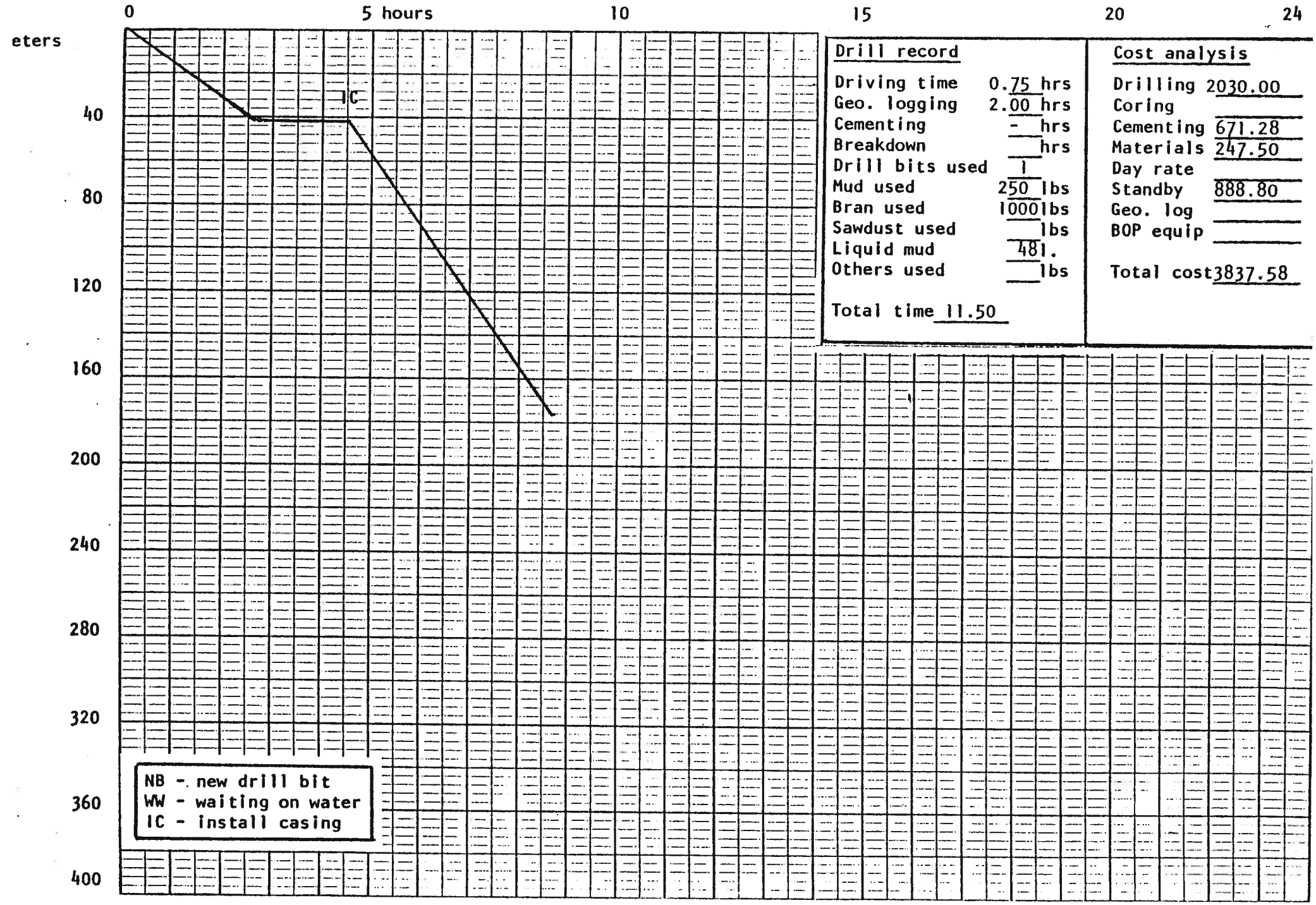
Total time 14.25

Cost analysis

Drilling	2380.00
Coring	
Cementing	408.00
Materials	730.64
Day rate	607.50
Standby	
Geo. log	1045.35
BOP equip	

Total cost 5171.49

TH ?- N ec 25 W4



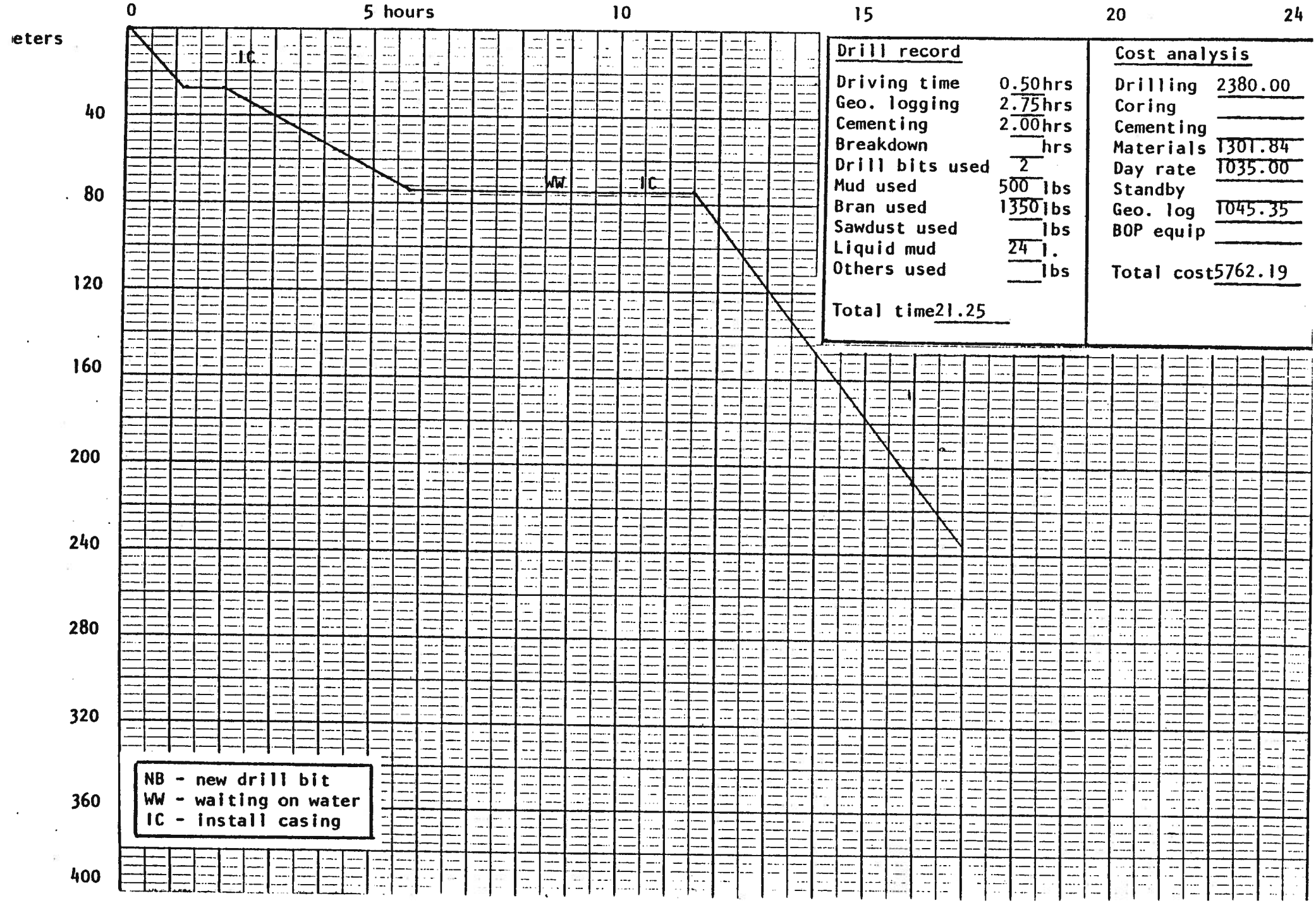
Drill record

Driving time	0.75 hrs
Geo. logging	2.00 hrs
Cementing	- hrs
Breakdown	hrs
Drill bits used	1
Mud used	250 lbs
Bran used	1000 lbs
Sawdust used	lbs
Liquid mud	481.
Others used	lbs
Total time	11.50

Cost analysis

Drilling	2030.00
Coring	
Cementing	671.28
Materials	247.50
Day rate	
Standby	888.80
Geo. log	
BOP equip	
Total cost	3837.58

Th 6- N. Sec 29 8 25 W4



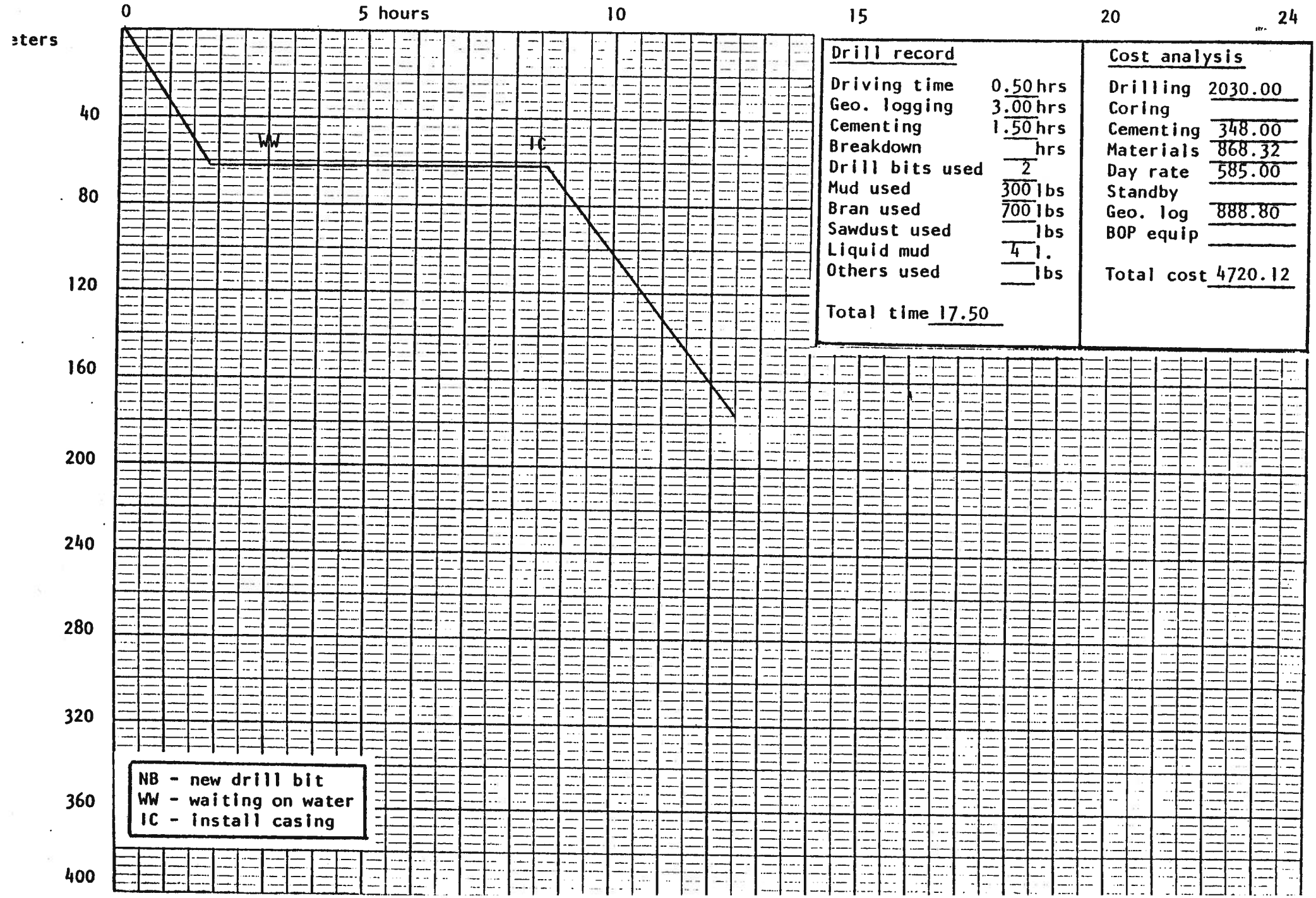
Drill record

Driving time	0.50 hrs
Geo. logging	2.75 hrs
Cementing	2.00 hrs
Breakdown	hrs
Drill bits used	2
Mud used	500 lbs
Bran used	1350 lbs
Sawdust used	lbs
Liquid mud	24 l.
Others used	lbs
Total time	21.25

Cost analysis

Drilling	2380.00
Coring	
Cementing	
Materials	1301.84
Day rate	1035.00
Standby	
Geo. log	1045.35
BOP equip	
Total cost	5762.19

TH 7- 01 N/E Sec 5 TP 39 R 24 W4



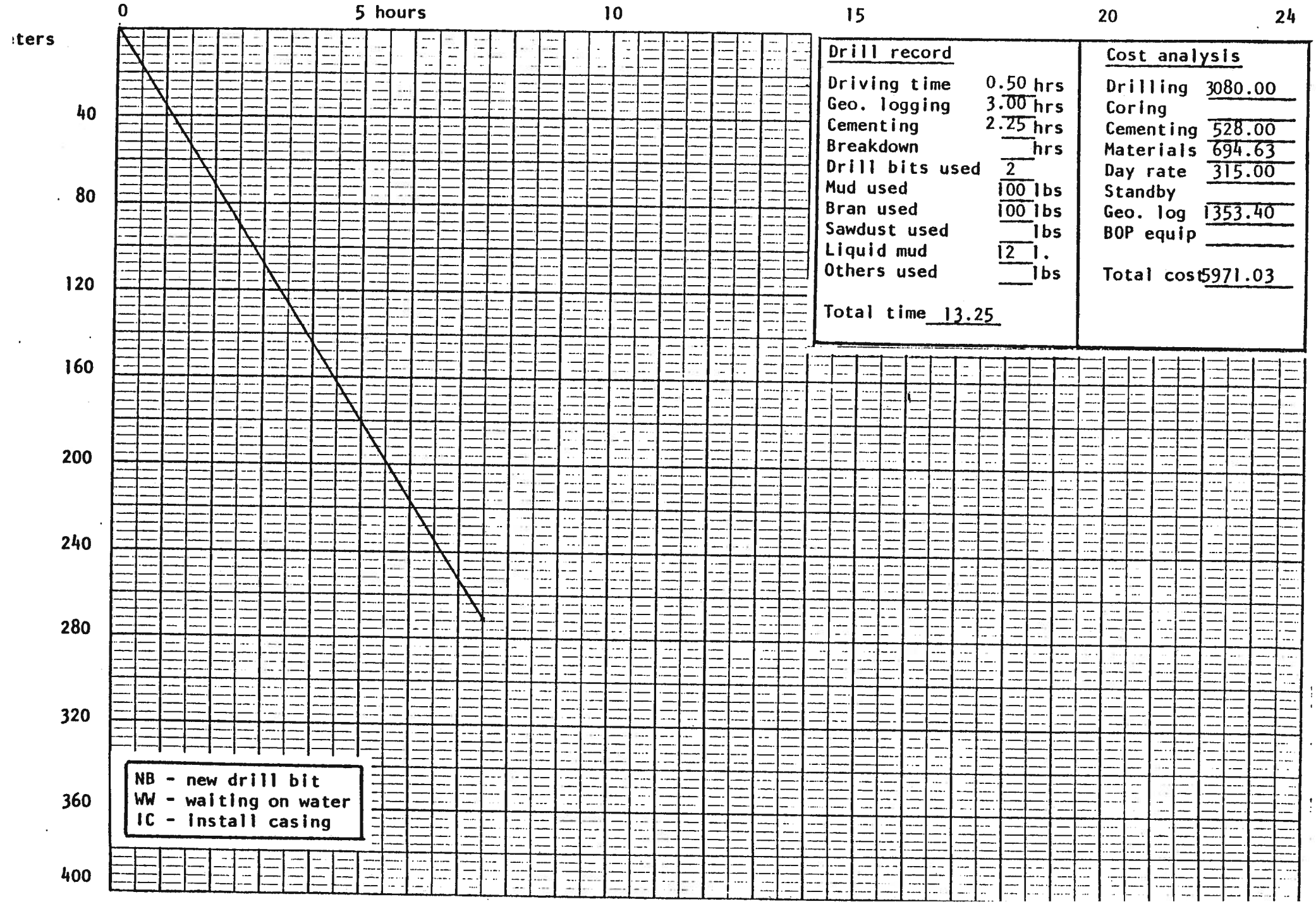
Drill record

Driving time	0.50 hrs
Geo. logging	3.00 hrs
Cementing	1.50 hrs
Breakdown	hrs
Drill bits used	2
Mud used	300 lbs
Bran used	700 lbs
Sawdust used	lbs
Liquid mud	4 l.
Others used	lbs
Total time	17.50

Cost analysis

Drilling	2030.00
Coring	
Cementing	348.00
Materials	868.32
Day rate	585.00
Standby	
Geo. log	888.80
BOP equip	
Total cost	4720.12

TH 3- N/ ec 3 .. 26 .14



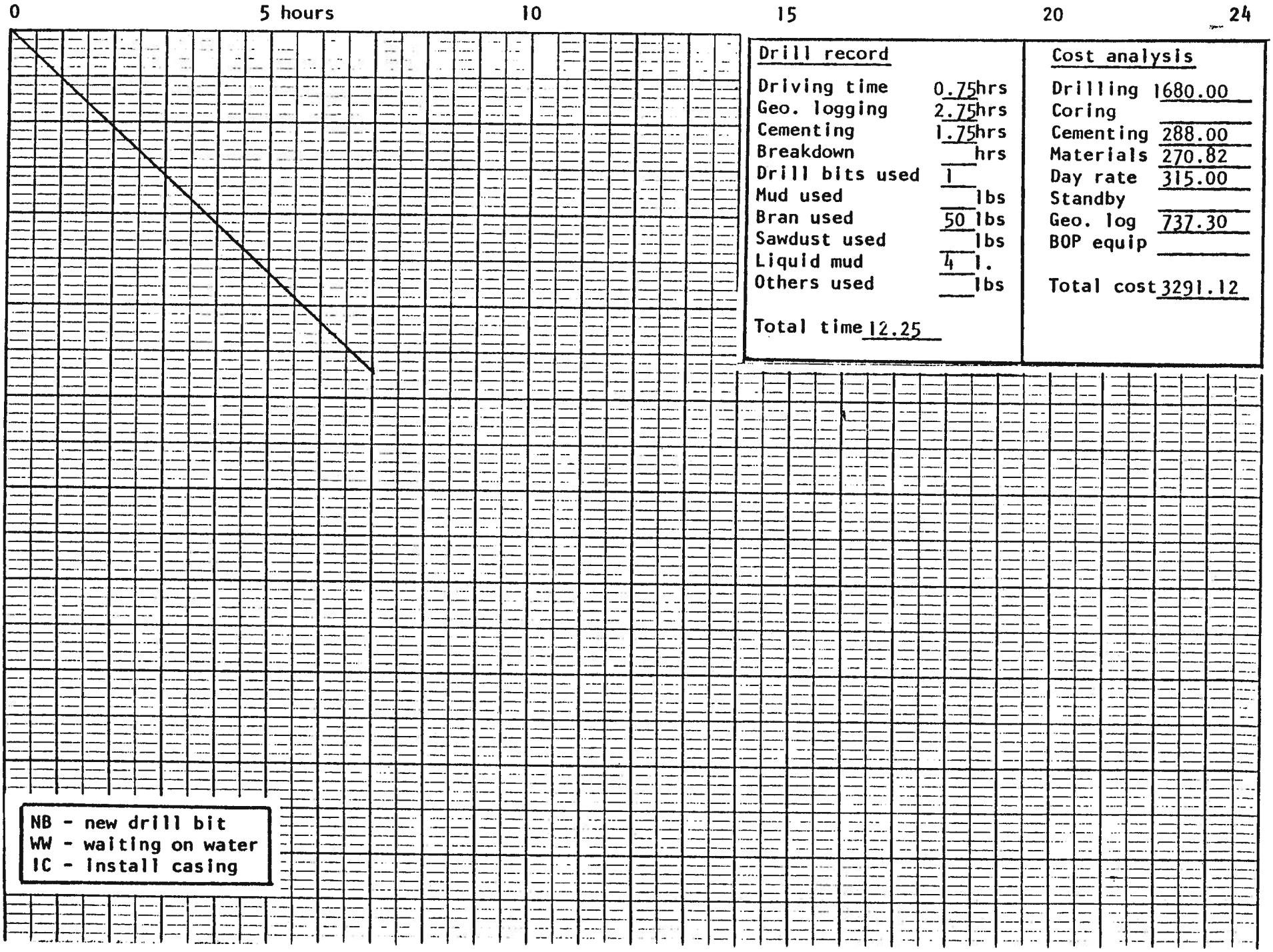
Drill record

Driving time	0.50 hrs
Geo. logging	3.00 hrs
Cementing	2.25 hrs
Breakdown	hrs
Drill bits used	2
Mud used	100 lbs
Bran used	100 lbs
Sawdust used	lbs
Liquid mud	12 l.
Others used	lbs
Total time	13.25

Cost analysis

Drilling	3080.00
Coring	
Cementing	528.00
Materials	694.63
Day rate	315.00
Standby	
Geo. log	1353.40
BOP equip	
Total cost	5971.03

TH__ N/ ec__ __ 24 14



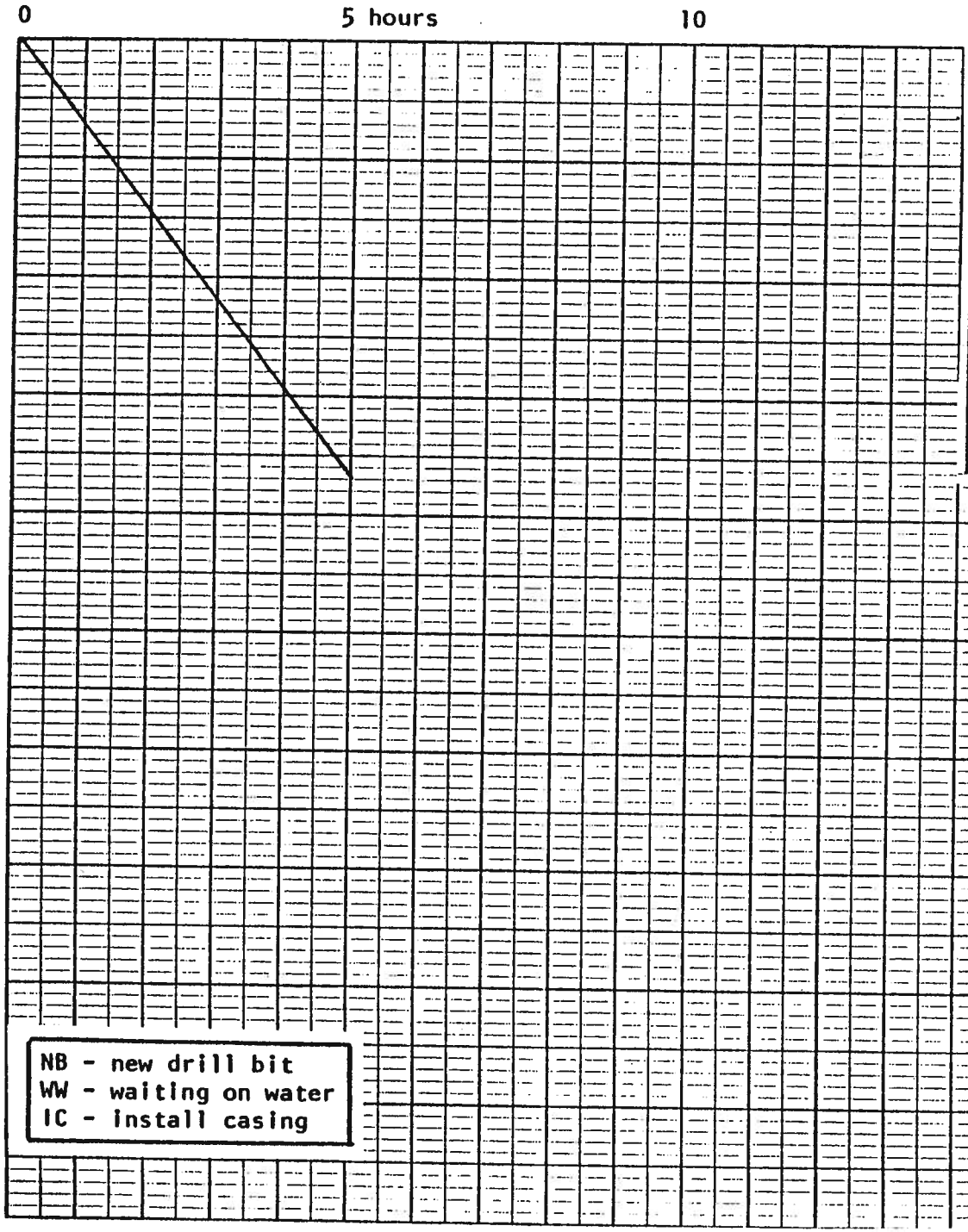
Drill record

Driving time	0.75 hrs
Geo. logging	2.75 hrs
Cementing	1.75 hrs
Breakdown	hrs
Drill bits used	1
Mud used	lbs
Bran used	50 lbs
Sawdust used	lbs
Liquid mud	4 l.
Others used	lbs
Total time	12.25

Cost analysis

Drilling	1680.00
Coring	
Cementing	288.00
Materials	270.82
Day rate	315.00
Standby	
Geo. log	737.30
BOP equip	
Total cost	3291.12

TH 10- N, ec 8 [illegible] 24 W4



Drill record

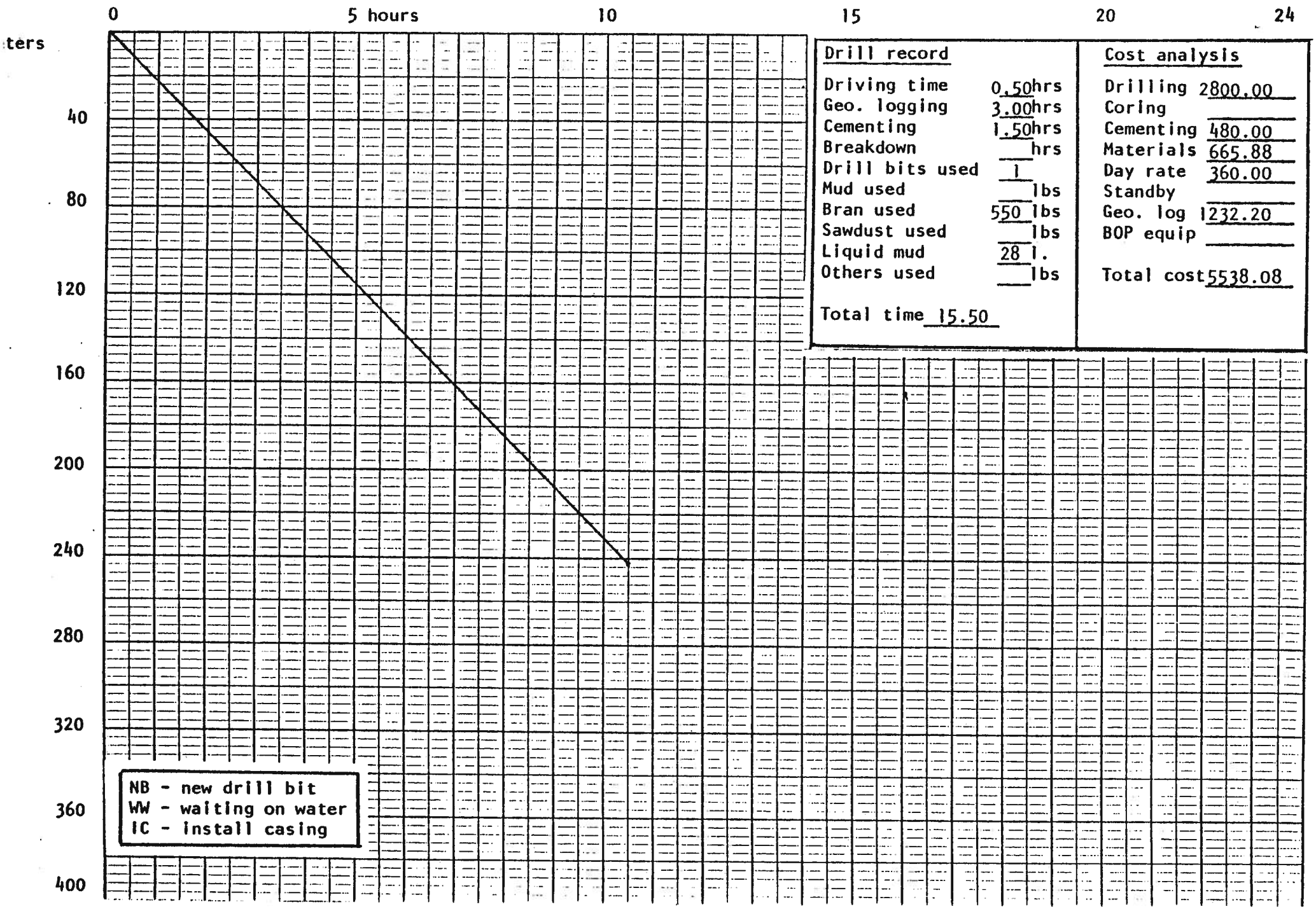
Driving time	0.50	hrs
Geo. logging	2.00	hrs
Cementing	1.25	hrs
Breakdown		hrs
Drill bits used		
Mud used	250	lbs
Bran used		lbs
Sawdust used		lbs
Liquid mud	8	l.
Others used		lbs

Total time 8.75

Cost analysis

Drilling	1680.00
Coring	
Cementing	288.00
Materials	302.13
Day rate	225.00
Standby	
Geo. log	737.30
BOP equip	
Total cost	3232.43

TH 11- N/ sec 8 39 n 25 w4



Drill record

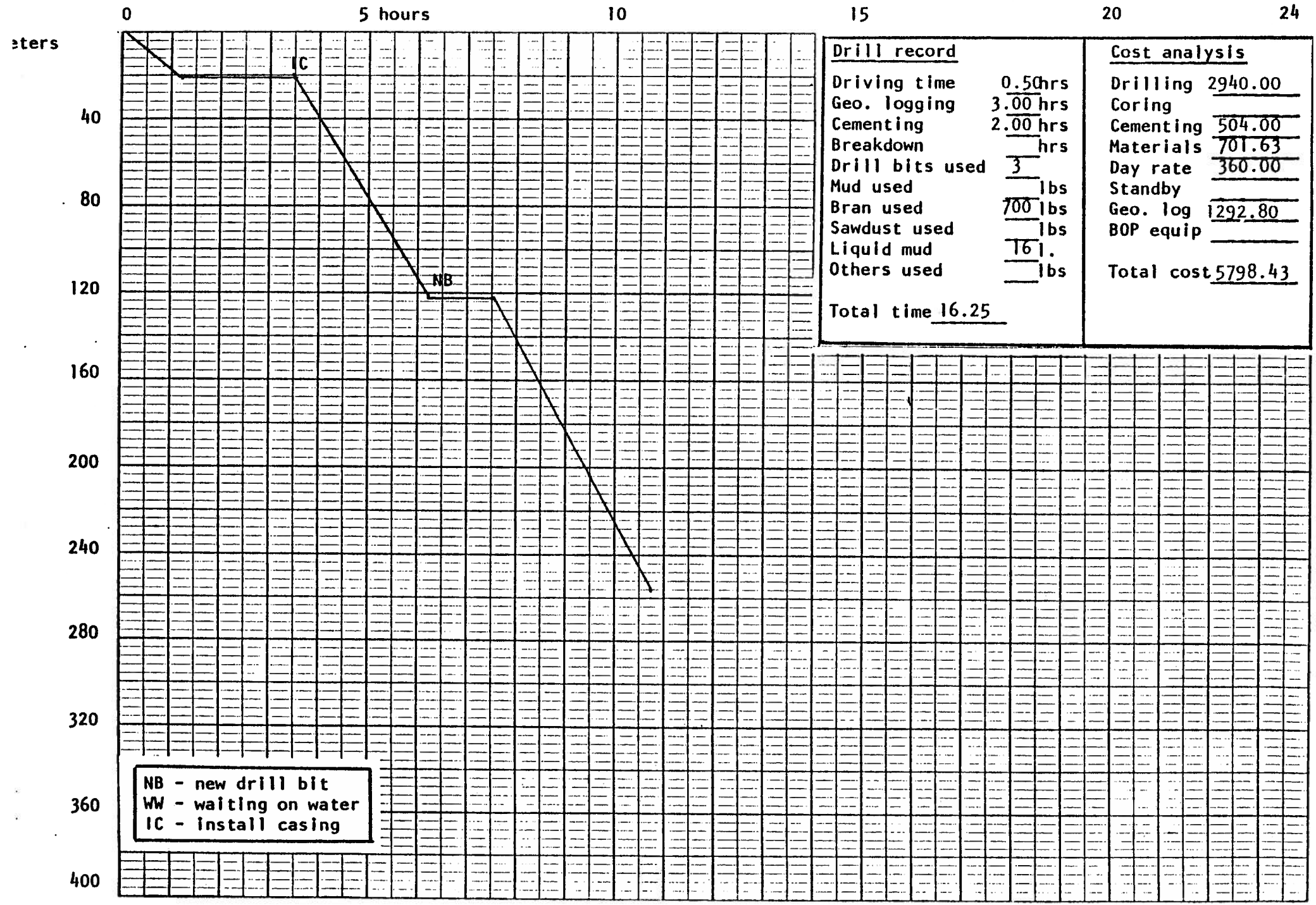
Driving time	0.50hrs
Geo. logging	3.00hrs
Cementing	1.50hrs
Breakdown	hrs
Drill bits used	1
Mud used	lbs
Bran used	550 lbs
Sawdust used	lbs
Liquid mud	28 l.
Others used	lbs

Total time 15.50

Cost analysis

Drilling	2800.00
Coring	
Cementing	480.00
Materials	665.88
Day rate	360.00
Standby	
Geo. log	1232.20
BOP equip	
Total cost	5538.08

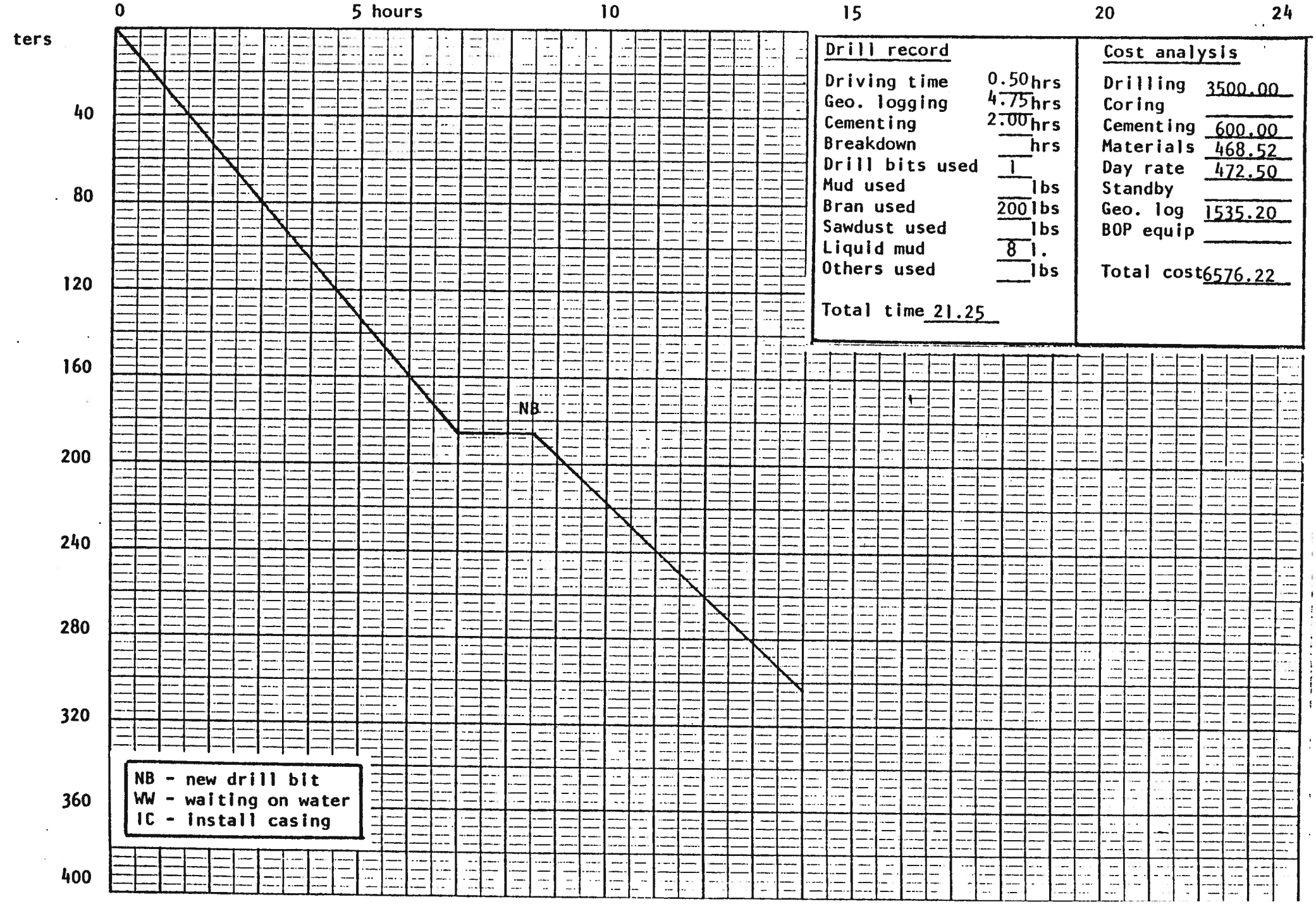
TH__ N, ec__ 25 N4



Drill record		
Driving time	0.50	hrs
Geo. logging	3.00	hrs
Cementing	2.00	hrs
Breakdown		hrs
Drill bits used	3	
Mud used		lbs
Bran used	700	lbs
Sawdust used		lbs
Liquid mud	161.	
Others used		lbs
Total time	16.25	

Cost analysis	
Drilling	2940.00
Coring	
Cementing	504.00
Materials	701.63
Day rate	360.00
Standby	
Geo. log	1292.80
BOP equip	
Total cost	5798.43

TH .3- N/ c .. 26 ..4



Drill record

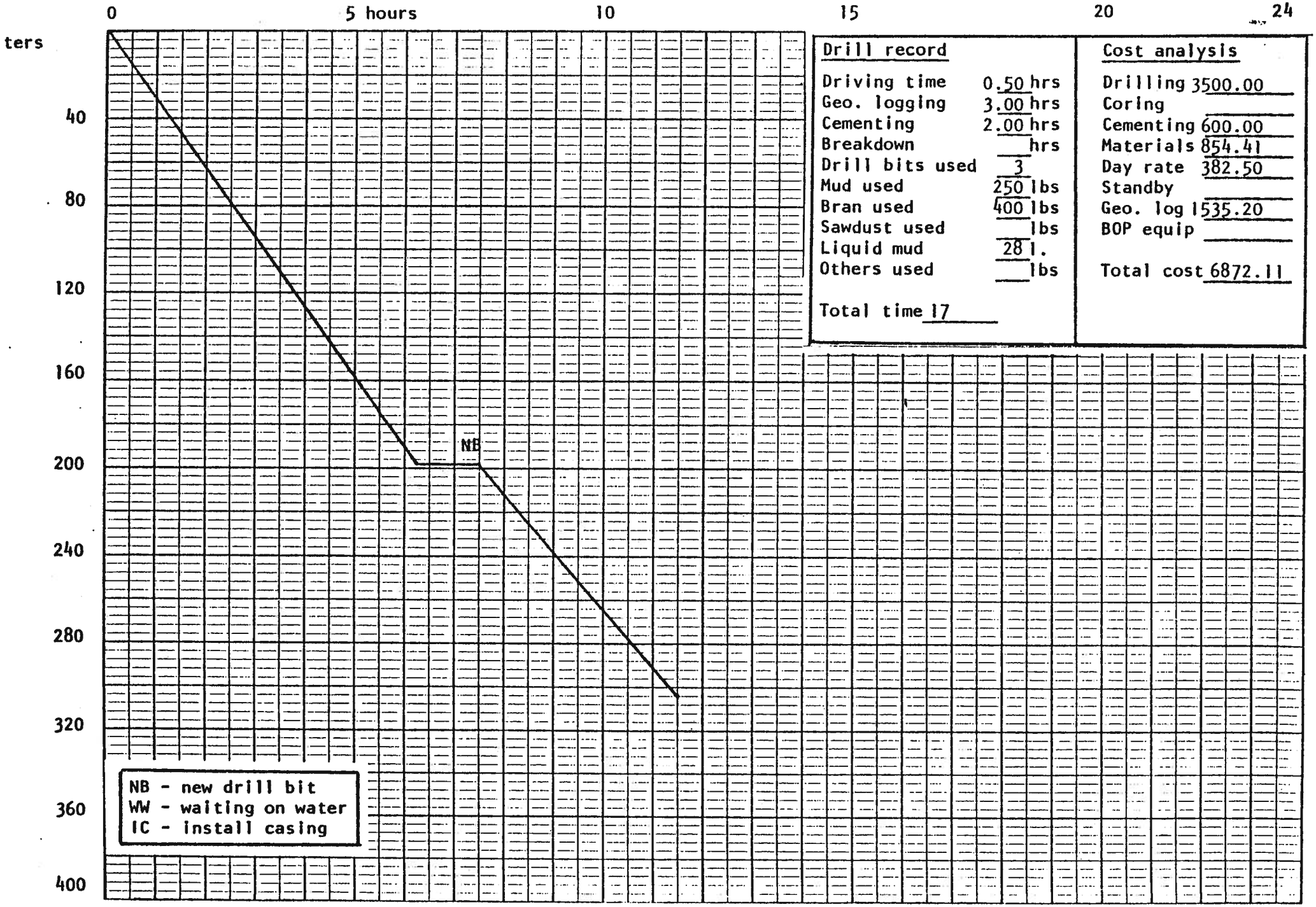
Driving time	0.50	hrs
Geo. logging	4.75	hrs
Cementing	2.00	hrs
Breakdown		hrs
Drill bits used	1	
Mud used		lbs
Bran used	200	lbs
Sawdust used		lbs
Liquid mud	8	l.
Others used		lbs

Total time 21.25

Cost analysis

Drilling	3500.00
Coring	
Cementing	600.00
Materials	468.52
Day rate	472.50
Standby	
Geo. log	1535.20
BOP equip	
Total cost	6576.22

TH 4 N/ c 3 26 4



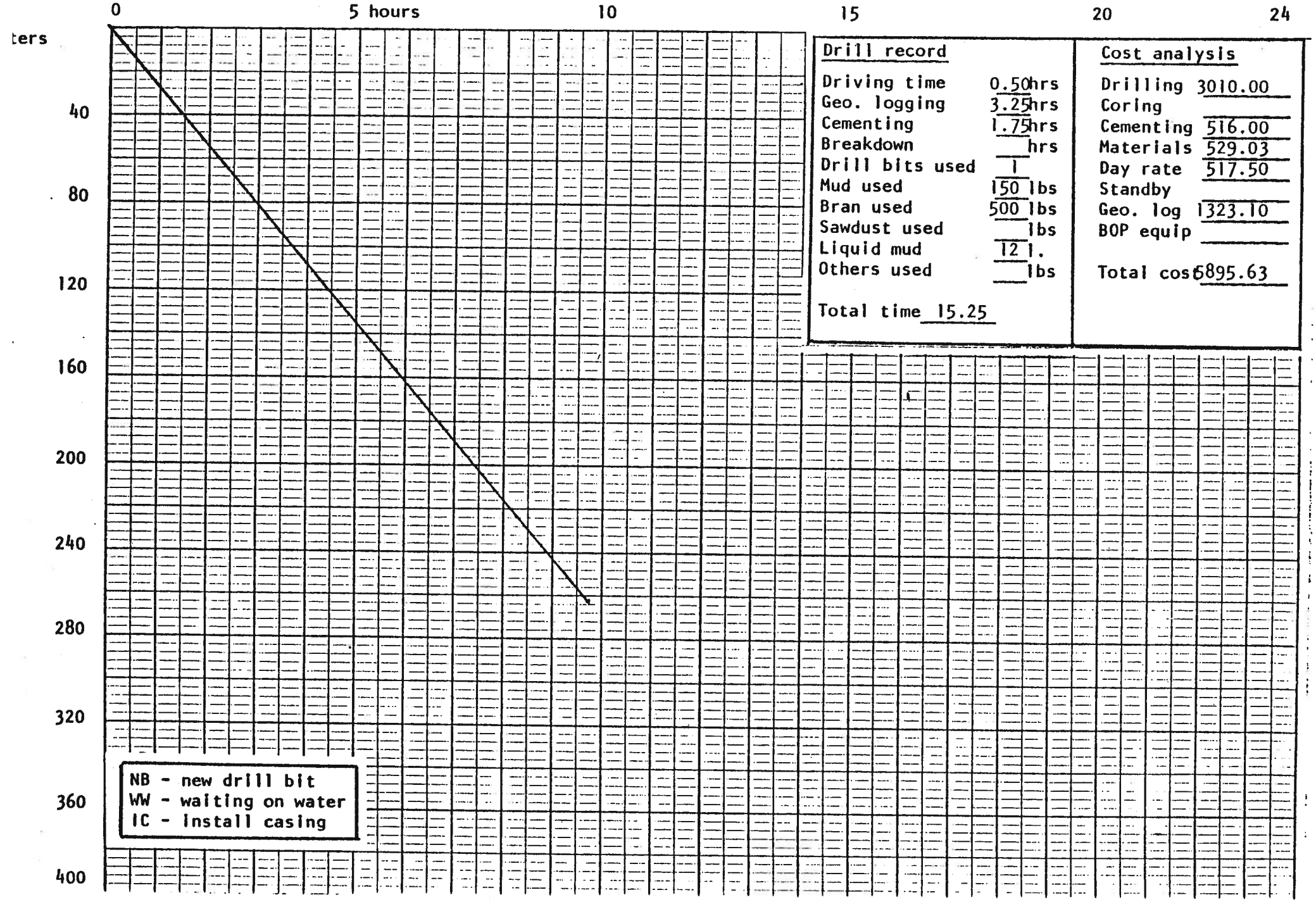
Drill record

Driving time	0.50 hrs
Geo. logging	3.00 hrs
Cementing	2.00 hrs
Breakdown	hrs
Drill bits used	3
Mud used	250 lbs
Bran used	400 lbs
Sawdust used	lbs
Liquid mud	28 l.
Others used	lbs
Total time	17

Cost analysis

Drilling	3500.00
Coring	
Cementing	600.00
Materials	854.41
Day rate	382.50
Standby	
Geo. log	1535.20
BOP equip	
Total cost	6872.11

TH 15- N/ c 25 4



Drill record

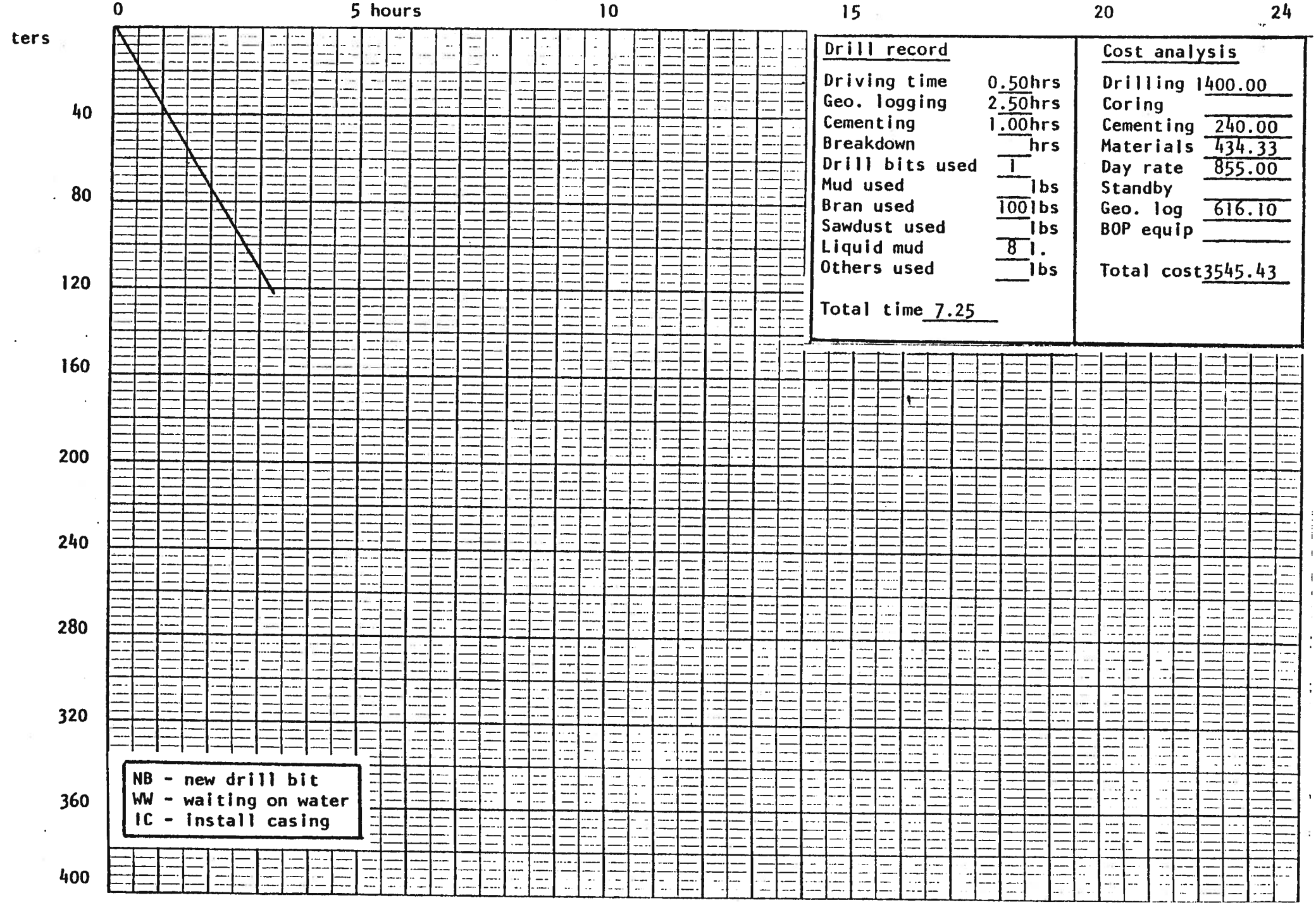
Driving time	0.50 hrs
Geo. logging	3.25 hrs
Cementing	1.75 hrs
Breakdown	hrs
Drill bits used	1
Mud used	150 lbs
Bran used	500 lbs
Sawdust used	lbs
Liquid mud	12 l.
Others used	lbs

Total time 15.25

Cost analysis

Drilling	3010.00
Coring	
Cementing	516.00
Materials	529.03
Day rate	517.50
Standby	
Geo. log	1323.10
BOP equip	
Total cost	6895.63

TH .6- N/ c .3. .24 .4



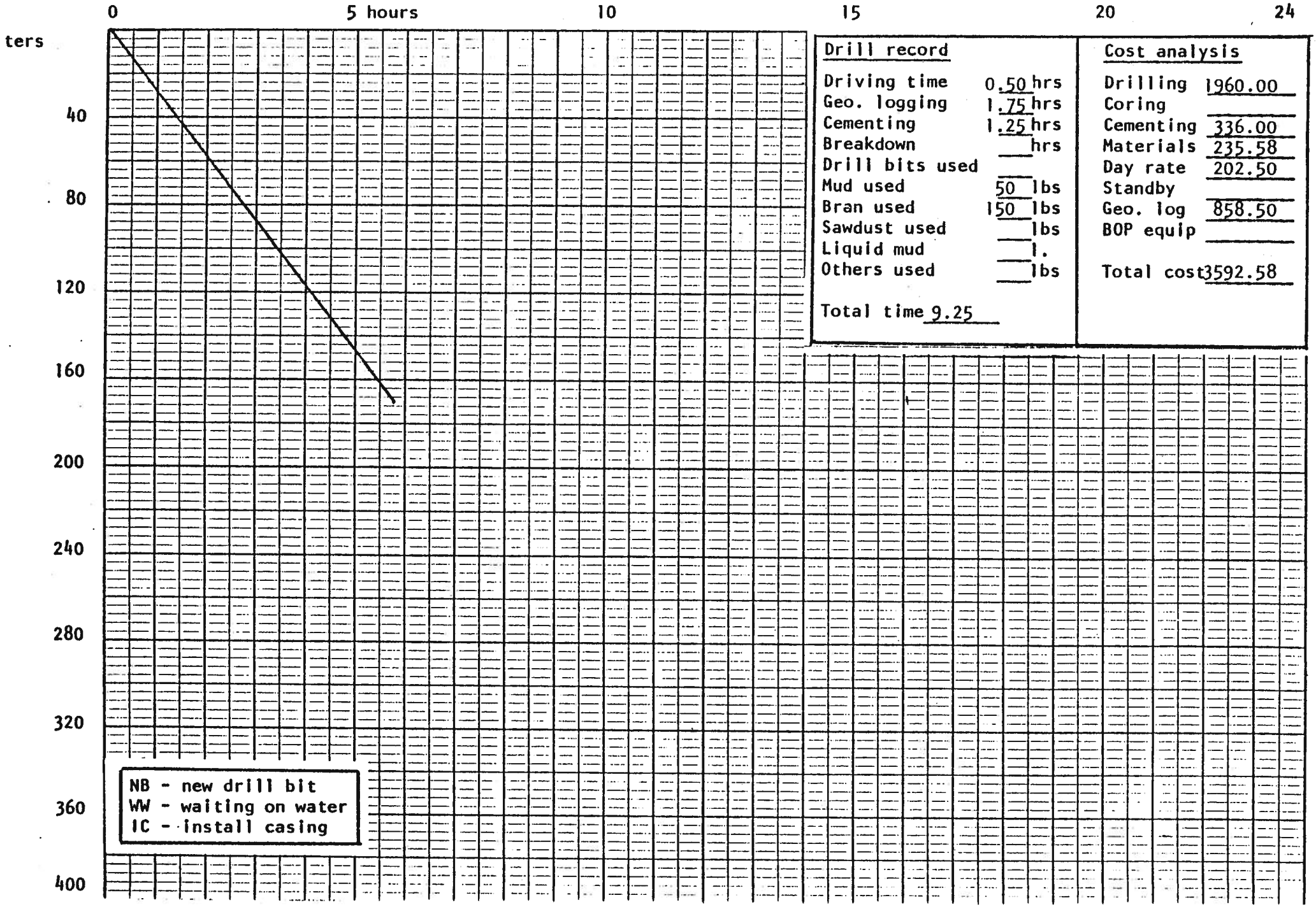
Drill record

Driving time	0.50 hrs
Geo. logging	2.50 hrs
Cementing	1.00 hrs
Breakdown	hrs
Drill bits used	1
Mud used	lbs
Bran used	100 lbs
Sawdust used	lbs
Liquid mud	8 l.
Others used	lbs
Total time	7.25

Cost analysis

Drilling	1400.00
Coring	
Cementing	240.00
Materials	434.33
Day rate	855.00
Standby	
Geo. log	616.10
BOP equip	
Total cost	3545.43

TH 17- .. N/. .ec 21 .. .. 24 ..4



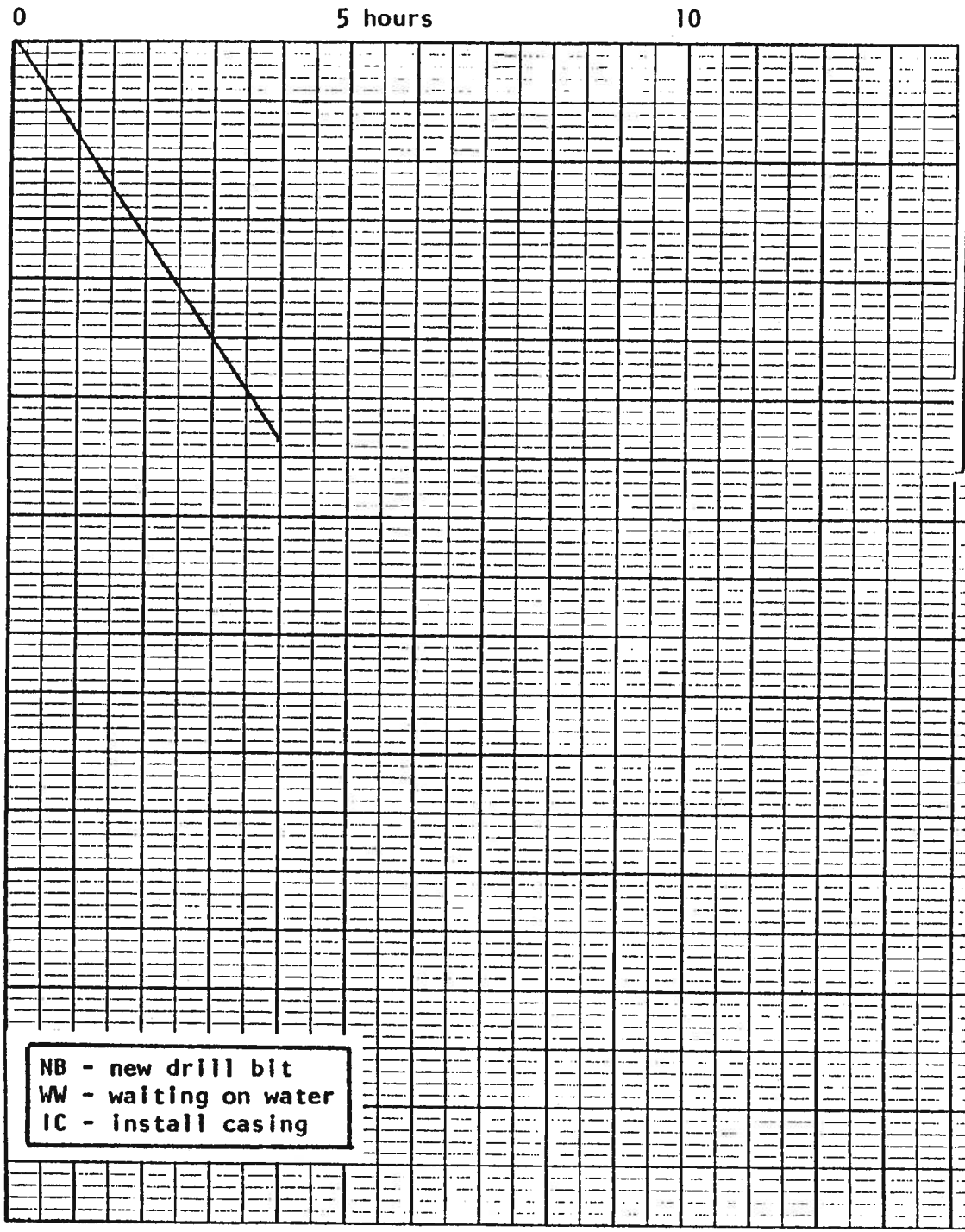
Drill record

Driving time	0.50 hrs
Geo. logging	1.75 hrs
Cementing	1.25 hrs
Breakdown	hrs
Drill bits used	
Mud used	50 lbs
Bran used	150 lbs
Sawdust used	lbs
Liquid mud	l.
Others used	lbs
Total time	9.25

Cost analysis

Drilling	1960.00
Coring	
Cementing	336.00
Materials	235.58
Day rate	202.50
Standby	
Geo. log	858.50
BOP equip	
Total cost	3592.58

TH 3- N/ ec 24 /4



Drill record

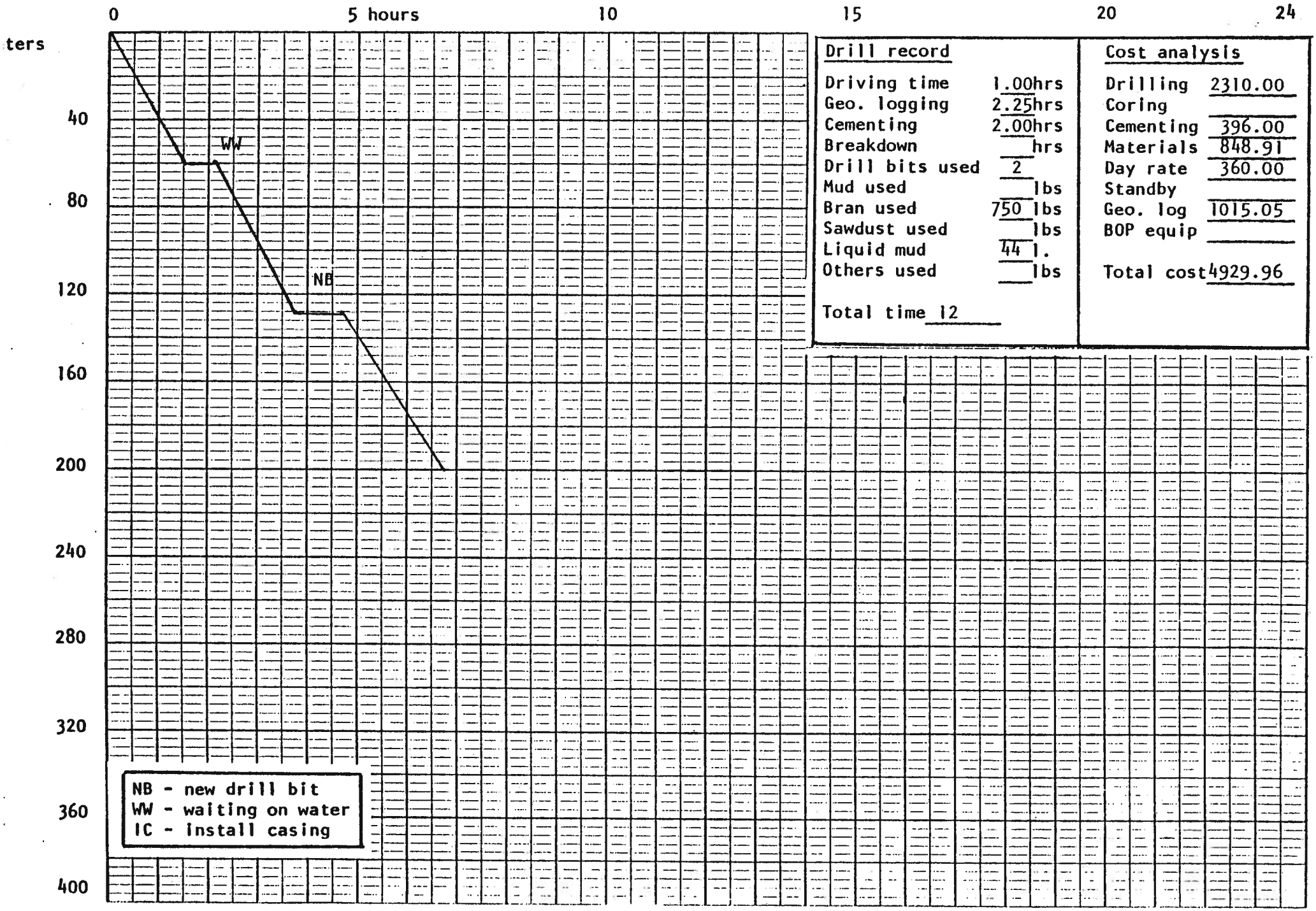
Driving time	0.50hrs
Geo. logging	2.50hrs
Cementing	1.25hrs
Breakdown	hrs
Drill bits used	1
Mud used	50 lbs
Bran used	100 lbs
Sawdust used	lbs
Liquid mud	l.
Others used	lbs

Total time 8.25

Cost analysis

Drilling	1540.00
Coring	
Cementing	264.00
Materials	251.20
Day rate	270.00
Standby	
Geo. log	676.70
BOP equip	
Total cost	3001.90

TH)- N/ ec 1 25 14



Drill record

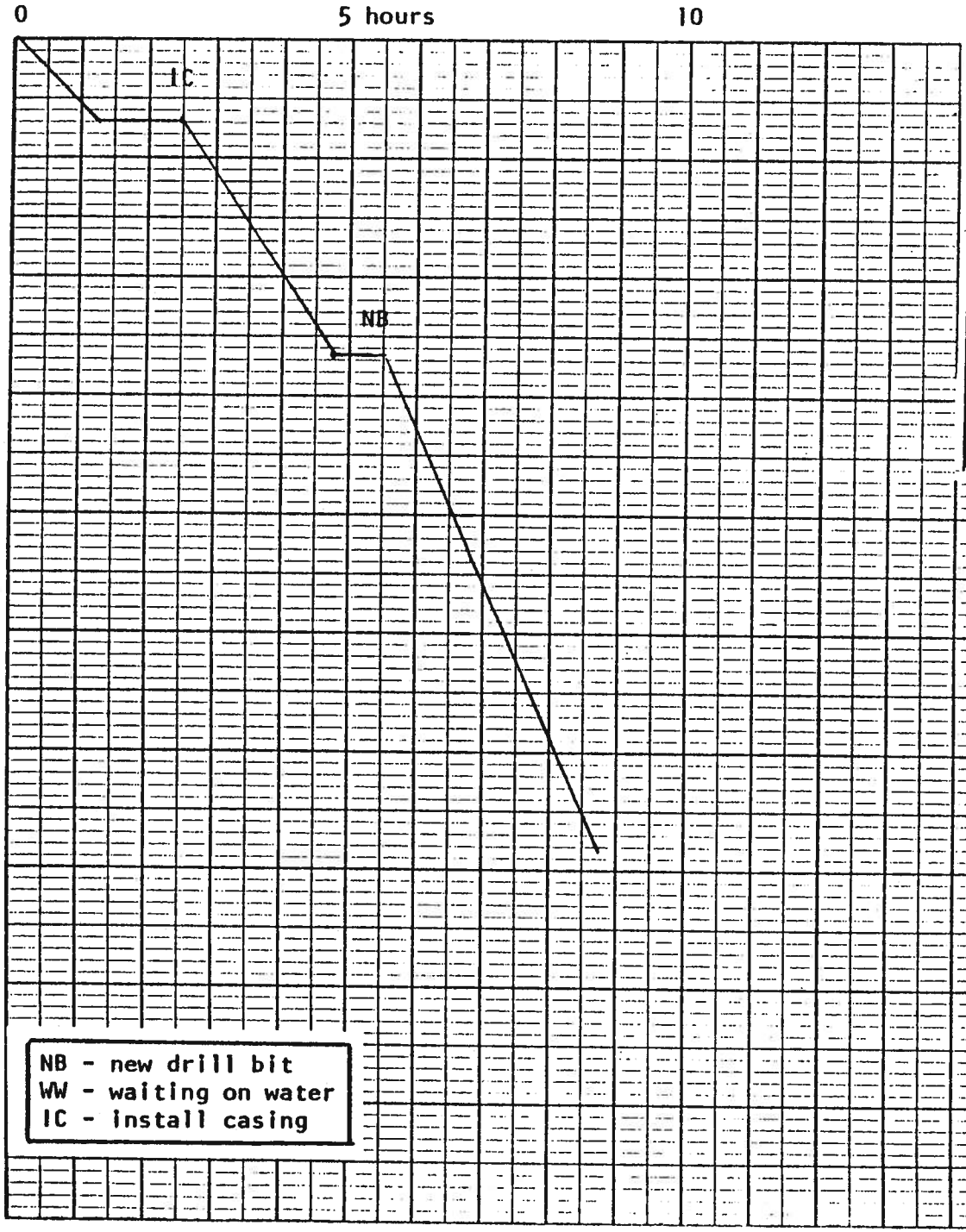
Driving time	1.00hrs
Geo. logging	2.25hrs
Cementing	2.00hrs
Breakdown	hrs
Drill bits used	2
Mud used	lbs
Bran used	750 lbs
Sawdust used	lbs
Liquid mud	44 l.
Others used	lbs

Total time 12

Cost analysis

Drilling	2310.00
Coring	
Cementing	396.00
Materials	848.91
Day rate	360.00
Standby	
Geo. log	1015.05
BOP equip	
Total cost	4929.96

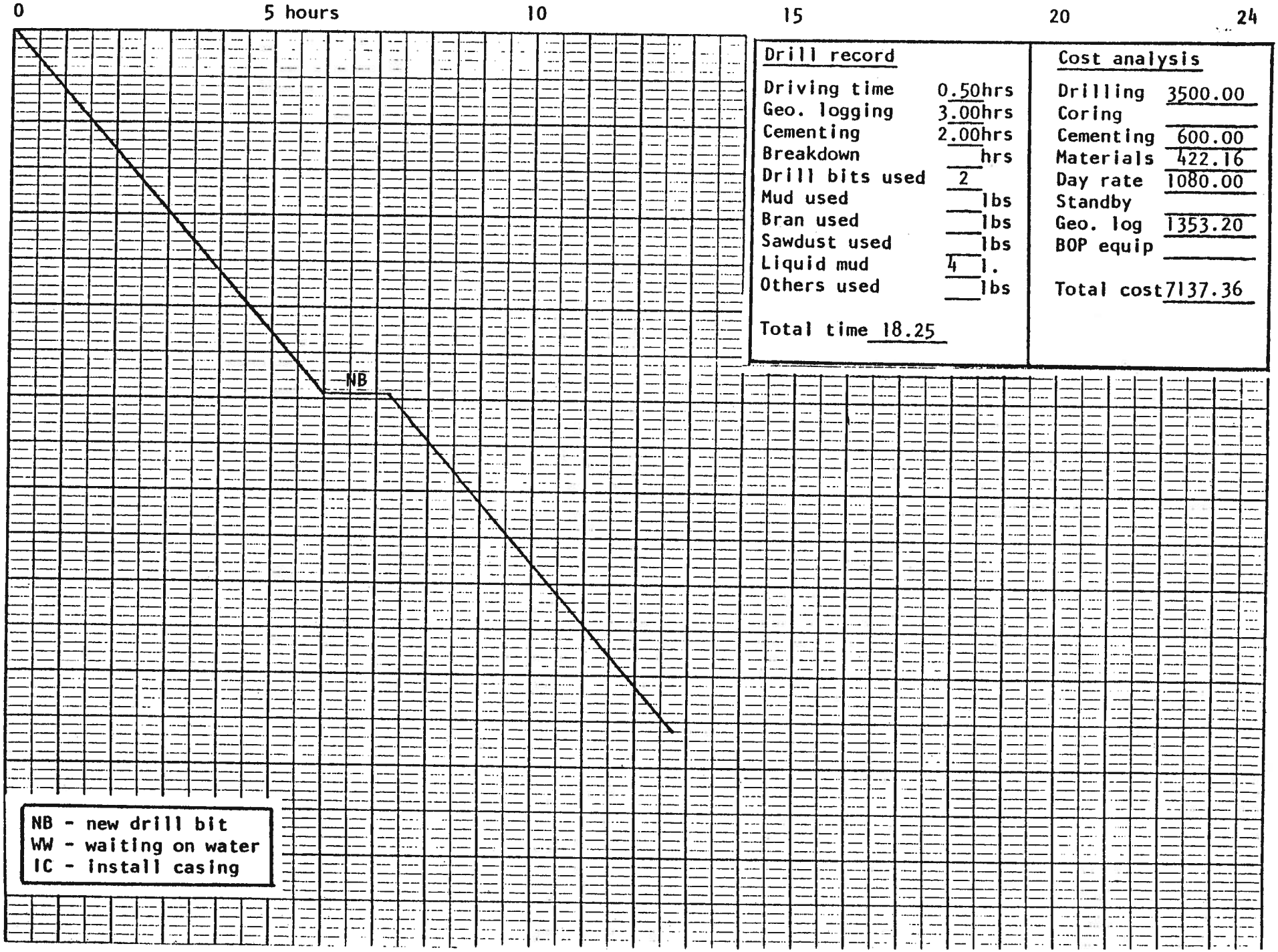
TH 20- N/ ec 34 39 " 26 N4



Drill record	
Driving time	1.00hrs
Geo. logging	2.00hrs
Cementing	2.00hrs
Breakdown	hrs
Drill bits used	4
Mud used	250 lbs
Bran used	250 lbs
Sawdust used	lbs
Liquid mud	l.
Others used	lbs
Total time	13.75

Cost analysis	
Drilling	3150.00
Coring	
Cementing	540.00
Materials	141.71
Day rate	630.00
Standby	
Geo. log	1383.70
BOP equip	
Total cost	6845.41

TH 21- .. N/ . Sec . . 40 R 26 W4



Drill record

Driving time	0.50hrs
Geo. logging	3.00hrs
Cementing	2.00hrs
Breakdown	hrs
Drill bits used	2
Mud used	lbs
Bran used	lbs
Sawdust used	lbs
Liquid mud	4 l.
Others used	lbs

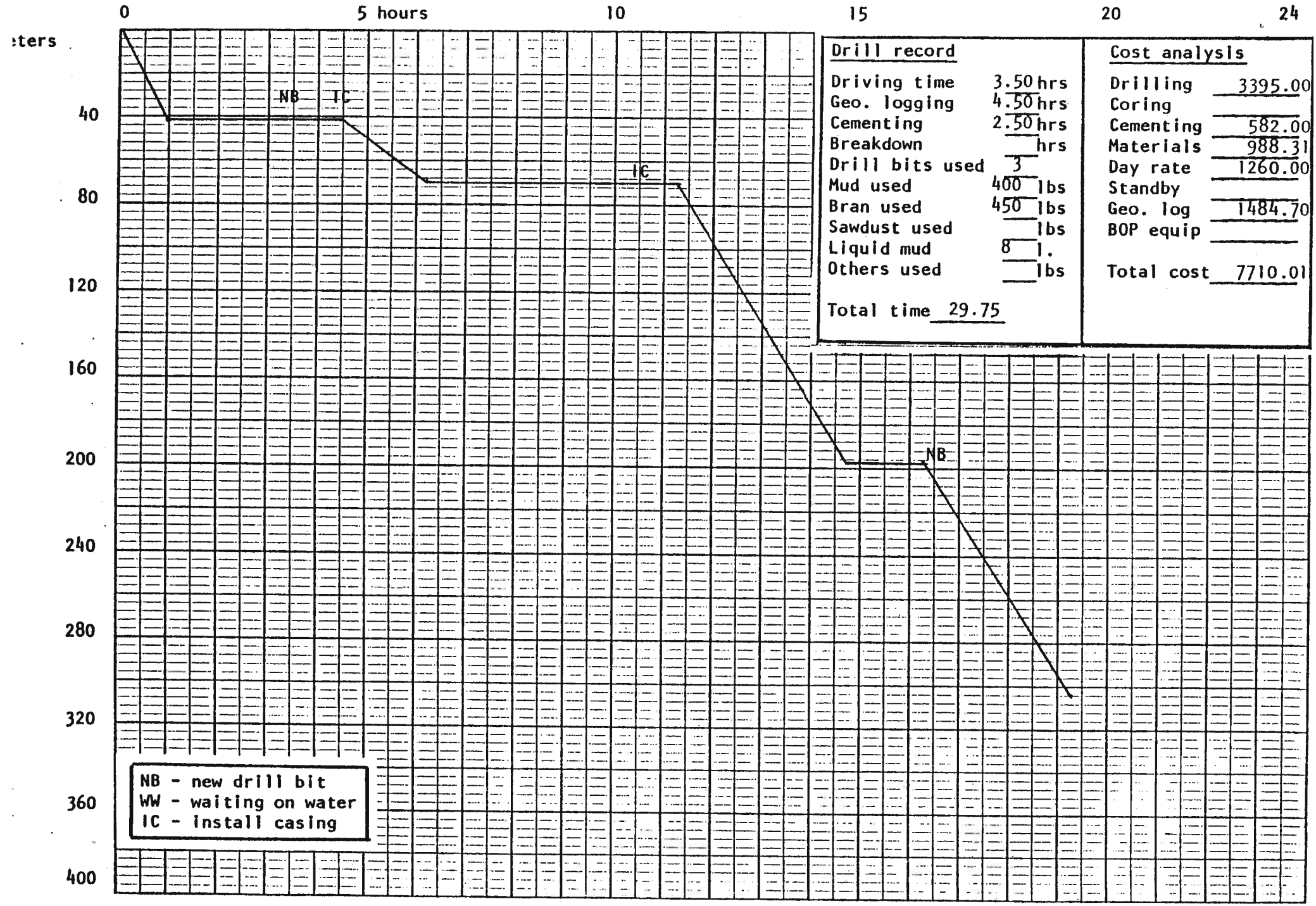
Total time 18.25

Cost analysis

Drilling	3500.00
Coring	
Cementing	600.00
Materials	422.16
Day rate	1080.00
Standby	
Geo. log	1353.20
BOP equip	

Total cost 7137.36

TH 22- 81 N/S Sec 23 To 40 - 26 W4



Drill record

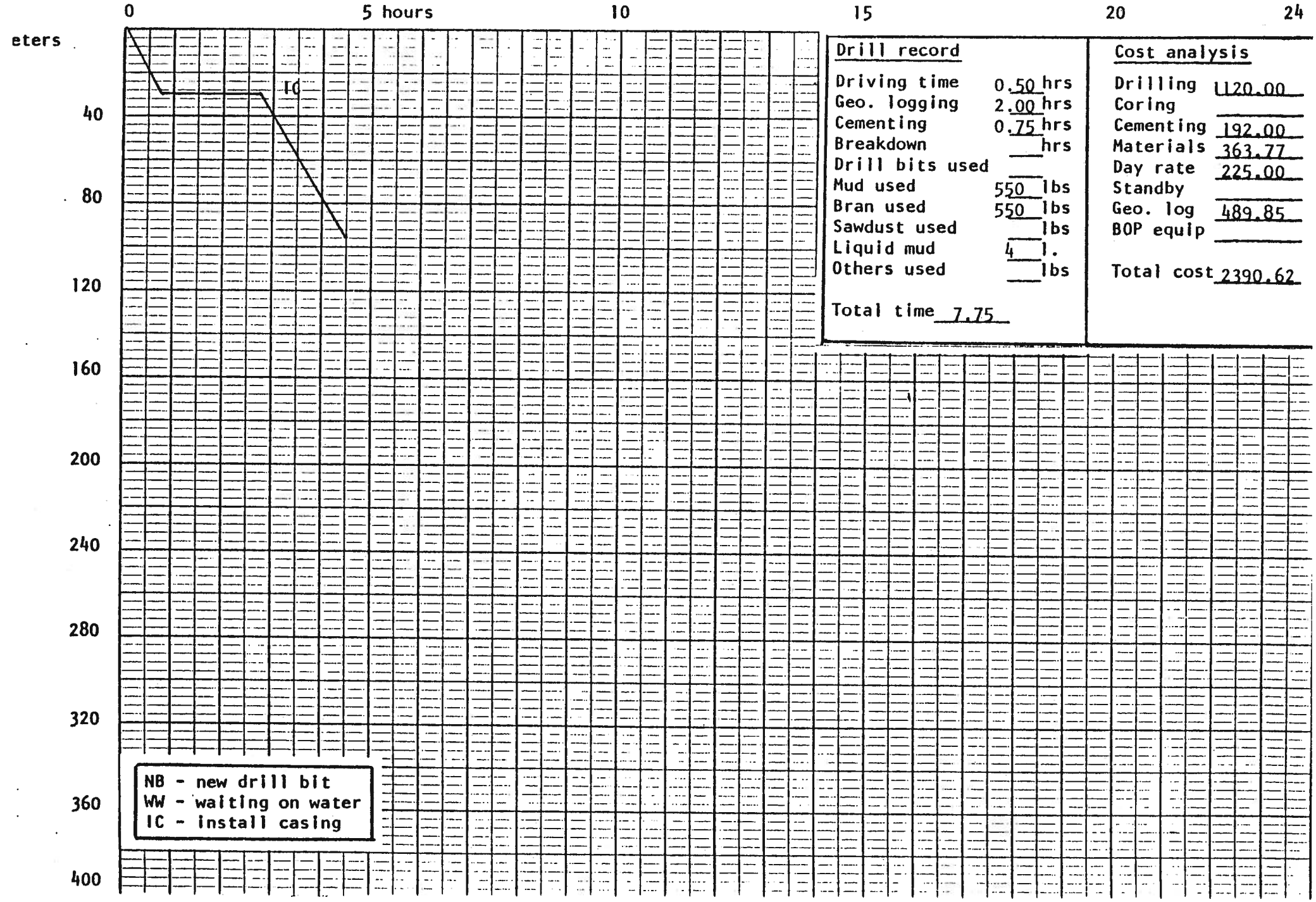
Driving time	3.50	hrs
Geo. logging	4.50	hrs
Cementing	2.50	hrs
Breakdown		hrs
Drill bits used	3	
Mud used	400	lbs
Bran used	450	lbs
Sawdust used		lbs
Liquid mud	8	l.
Others used		lbs

Total time 29.75

Cost analysis

Drilling	3395.00
Coring	
Cementing	582.00
Materials	988.31
Day rate	1260.00
Standby	
Geo. log	1484.70
BOP equip	
Total cost	7710.01

Th 23- N Sec ... 24 W4



Drill record

Driving time	0.50 hrs
Geo. logging	2.00 hrs
Cementing	0.75 hrs
Breakdown	hrs
Drill bits used	
Mud used	550 lbs
Bran used	550 lbs
Sawdust used	lbs
Liquid mud	4 l.
Others used	lbs

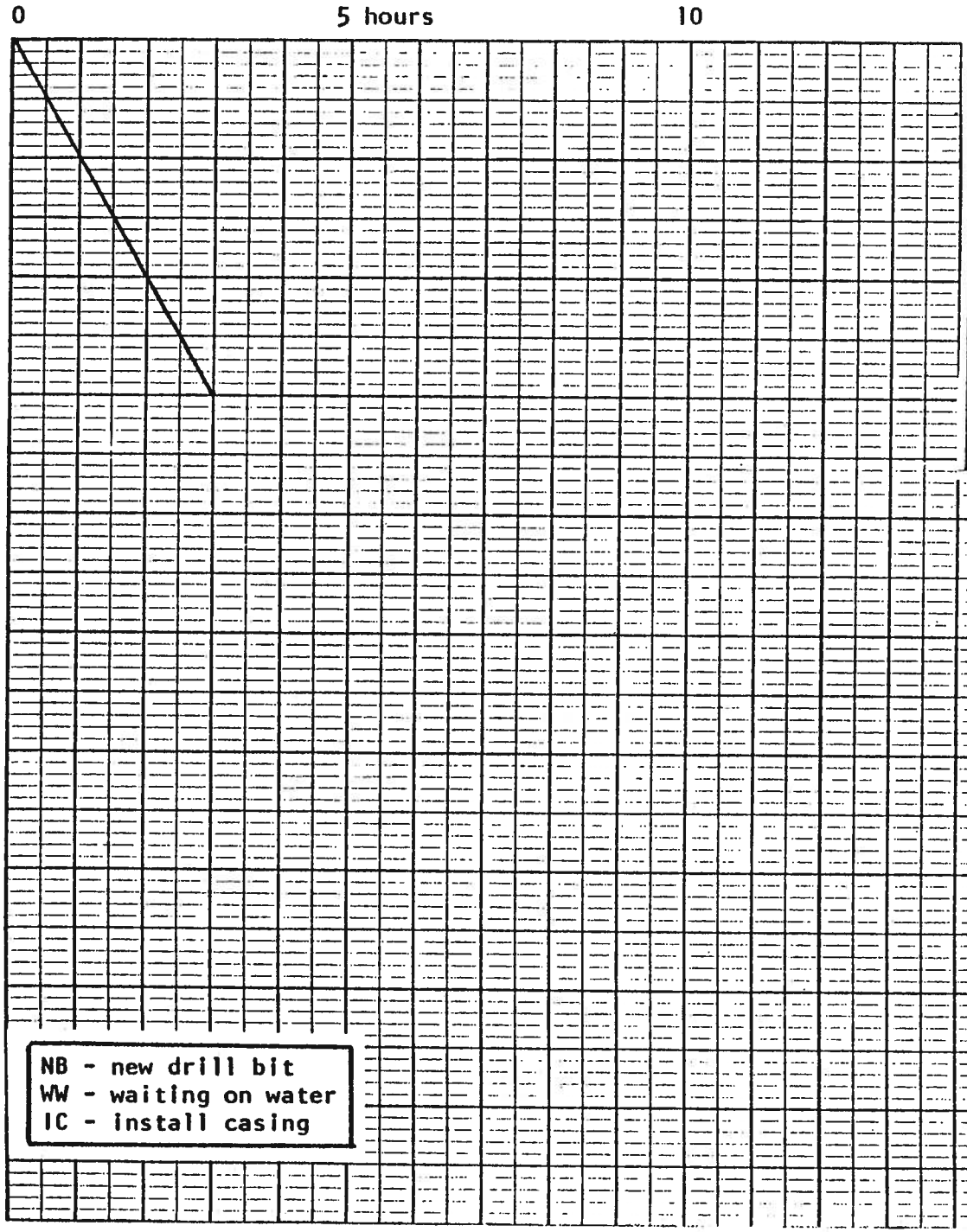
Total time 7.75

Cost analysis

Drilling	1120.00
Coring	
Cementing	192.00
Materials	363.77
Day rate	225.00
Standby	
Geo. log	489.85
BOP equip	

Total cost 2390.62

TH [illegible] N/[illegible]ec [illegible] [illegible] [illegible] 2[illegible] /4



Drill record

Driving time	0.50 hrs
Geo. logging	2.00 hrs
Cementing	1.25 hrs
Breakdown	hrs
Drill bits used	1
Mud used	600 lbs
Bran used	400 lbs
Sawdust used	lbs
Liquid mud	44 l.
Others used	lbs

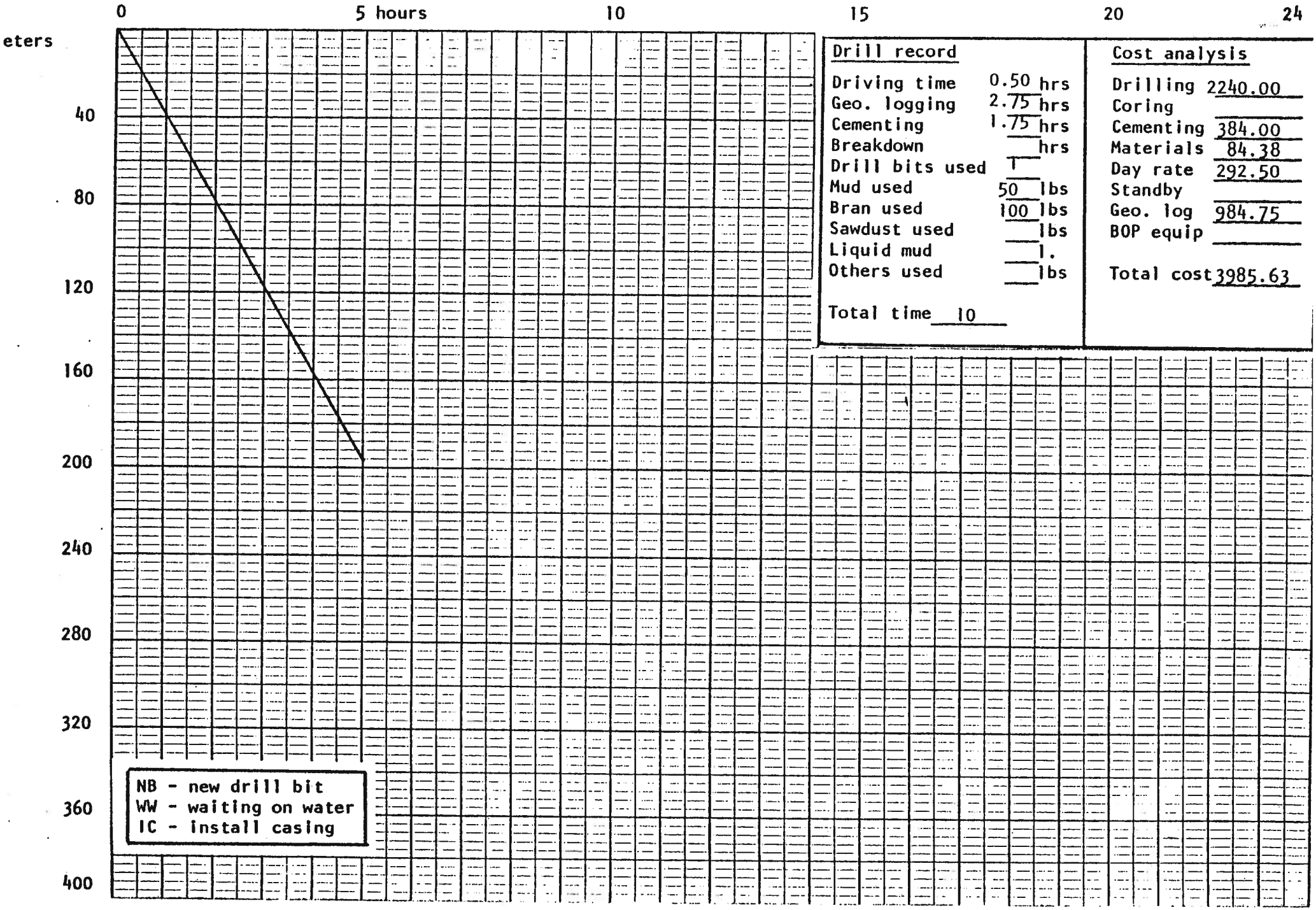
Total time 6.75

Cost analysis

Drilling	1400.00
Coring	
Cementing	240.00
Materials	752.09
Day rate	292.50
Standby	
Geo. log	616.10
BOP equip	

Total cost 3300.69

TH 25- N ec 1 25 W4



Drill record

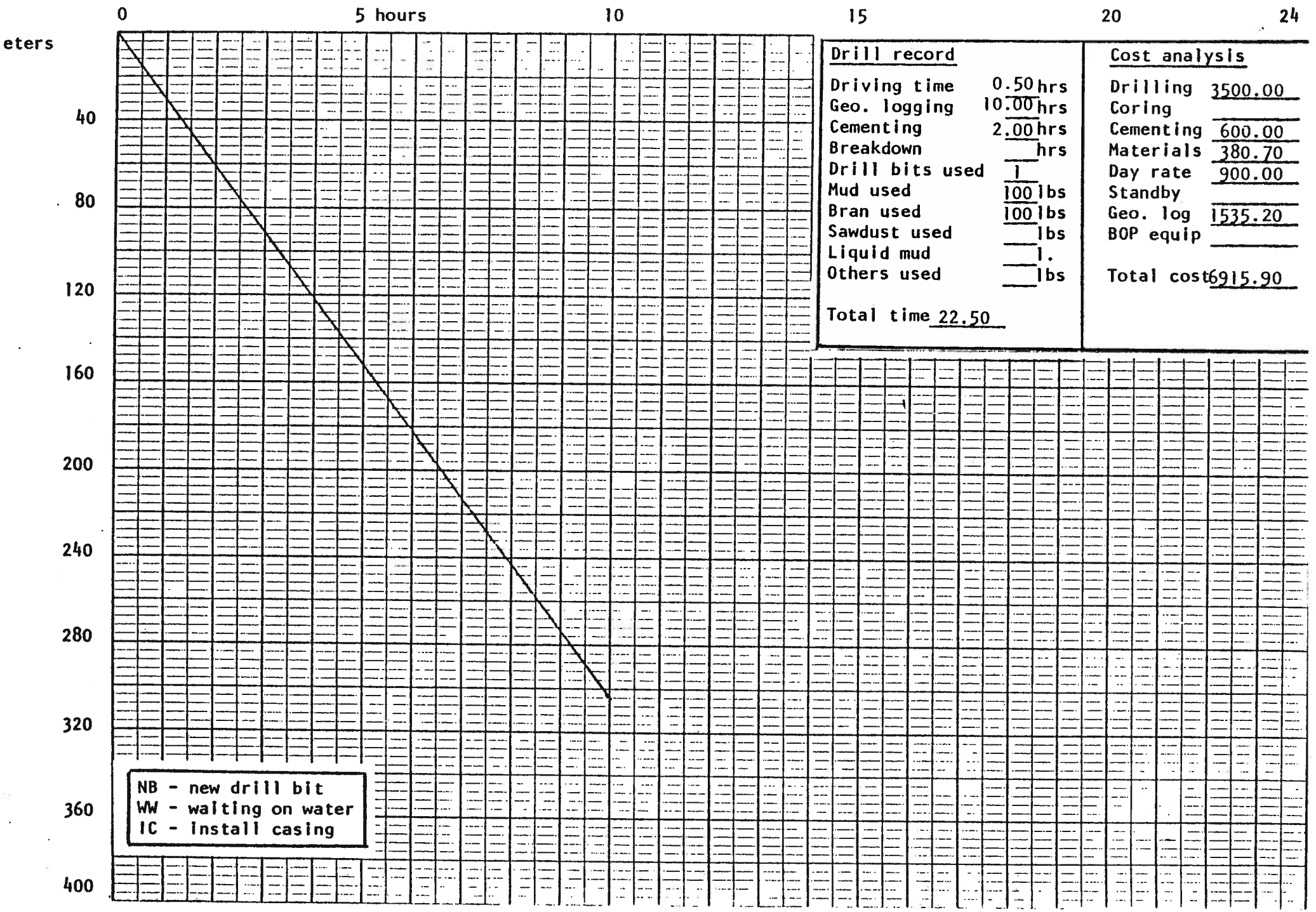
Driving time	0.50	hrs
Geo. logging	2.75	hrs
Cementing	1.75	hrs
Breakdown		hrs
Drill bits used	1	
Mud used	50	lbs
Bran used	100	lbs
Sawdust used		lbs
Liquid mud		l.
Others used		lbs

Total time 10

Cost analysis

Drilling	2240.00
Coring	
Cementing	384.00
Materials	84.38
Day rate	292.50
Standby	
Geo. log	984.75
BOP equip	
Total cost	3985.63

TI 26- N Sec 4 p 1 2 W4



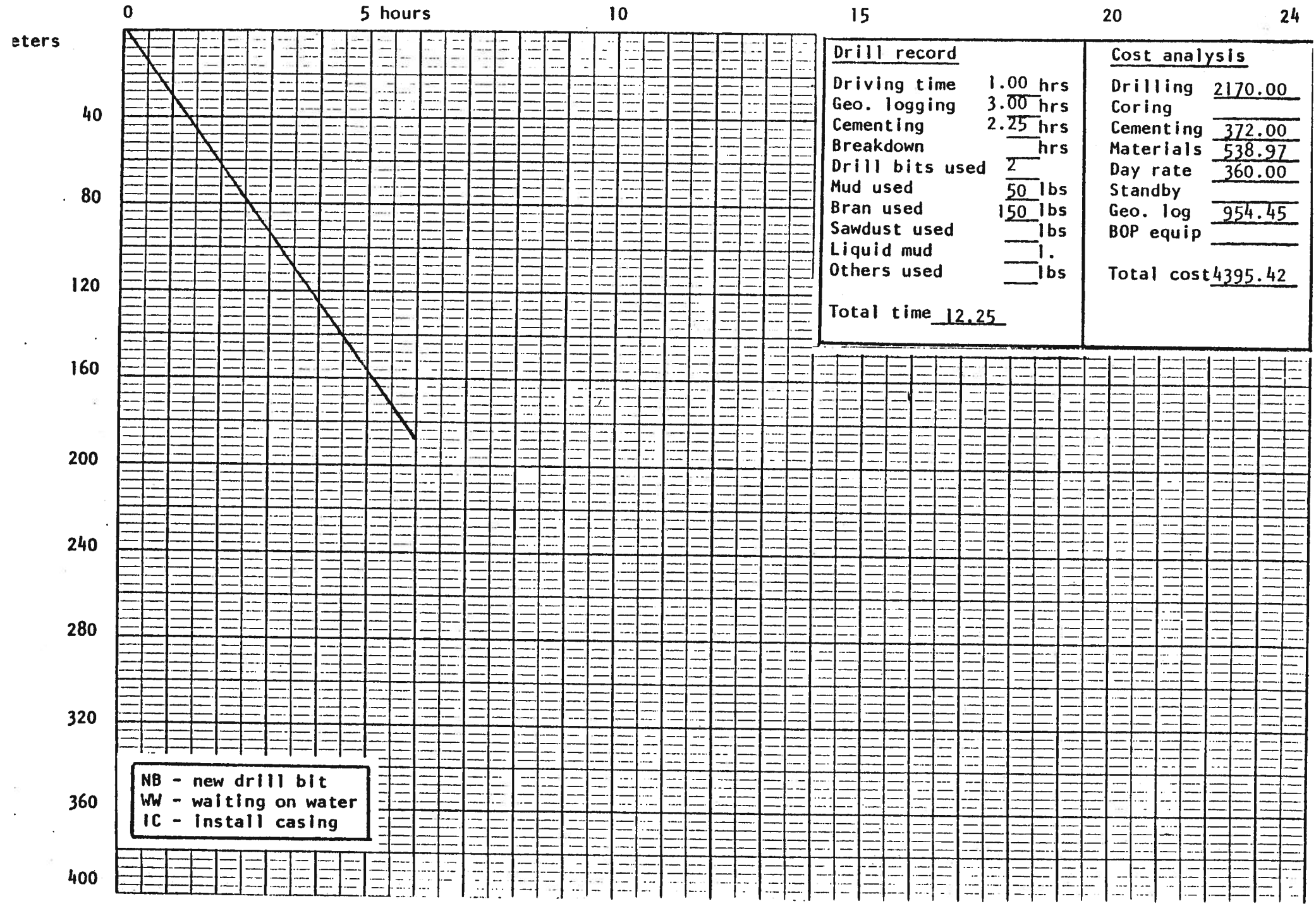
Drill record

Driving time	0.50 hrs
Geo. logging	10.00 hrs
Cementing	2.00 hrs
Breakdown	hrs
Drill bits used	1
Mud used	100 lbs
Bran used	100 lbs
Sawdust used	lbs
Liquid mud	l.
Others used	lbs
Total time	22.50

Cost analysis

Drilling	3500.00
Coring	
Cementing	600.00
Materials	380.70
Day rate	900.00
Standby	
Geo. log	1535.20
BOP equip	
Total cost	6915.90

TH 7- N ec 25 W4



Drill record

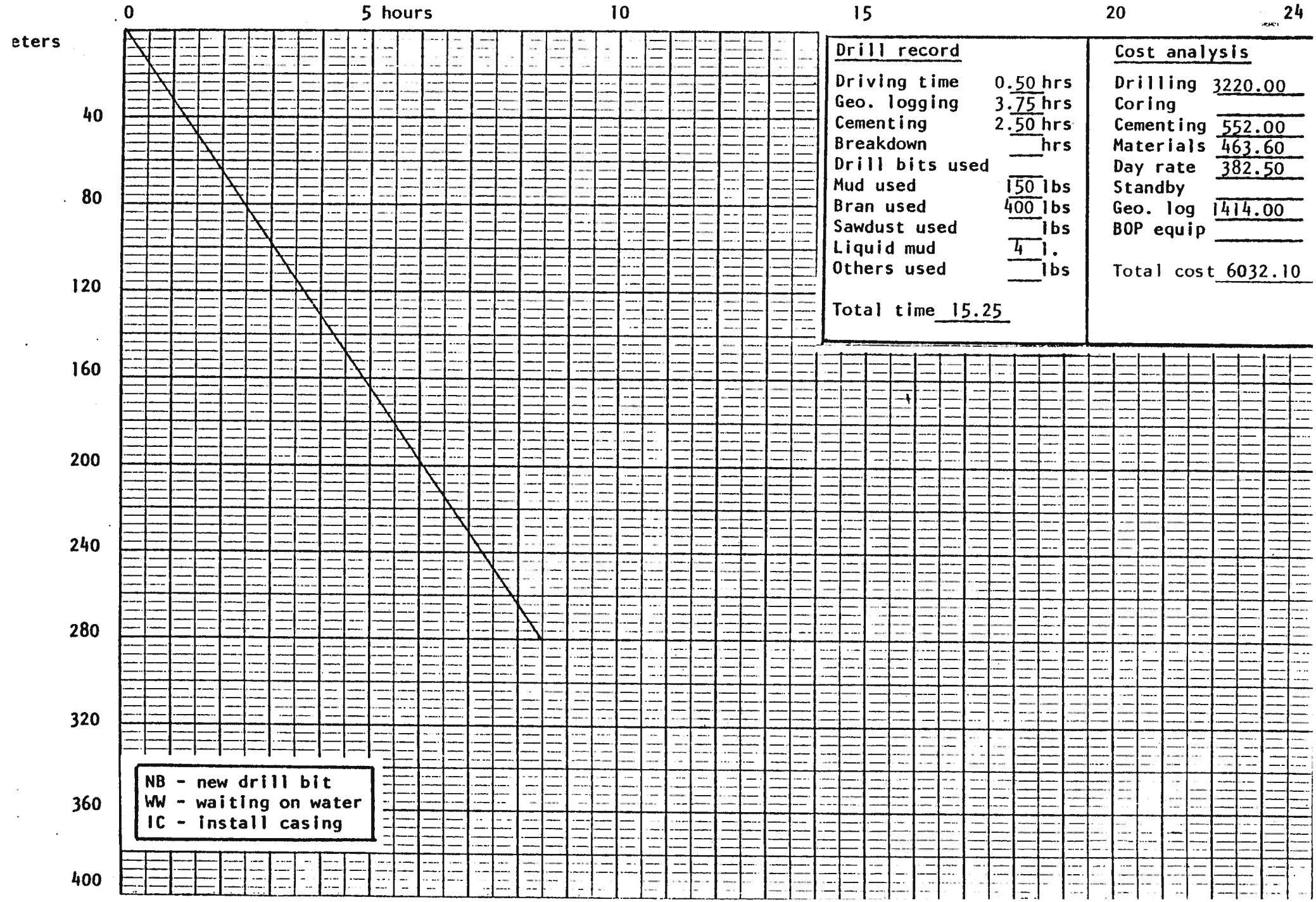
Driving time	1.00	hrs
Geo. logging	3.00	hrs
Cementing	2.25	hrs
Breakdown		hrs
Drill bits used	2	
Mud used	50	lbs
Bran used	150	lbs
Sawdust used		lbs
Liquid mud		l.
Others used		lbs

Total time 12.25

Cost analysis

Drilling	2170.00
Coring	
Cementing	372.00
Materials	538.97
Day rate	360.00
Standby	
Geo. log	954.45
BOP equip	
Total cost	4395.42

Tl 28- N. Sec p 4. 2p W4



Drill record

Driving time	0.50 hrs
Geo. logging	3.75 hrs
Cementing	2.50 hrs
Breakdown	hrs
Drill bits used	
Mud used	150 lbs
Bran used	400 lbs
Sawdust used	lbs
Liquid mud	4 l.
Others used	lbs

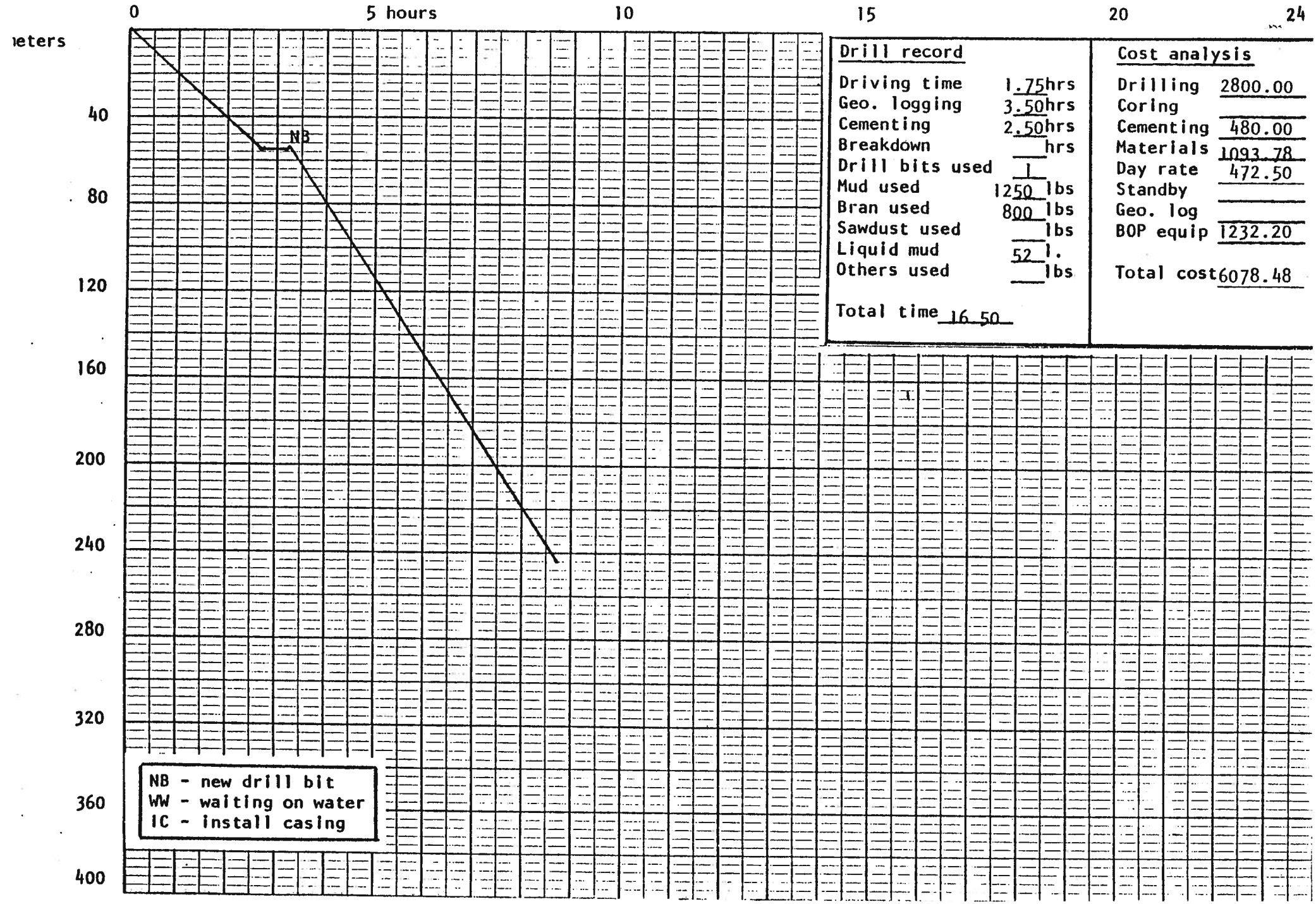
Total time 15.25

Cost analysis

Drilling	3220.00
Coring	
Cementing	552.00
Materials	463.60
Day rate	382.50
Standby	
Geo. log	1414.00
BOP equip	

Total cost 6032.10

Tl 9- N Sec 26 W4



Drill record

Driving time	1.75hrs
Geo. logging	3.50hrs
Cementing	2.50hrs
Breakdown	hrs
Drill bits used	1
Mud used	1250 lbs
Bran used	800 lbs
Sawdust used	lbs
Liquid mud	52 l.
Others used	lbs
Total time	16.50

Cost analysis

Drilling	2800.00
Coring	
Cementing	480.00
Materials	1093.78
Day rate	472.50
Standby	
Geo. log	
BOP equip	1232.20
Total cost	6078.48