Alberta Research Council
Open File Report 1968-3

An Attempt to Convert an Abandoned Oil Well to a Water Well in the Joffre Field, Alberta

by

Wm. R. Turner

Alberta
RESEARCH COUNCIL

AN ATTEMPT TO CONVERT AN ABANDONED OIL WELL TO A WATER WELL IN THE JOFFRE FIELD, ALBERTA

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In June, 1967, an attempt was made by the Research Council of Alberta to convert an abandoned oil well to a water well by gun-perforating the surface casing opposite water-producing sands. It was felt that due to the depth at which fresh water-bearing aquifers occurred in the area, gun-perforation of abandoned oil wells might prove to be the most economical method by which landowners in the area could obtain adequate supplies of fresh water.

The following discussion describes the technique used in the conversion and offers some comments as to why we were unsuccessful.

The Joffre oil field is located in south-central Alberta, approximately 10 miles northeast of the city of Red Deer. Most wells completed in the field produce oil and gas from both the Lower Cretaceous Viking Formation and the underlying Devonian reef complex. With the depletion of reserves from these two horizons, the number of wells abandoned for economic reasons increases with time.

The Alberta Oil and Gas Conservation Board regulations regarding the abandonment of oil and gas wells in the Joffre field require that a 200-foot cement plug be set at the bottom of the surface casing, which in the Joffre field is approximately 600 feet. Since there are some prolific aquifers in this area at depths of 200 to 400 feet, it was felt that the conversion of these abandoned wells for water supply purposes would be economically feasible.

The well used in this study was drilled by Imperial Oil Limited in Lsd. 5, Sec, 5, Tp. 39, R. 26, W. 4th Mer. on the southwestern limits of the Joffre field. The well was abandoned in the spring of 1967 and at the request of the landowner the 13-inch surface casing was capped and left exposed at the surface.

The first step in the conversion procedure was to determine exactly at what intervals the well penetrated water-bearing sands. This was accomplished by running a Schlumberger gamma-ray log in the well (Fig. 1) and correlating with a log run in a well 1 1/2 miles south (Fig. 2) in which water sands had been encountered in the depth intervals 275-308 and 464-545 feet. Analysis of the gamma-ray log for the northern well indicated a potential water-bearing sand between 280-308 feet.

Using a Schlumberger "Hyper Jet" perforating tool, the casing was perforated with 20 shots (9" spacing) between 288 and 303 feet.

The technique proved unsuccessful in that water did not enter the well after perforating. Examination of the well two days later indicated that no water had entered the well and it was decided that the technique was not appropriate.

Based on an analysis of the operation, the following conclusions can be drawn:

The well failed to produce water because:

1. The "sands" were not saturated, or
2. The perforations did not penetrate the formation to a point at which water could flow into the well.

November 28, 1967.

SCHLUMBERGER

COMPLETION RECORD

SCHLUMBERGER OF CANADA Calgary, Alberta

FIELD JOFFRE
WELL RESEARCH JOFFRE WTH
COMPANY RESEARCH COUNCIL OF ALBERTA

COMPANY RESEARCH COUNCIL OF ALBERTA

WELL RESEARCH JOFFRE WTH
5-5-39-26

FIELD JOFFRE

PROVINCE ALBERTA

LOCATION LSD 5 Sec. 5 Twp. 39 Rge. 26W4

Other Services:

Permanent Datum TOP OF CASING Elev.
Log Measured From " Ft. Above Perm. Datum

ELEV: KB
GL
CBF

SO #11714

19 JUNE 67 CAL PL

REMARKS

NOTE: COLLARS RECORDED 3' DEEP
CORRECTED IN DEPTH TRACK

PREVIOUS COMPLETION INFORMATION

Depth Control Log — Yes ☐ No ☒ To
Perforated — Yes ☐ No ☒ From
Bridge Plug Set at
Production Packer Set at
Cement Retainer Set at

DEPTH CONTROL LOG

	14 JUNE 67
Reading	447
Reading	00
Measured	447
th Reached	457
om Driller	460
d Type	AIR
d Level	-
l Head Pressure	NIL
k No.	2829 RD
orded By	ANDERSON
ness	TURNER

PERFORATING RECORD

Gun Type and Size	Shot Density	No. of Shots	Perforating Interval From	To
3 3/8"	1/9"	20	288	303
HYPER JET				

CASING RECORD

Size — Inches	Weight — Lbs.	From	To
13		SURF	TD

COLLAR LOCATION

Casing	Tubing
263	
292	
324	

OTHER SERVICES

Service	Type	Size	Depth
Bridge Plug			
Production Packer			
Cement Retainer			

bing Bottom
ating Nipple

Junk Basket Size
Gauge Ring Number

CASING COLLAR LOG

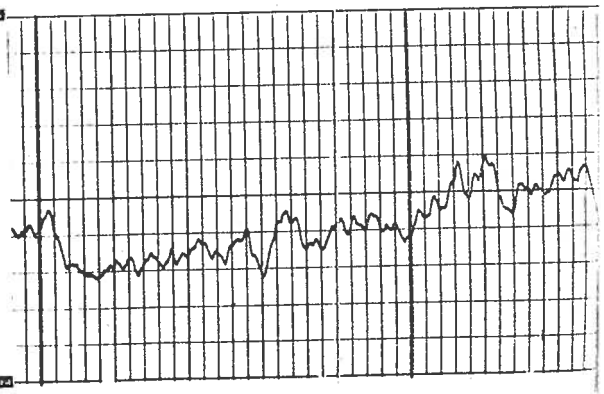
RECORDED COLLARS

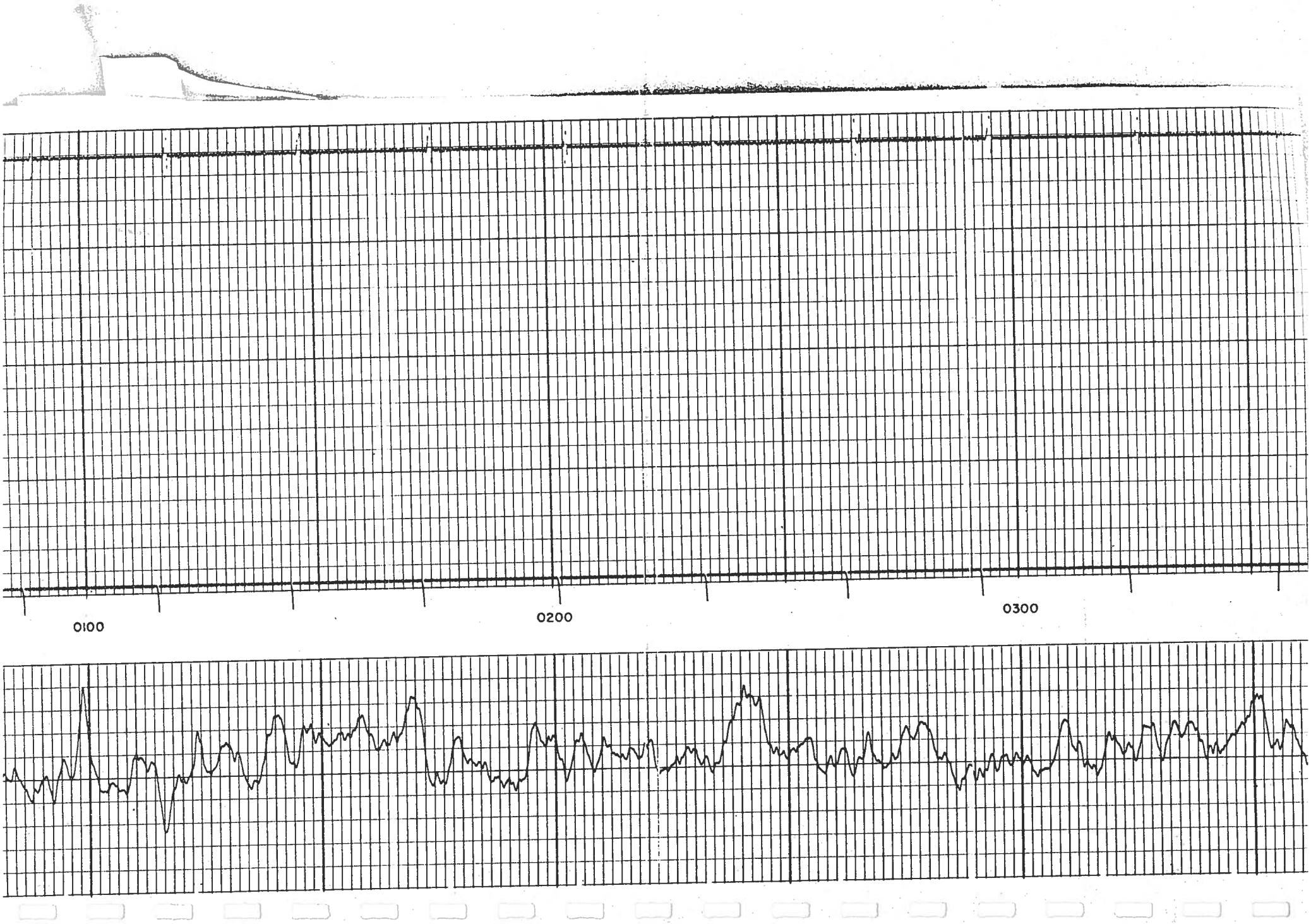
CORRECTED COLLARS

Casing Collars

0000

GAMMA RAY

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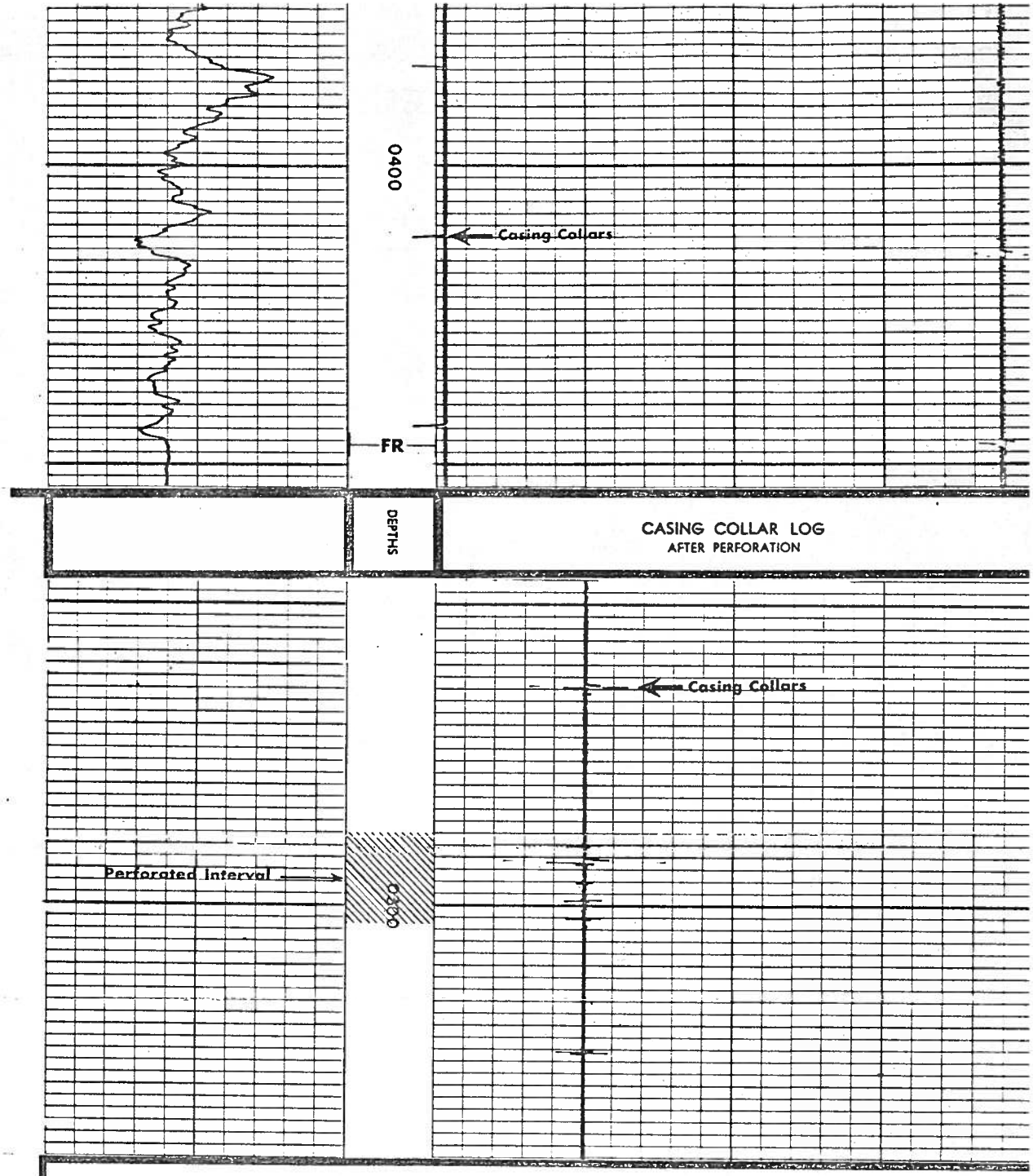


COMPANY RESEARCH COUNCIL OF ALBERTA

WELL RESEARCH JOFFRE WTH 5-5-39-26

FIELD JOFFRE PROVINCE ALBERTA

SCHLUMBERGER

SCHLUMBERGER

COMPLETION RECORD

SCHLUMBERGER OF CANADA Calgary, Alberta

FIELD RESEARCH JOFFRE WTH
WELL 12-25-38-27
COMPANY RESEARCH COUNCIL OF CANADA

COMPANY RESEARCH COUNCIL OF ALBERTA

WELL RESEARCH JOFFRE WTH
12-25-38-27

FIELD JOFFRE

PROVINCE ALBERTA

LOCATION LSD 12 Sec. 25 Twp. 38 Rge. 27W4

Other Services:

Permanent Datum CASING TOP Elev.
Log Measured From " , Ft. Above Perm. Datum

ELEV: KB
GL
CBF

SO #37262

19 JUNE 67 CAL PL

REMARKS

NOTE: COLLARS ARE RECORDED 3' DEEP
CORRECTED IN DEPTH TRACK

PREVIOUS COMPLETION INFORMATION

Depth Control Log — Yes [ ] No [X] From To
Perforated — Yes [ ] No [X]
Bridge Plug Set at
Production Packer Set at
Cement Retainer Set at

DEPTH CONTROL LOG	
	14 JUNE 67
Reading	770
Reading	0
Measured	770
h Reached	780
m Driller	760
Type	AIR
Level	-
Head Pressure	NIL
No.	2829 RD
rded By	ANDERSON
ess	TURNER

PERFORATING RECORD

Gun Type and Size	Shot Density	No. of Shots	Perforating Interval From	To

CASING RECORD

Size — Inches	Weight — Lbs.	From	To
8 5/8		SURF	TD

COLLAR LOCATION

Casing	Tubing

OTHER SERVICES

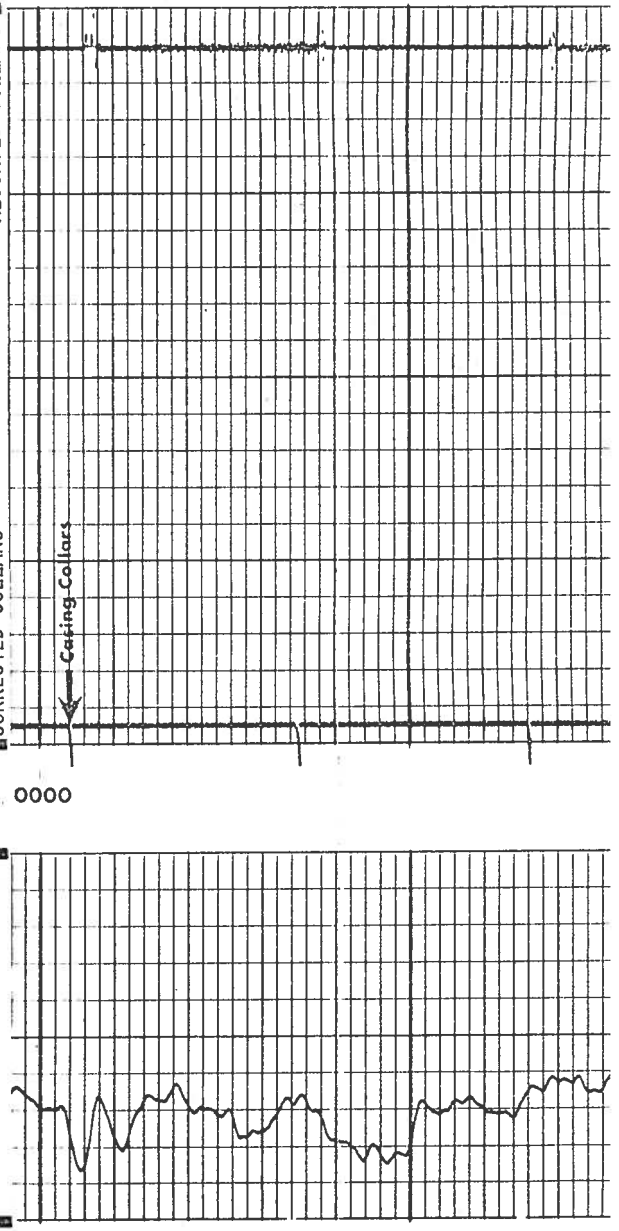
Service	Type	Size	Depth
Bridge Plug			
Production Packer			
Cement Retainer			

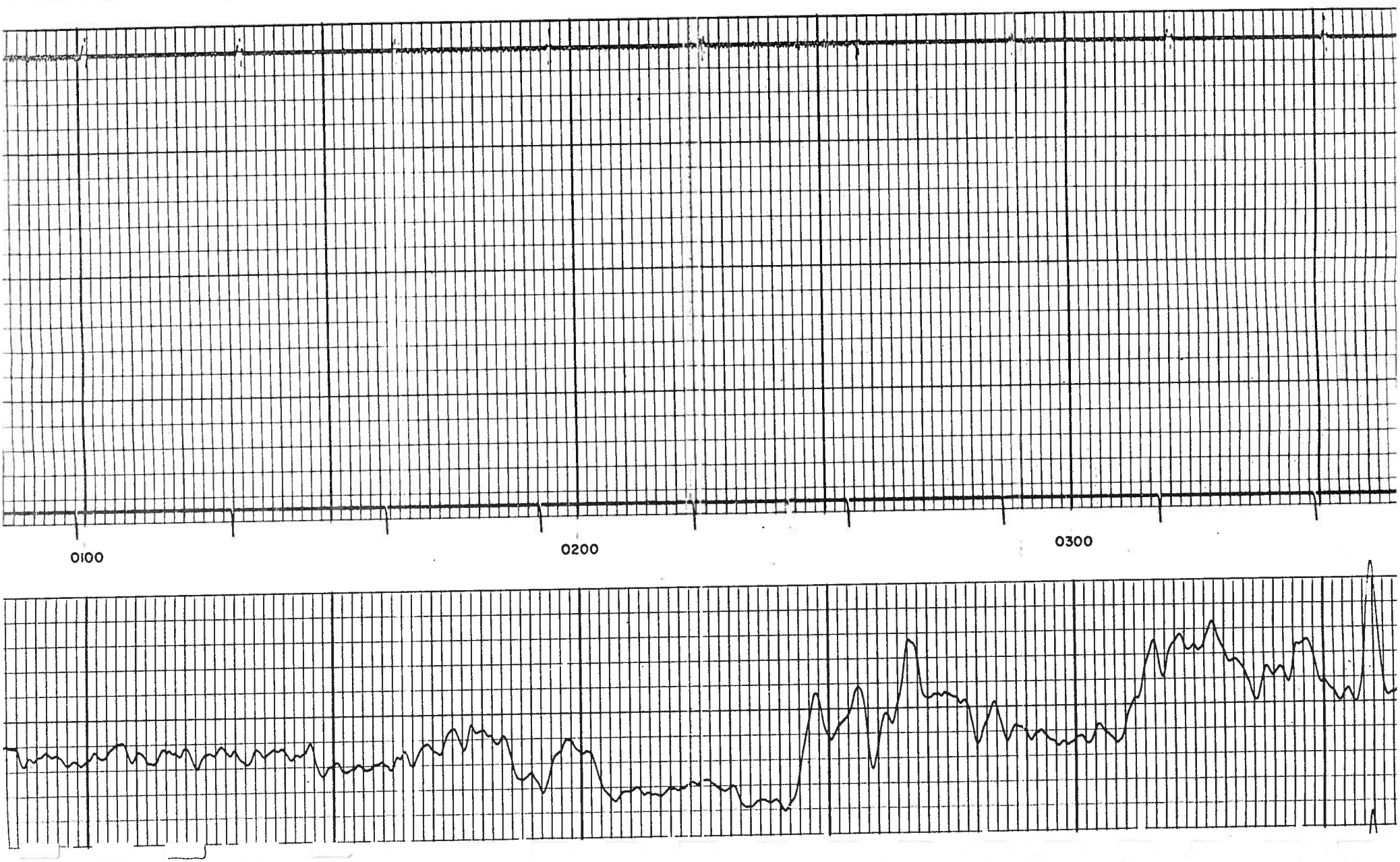
ng Bottom
ring Nipple

Junk Basket Size
Gauge Ring Number

CASING COLLAR LOG

GAMMA RAY

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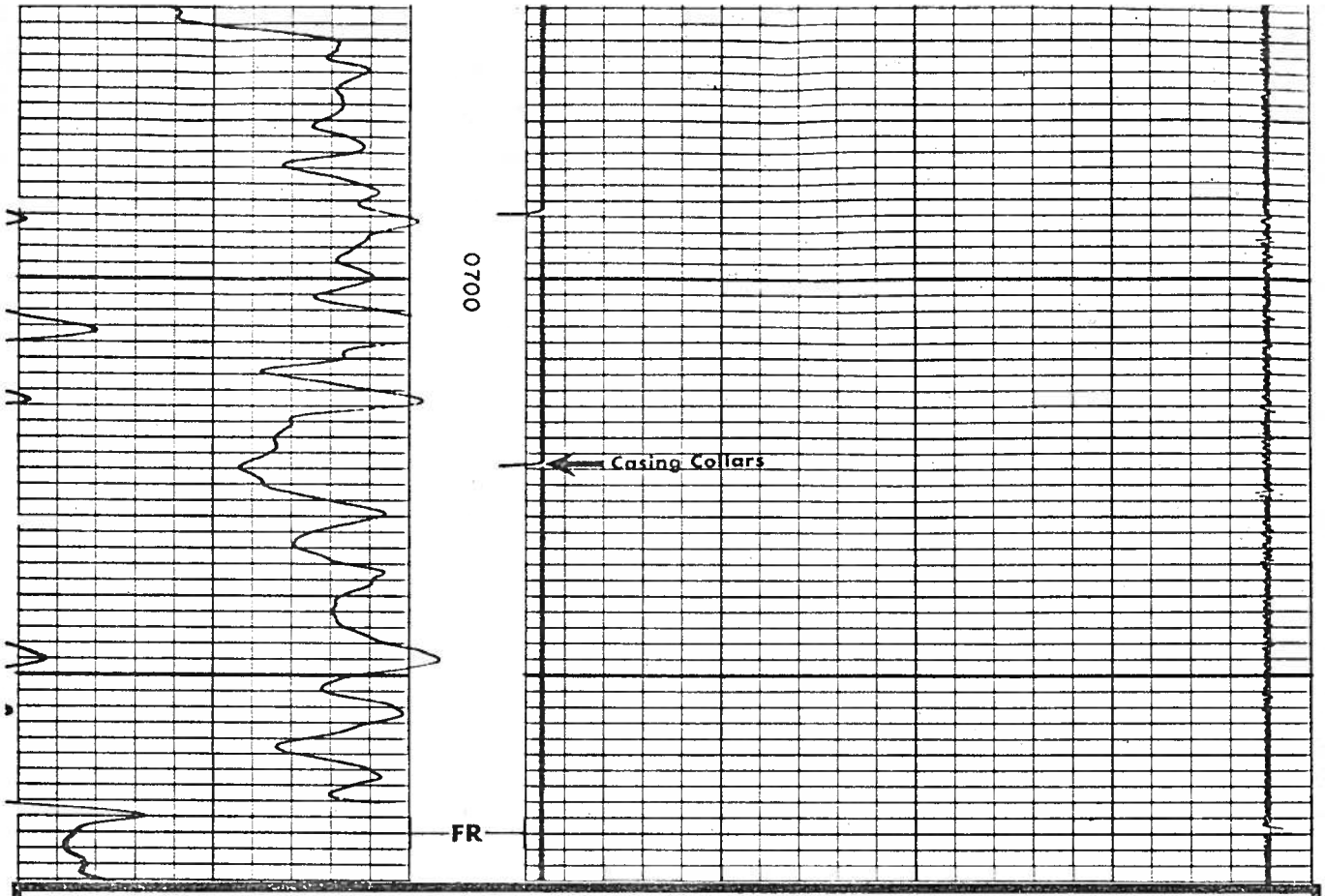

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WELL RESEARCH JOFFRE WTH 12-25-38-27

FIELD JOFFRE PROVINCE ALBERTA

SCHLUMBERGER