x. asternhauer

An Attempt to Convert an Abandoned Oil
Well to a Water Well in the Joffre
Field, Alberta
by
Wm. R. Turner





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

by

Wm. R. Turner

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.

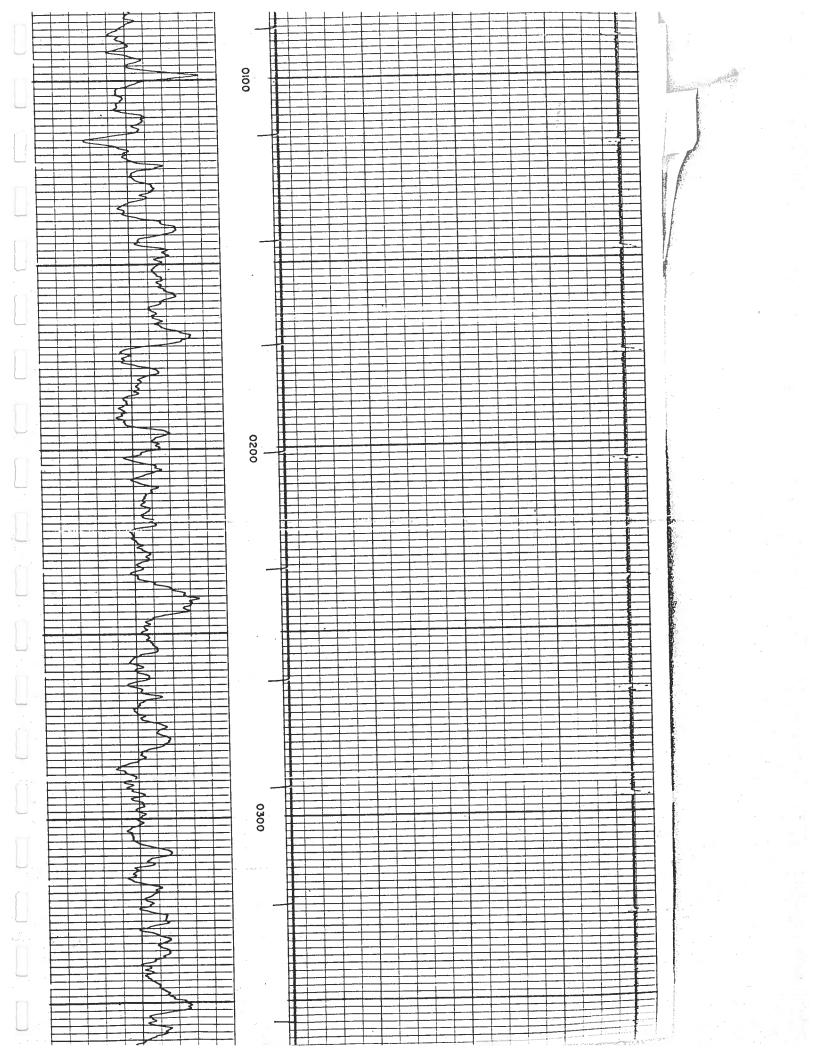
The technique proved unsuccessful in that water did not enter the well after perforating. Examination of the well two days later indicated that no water had entered the well and it was decided that the technique was not appropriate.

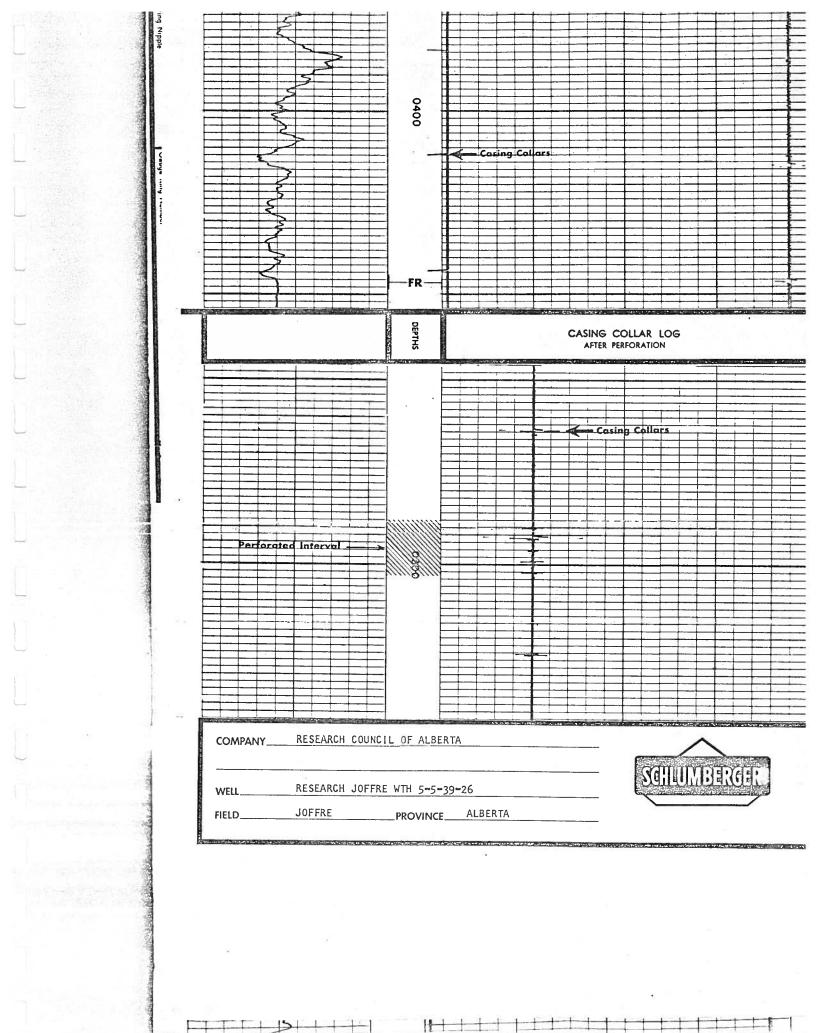
Based on an analysis of the operation, the following conclusions can be drawn:

The well failed to produce water because:

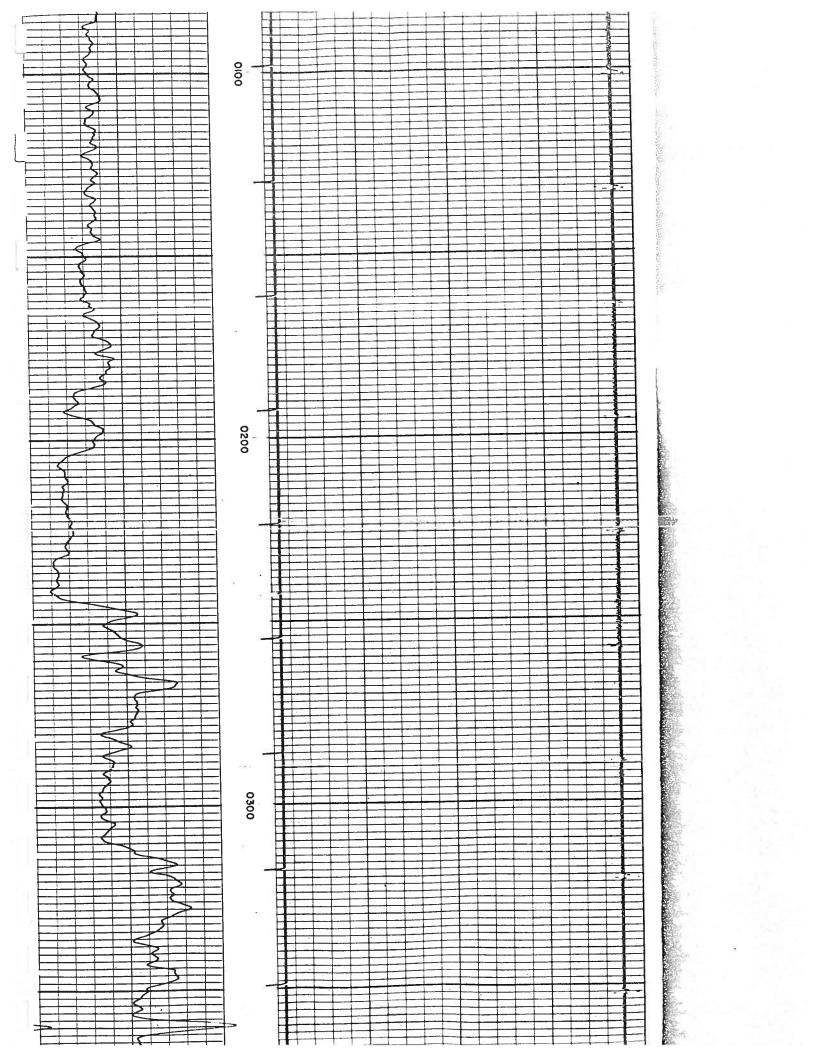
- 1. The "sands" were not saturated, or
- 2. The perforations did not penetrate the formation to a point at which water could flow into the well.

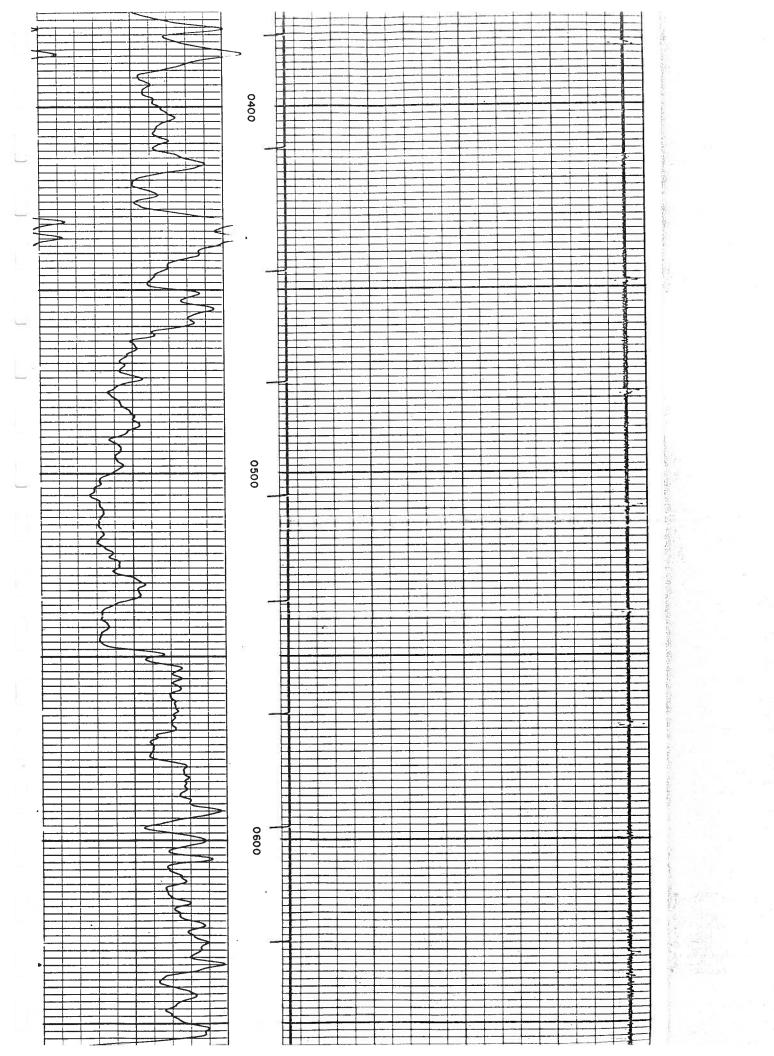
bing Bottom	COLLAR IC Casing 263 292 324	J Level I Head Pressure It No. orded By ness	Reading Reading Measured th Reached om Driller	FIELD	ALBERTA	NCIL OF	SCHLUN	
	LOCATION Tubing	NIL 2829 RD ANDERSON TURNER	4 JUNE 67 4447 00 00 4447 457 460 AIR	manent Dat Measured	PROVINCE LOCATION LSD	WELL	SCHLUMBERGER COMPANY	
Junk Basket Size Gauge Ring Number	Service Bridge Plug Production Packer Cement Retainer	Size — Inches 13	Gun Type and Size 3 3/811 HYPER JET	DP OF CASING	JOFFRE ALBERTA S. Sec. 5	RESEARCH JOFFRE	RESEARCH C	
	OTHER SS	CASING R Weight — Lbs.	Shot No. of Density Shots 1/91 20	Ft. Above Perm. Datum PERFORATING RECORD	Twp. 39 Rge. 2	OFFRE WTH	ESEARCH COUNCIL OF ALBER	
	SERVICES Size	RECORD From SURF		Datum GL GR CBF CBF	26W4 Other Services:		RESEARCH COUNCIL OF ALBERTA	JEREKUS PAN
	19 JUNE 67 CAL PL	1.0	Perforating Interval To 88 303		95			
REMARKS				1		S0 #11714		
	FOUR COMPLETION INFOR Landral Ling — Yes reived — Yes ge Plug Set at uction Packer Set at ent Retainer Set at	No X	Ţ _o	NOTE;	COLLARS RECC CORRECTED IN	DRDED 3º DE N. DEPTH. TRA	EP CK	
	GAMMA RAY				CASING COLLAR	LOG		
100000000000000000000000000000000000000		Visit province and the second	CORREC	TED COLLARS			RECÓRDED COLL	LARS
			ŏ					
				Gasing Collar				
							-	





	Head Pressure	Level	DEPTY							RESEARCH JOFFRE WTH 12-25-38-27 COMPANY RESEARCH COUNCIL OF CANADA											- Children	CHILD												
						Tubing	IOCATION		TURNER	ANDERSON	NIL	1	AIR	760	780		770	14 JUNE 67	TROL LOG		Log Measured From	7	rso	IOCATION	PROVINCE .	FIELD			WELL		COMPANY		一世の現代を記録を記録を記録を記録しませた。	CHILDELLE
Junk Basket Size Gauge Ring Number			300	Production Packer	Bridge Plug	Service			l,	Size — Inches						azic Dup	Gun Type		AND DESCRIPTION OF THE PERSON	gradin a	CASING TOP	CACINO TAN	0 12 Sec. 25		ALBERTA	JOFFRE	12-25-38-27		RESEARCH JOFFRE WIH		KESEAKUH COUNCIL	ם ביים	DAMES .	- Contraction
				•		Туре	OTHER		The state of the s	Weight — Lbs.		54	Action to the second			+	Shot		PERFORATII		Elev	l	Twp. 38 Rge.						FFRE WTH		Ş	2	रक्रमण्डा हा व्यवस्था हो।	いて、日本のことでくというできている。
		Size	SERVICES		3071	From	RECOR			+	+	+	No. of		PERFORATING RECORD		rm. Datum GL	_	27W4	Othe						1000	ALBEKIA	D T A	MON G	China Ani				
						Depth			-	10.0	-					Tiom I	rating Inter		And in the Contraction of the Co	CBF	କ 🌡			Other Services:			22	,				# # # # # # # # # # # # # # # # # # #	अस्तर अंतिक	している
	ABYC		1 a pt		9	Ju	NE (57	CÀL	. ?	L	ļ.	m, "pari)		A-0-2		verlai	_		100	e care le		r shirts.			ninaid.	50.00	97-(a)	\$0	#3	726	2		1000
REM	Dept Ferfo	/IOUS th Corporated pe Plus suction	ntrol g Set	Log	=	Yes Yes		No No	×		omi			To	-		- 100 				NOTE	:	-C0	LL RR	ARS ECT	AR ED	E R	ECO DEP	RDE	D 3	CK	EEP		
REM	Dept Ferfo Bridg	h Cor orated ge Plus	Packetaine	Log at er Se	t at	Yes		No	×]	om.			Te	The state of the s					<u> </u>	NOTE		CO	ORR	ECT	AR	i N	DEP	Tri	ID 3	OCK .	DEEP		5
REM	Dept Ferfo Bridg	h Cor prated ge Plus uction	Packetaine	at er Set	t at	Yes		No	×]	Offi			Te	Paradinary and County						NOTE		CO	ORR	ECT	ED_	i N	DEP	Tri	TRA	SI D	DEEP		
REM	Dept Ferfo Bridg	h Cor prated ge Plus uction	Packetaine	at er Set	t at	Yes		No	×]	Offi		00000		State of the state	CO	RRE			COL.	LAR	S	CO	ORR	ECT	ED_	i N	DEP	Tri	TRA	- CK	CORI	CO	
REM	Dept Ferfo Bridg	h Cor prated ge Plus uction	Packetaine	at er Set	t at	Yes		No	×]	Offi		0000		State of the state	CO	RREI			COL.	LAR	S	CO	ORR	ECT	ED_	i N	DEP	Tri	TRA	- CK		CO	
REM	Dept Ferfo Bridg	h Cor prated ge Plus uction	Packetaine	at er Set	t at	Yes		No	×]	omi vicini di se con di se		00000		State of the state	CO	RREL			COL.	LAR	S	CO	ORR	ECT	ED_	i N	DEP	Tri	D 3	- CK		CO	
REM	Dept Ferfo Bridg	h Cor prated ge Plus uction	Packetaine	at er Set	t at	Yes		No	×]	Om.		0000		State of the state	CO	RRE			COL.	LAR	S	CO	ORR	ECT	ED_	i N	DEP	Tri	D 3	- CK		CO	
REM	Dept Ferfo Bridg	h Cor prated ge Plus uction	Packetaine	at er Set	t at	Yes		No	×]	- Contraction of the Contraction		0000		State of the state	CCO	RRE			COL.	LAR	S	CO	ORR	ECT	ED_	i N	DEP	Tri	D 3	- CK		CO	
REM	Dept Ferfo Bridg	h Cor prated ge Plus uction	Packetaine	at er Set	t at	Yes		No	×]	omi vota in the control of the contr		0000		State of the state	CCO	RREI			COL.	LAR	S	CO	ORR	ECT	ED_	i N	DEP	Tri	TRA	- CK		CO	
REM	Dept Ferfo Bridg	h Cor prated ge Plus uction	Packetaine	at er Set	t at	Yes		No	×]	Description of the second of t		0000		State of the state	CCO	RREU			COL.	LAR	S	CO	ORR	ECT	ED_	i N	DEP	Tri	D 3	- CK		CO	





		0700									
			Casin	g Colar							
.COMPANY_	RESEARCH COUN	FR-CIL OF ALBE	RTA			and the second		^			
WELL	RESEARCH JOF		25 - 38 - 27 CE ALBERTA		 ****	SCH	LUA	Æ	ER	gi	

-d