ENGINEERED PRODUCTION LOGGING

Schlumberger

COMPANY ARCO OIL AND GAS

WELL COLUMBIA COUNTY 13-1 RD #1

FIELD MIST

COUNTY COLUMBIA STATE CALIFORNIA

API Serial No.
Location:

Sec. 1 Twp. 6 NORTH Rge. 5 WEST

SERVICES RUN:
TRACER
GR

Permanent Datum: GROUND LEVEL Elev.: 1163.2'
Log Measured From: KB , 11.4 Ft. Above Perm. Datum
Drilling Measured From: KB , 11.4 Ft. Above Perm. Datum

ELEVATION:
KB 1174.6'
DF
GL 1163.2'

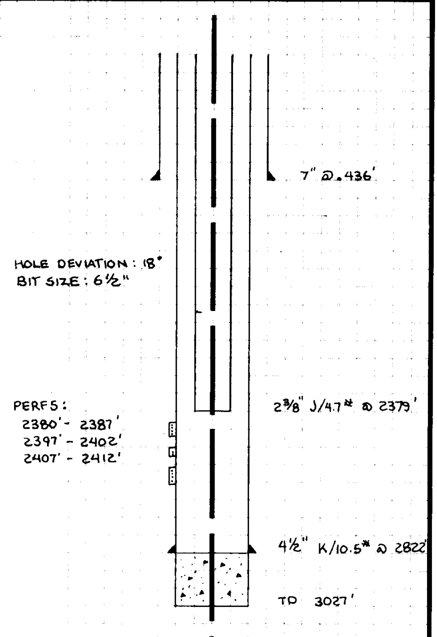
Date	9-17-86	Equipment	8128
Run No.	ONE	Location	SACRAMENTO
Depth—Driller	2822'	Recorded By	BLAZE
Depth—Schl.	2810'	Witness By Mr.	ANDERSON
Btm. Log Interval	2546'		
Top Log Interval	150'		

FOLD HERE

The well name, location and borehole reference data were furnished by the customer.

WELL SKETCH

Schlumberger Depths | Driller Depths



HOLE DEVIATION : 18°
BIT SIZE : 6½"

PERFS:
2380' - 2387'
2397' - 2402'
2407' - 2412'

Depths of these records relate to: ☐ Schlumberger line measurements
☒ Correlated by CCL to Radioactivity Log Measurements

Indicate: Hole deviation in production zone
Open hole diameter
Diameter and weight of casing and tubing
Position & nature of Perforations (SC, Capsules, etc.)

OBJECTIVE:

TO INSPECT WELL 13-1 RD #1 FOR LEAKS IN THE CASING WHICH WOULD LEAD TO INJECTION FLUID ENTERING A FRESH WATER SAND.

TECHNIQUE:

1) SELF METHOD
2) VELOCITY SHOTS

NOTE: FLUID PUMPED IN AT A CONSTANT RATE DURING THE LOGGING OPERATION

INTERPRETATION:

- WATER WAS PUMPED AT A ~~CONSTANT RATE~~ OF 790 BB/D. VARIED 288 TO 759 BWPD.
- USING THE SELF METHOD, A TUBING LEAK AT 2350' WAS DISCOVERED. 711 BBL/D FLUID WAS LEAVING THE TUBING AT 2350', WHILE 79 BBL/D EXITED THROUGH THE TUBING TAIL.
- THE 711 BBL/D FLUID LEAVING THE TUBING AT 2350', WAS ENTERING THE FORMATION THROUGH THE PERFORATIONS AND MIGRATING VERTICALLY THROUGH CEMENT CHANNELS TO 2340'.
- THE REMAINING 79 BBL/D FLUID WAS EXITING THE TUBING TAIL AND ENTERING THE FORMATION THROUGH PERFORATIONS FROM 2402' TO 2397'.

S.O. No. ____________ By: BLAZE

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees: These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule.

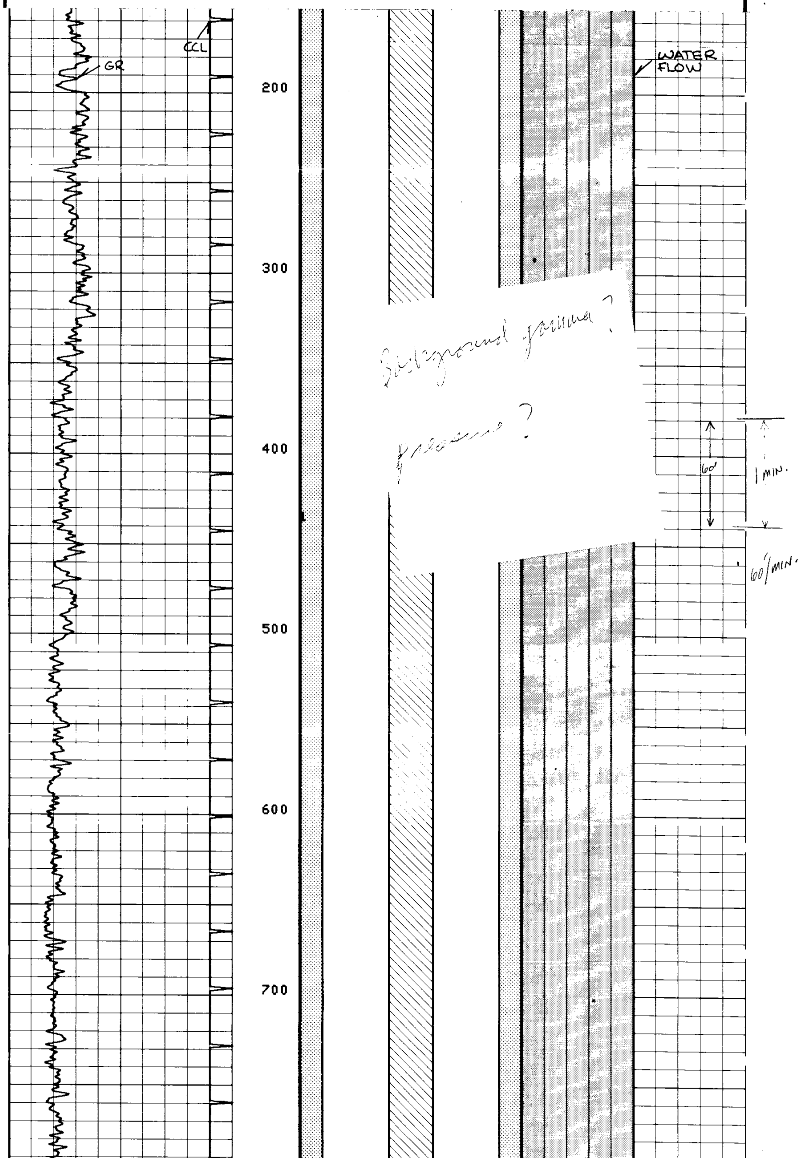
WELL SKETCH LISTING

ITEM		CATEGORY	DESCRIPTION	TOP DEPTH	BOT DEPTH
1		CASING #1	7" CASING	0.0 F	436.0 F
2	*	TUBING #1	2 3/8" J/4.7# TUBING	0.0 F	2376.0 F
3		PERFOR	PERFS 4 SPF	2380.0 F	2387.0 F
4		PERFOR	PERFS 4 SPF	2397.0 F	2402.0 F
5		PERFOR	PERFS 4 SPF	2407.0 F	2412.0 F
6		CASING #2	4 1/2" K/10.5# CASING	0.0 F	2822.0 F
7		PLUG	CEMENT PLIG 2822'-3027	2822.0 F	3027.0 F
8		BITSIZ #1	BIT SIZE 6 1/2"	0.0 F	3027.0 F

* = ITEM WITH SMALLEST I.D. IN WELL

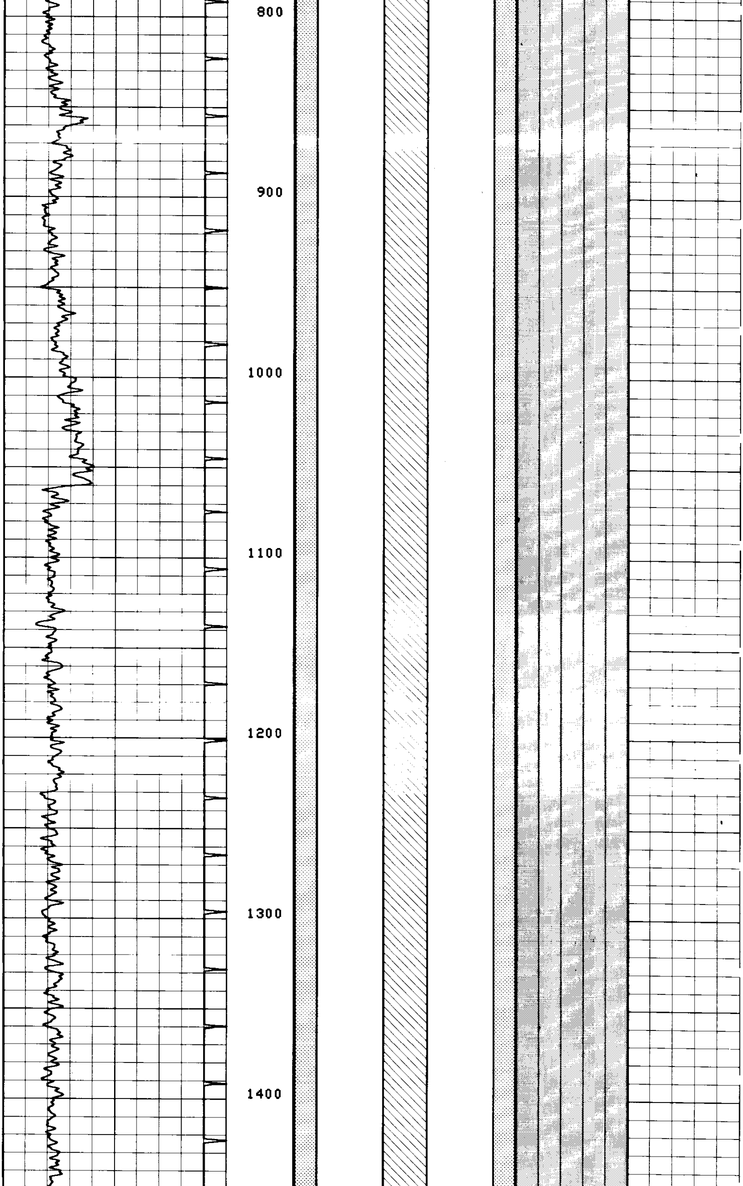
ACCL			
-18.00	2.0000		
GR (GAPI)		WATQ(BB/D)	
0.0	100.00	0.0	1580.00

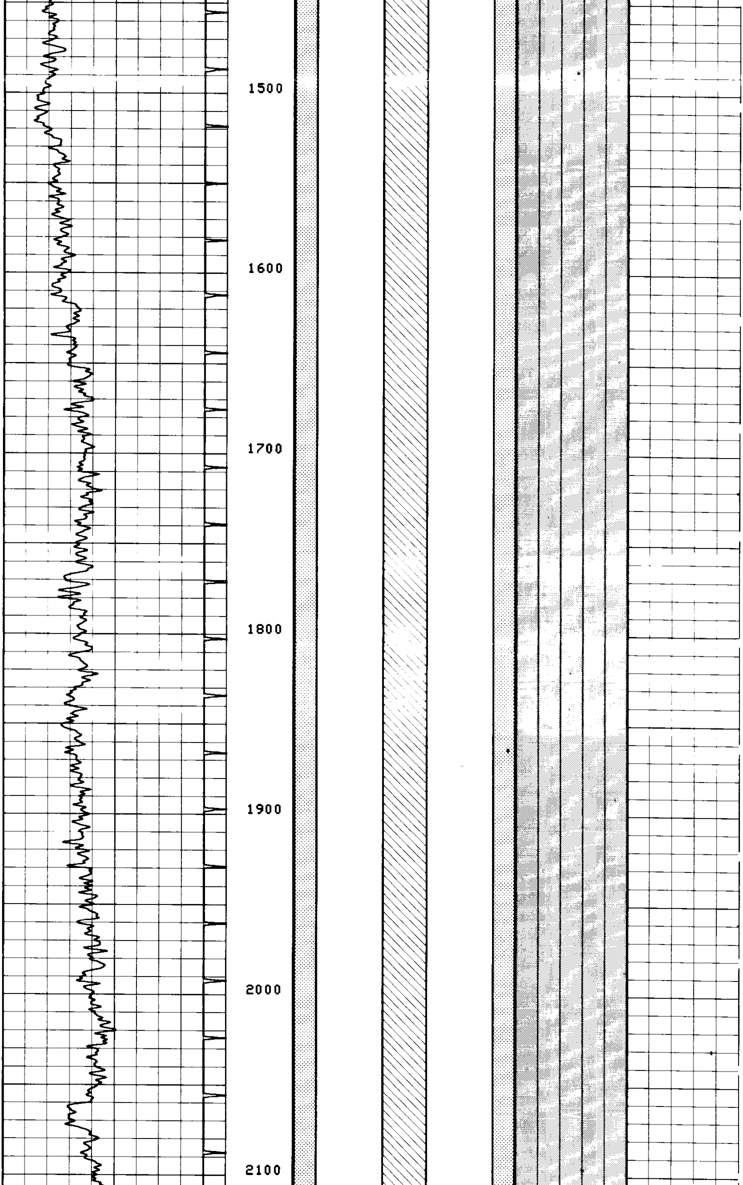
CP 28.457 FILE 1 18-SEP-86 10:03
DATA ACQUIRED NA

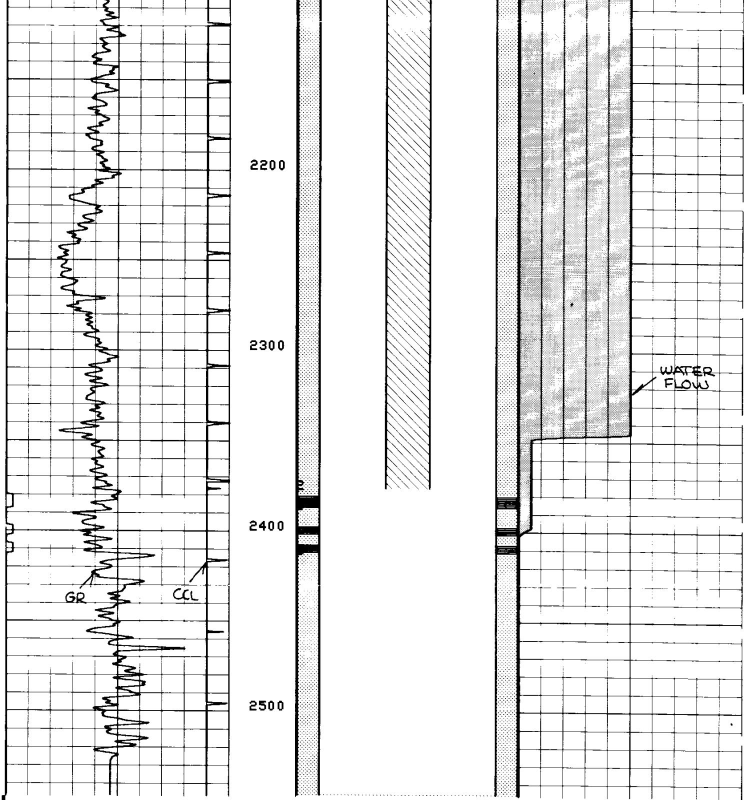


Background gamma ?

pressure ?







CP 28.457 FILE 1 18-SEP-86 10:09
DATA ACQUIRED NA

ACCL
-18.00 2.0000
GR (GAPI)
0.0 100.00

WATQ(BB/D)
0.0 500.00

SENSOR MEASURE POINT TO TOOL ZERO

GRTE	8.5	FEET	GR	14.1	FEET
UEI	11.1	FEET	LEI	10.3	FEET
EXP1	0.0	FEET	GRSG	1.2	FEET
EXP3	0.0	FEET	EXP2	0.0	FEET
TENS	-5.0	FEET	EXT	0.0	FEET
CCL	23.0	FEET	CVEL	0.0	FEET

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT

```
QIOP AUTO                              TCSH 0.0          IN
VPCF .830000                           FDSH 0.0          G/C3
NTHR -10.0000     F/MN                 TIRA .500000
FCHD CSID                              PTHR 10.0000      F/MN
BS   8.00000      IN                   BHS  CASE
PP   NORM                              DD   0.0          F

                       TAPE NOT MADE
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BEFORE + AFTER GR
LOGS SHOWN

Track 1		Track 2	
		OHDI(IN)	
		8.0844	-8.084
		OHDI(IN)	
		-8.084	8.0844
		LEF1	
		1.0106	-1.011
		RIG1	
		-1.011	1.0106
		LEF2	
		1.0106	-1.011
		RIG2	
		-1.011	1.0106
GR;10 (GAPI)		LEF3	
0.0	500.00	1.0106	-1.011
ACCL;1		RIG3	
-18.00	2.0000	-1.011	1.0106
GR;1 (GAPI)		ITNO	
0.0	500.00	0.0	1.0000

SELF METHOD

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CP 28.457          FILE     0        18-SEP-86  10:59
                   DATA ACQUIRED          NA
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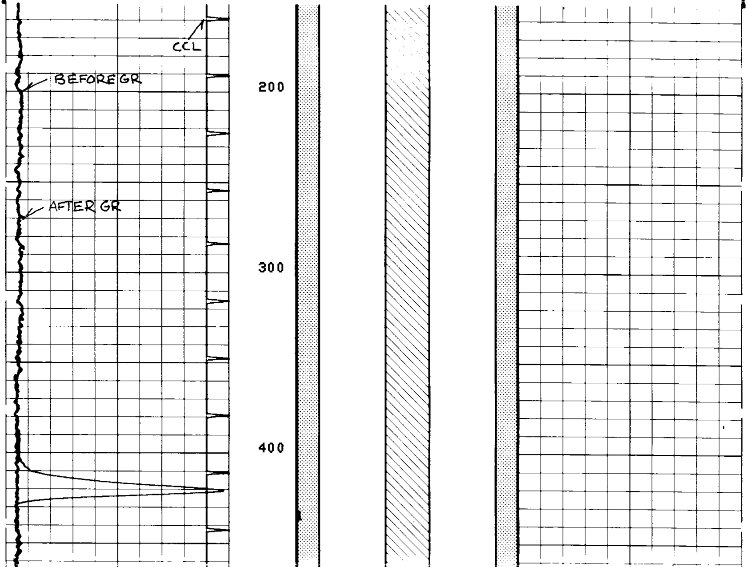
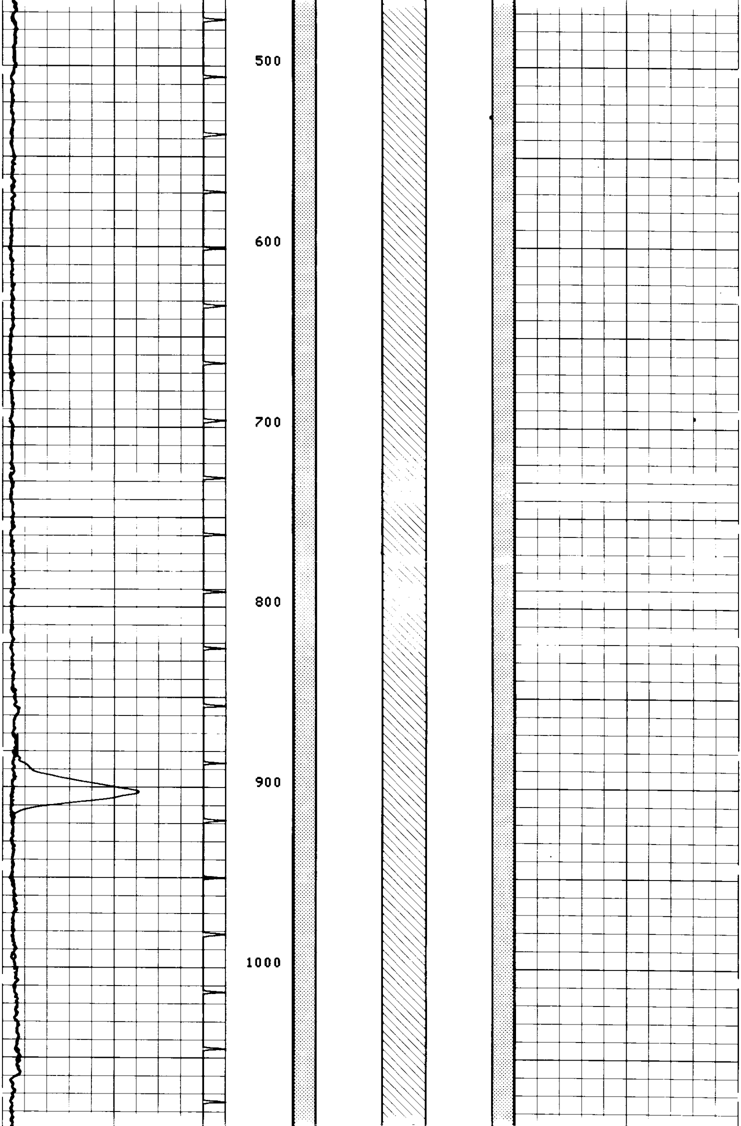
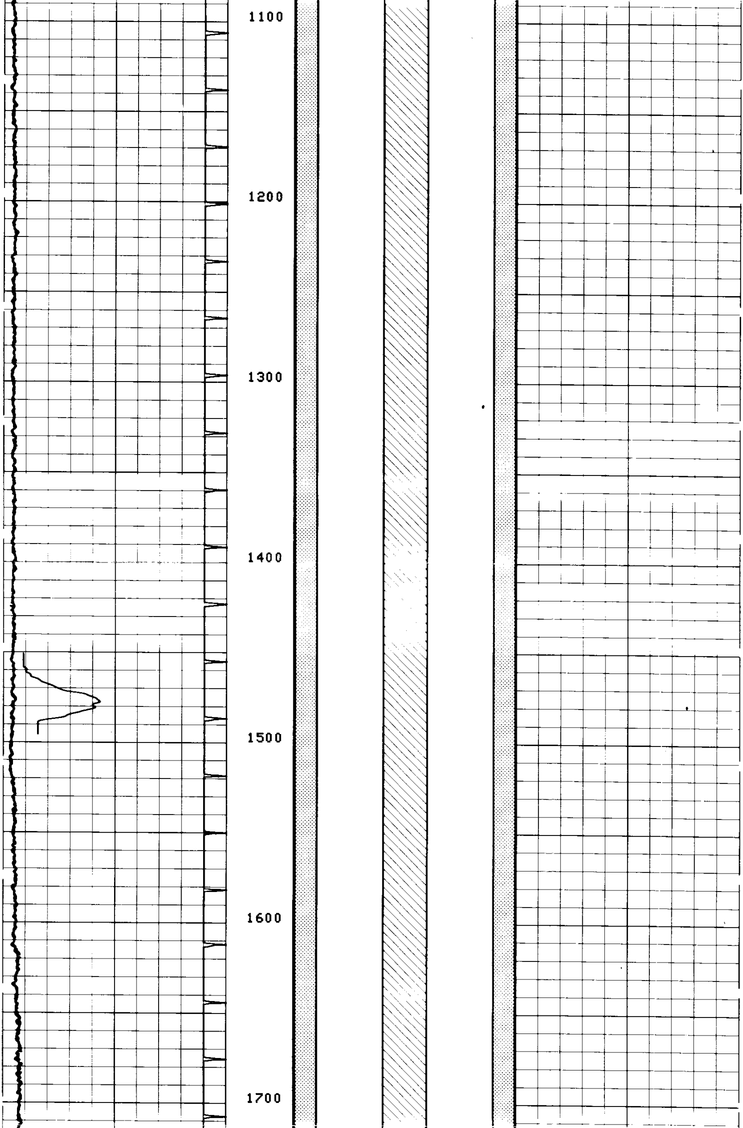
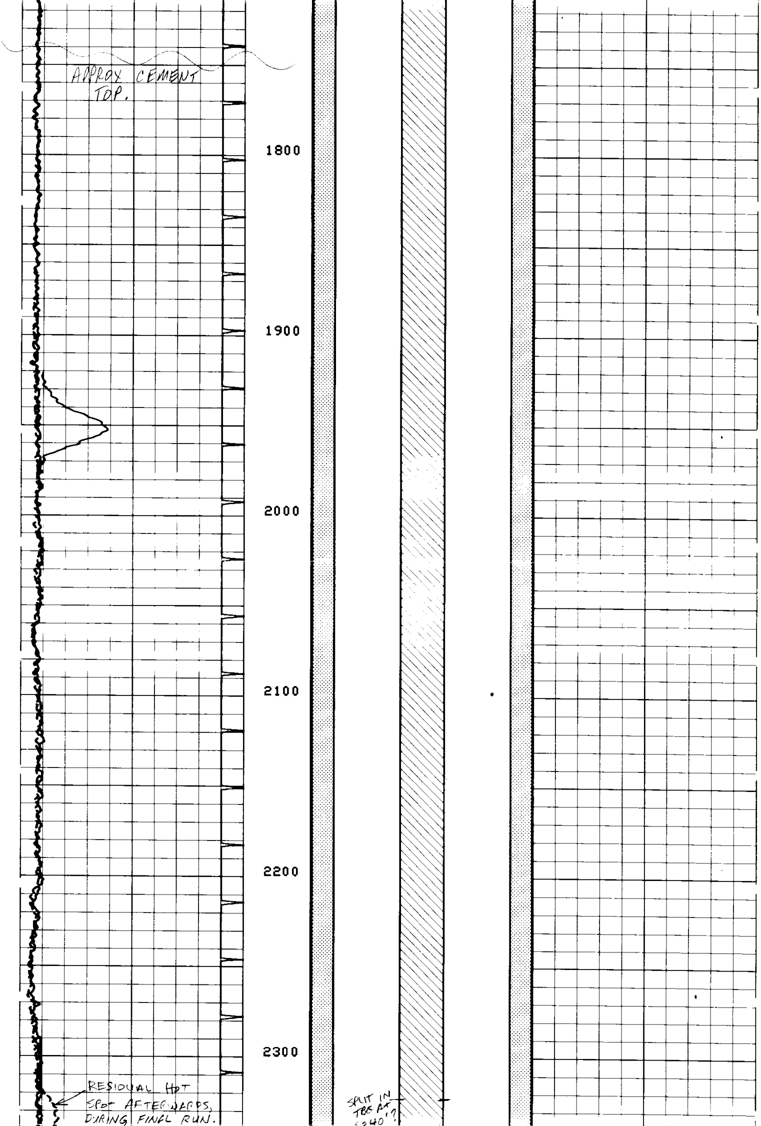




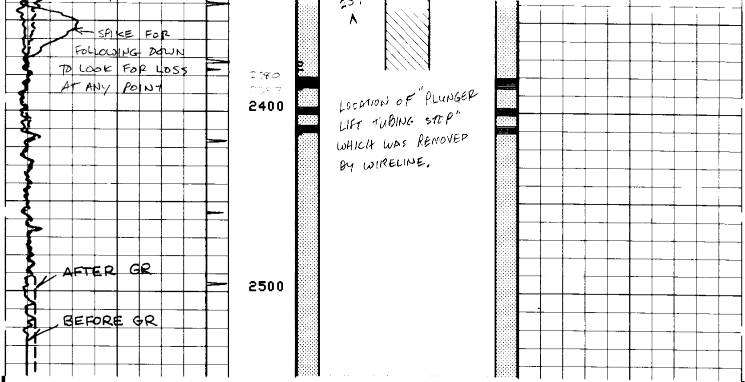




APPROX CEMENT TOP.

RESIDUAL HOT SPOT AFTERWARDS, DURING FINAL RUN.

SPLIT IN TBG AT 2340'?



CP 28.457 FILE 0 18-SEP-86 10:51 SELF METHOD

DATA ACQUIRED NA

GR;10 (GAPI)	
0.0	500.00
ACCL;1	
-18.00	2.0000
GR;1 (GAPI)	
0.0	500.00

SENSOR MEASURE POINT TO TOOL ZERO

GRTE	8.5	FEET	GR	14.1	FEET
UEI	11.1	FEET	LEI	10.3	FEET
EXP1	0.0	FEET	GRSG	1.2	FEET
EXP3	0.0	FEET	EXP2	0.0	FEET
TENS	-5.0	FEET	EXT	0.0	FEET
CCL	23.0	FEET	CVEL	0.0	FEET

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
QIOP	FLOW		TCSH	0.0	IN
VPCF	.830000		FDSH	0.0	G/C3
NTHR	-10.0000	F/MN	TIRA	.500000	
FCHD	CSID		PTHR	10.0000	F/MN
BS	8.00000	IN	BHS	CASE	
PP	NORM		DO	0.0	F

TAPE NOT MADE

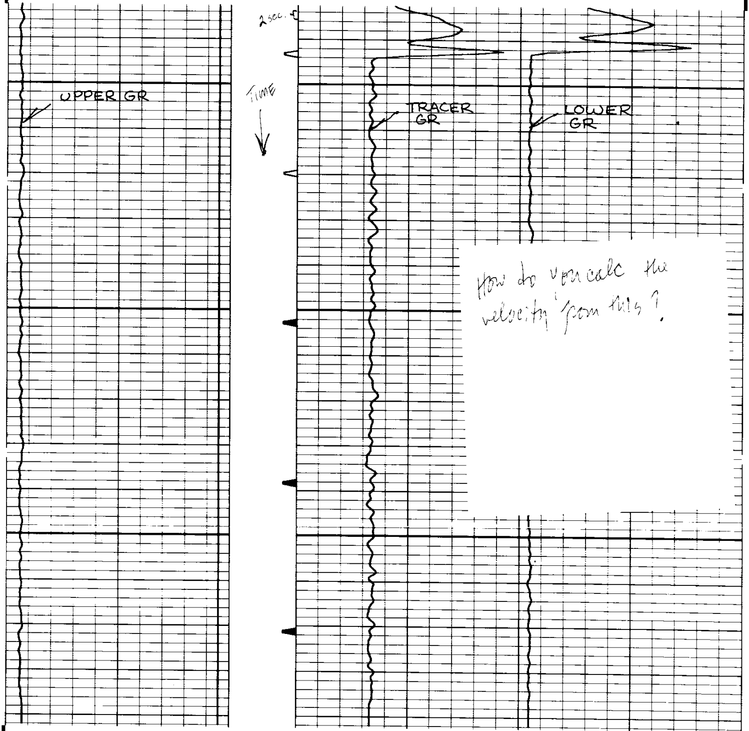
REMARKS:

TRACER EJECTOR DEPTH AT 139'. 790 bbl/day

CCL -19.00 1.0000 GR (GAPI) 0.0 500.00		GRTE(GAPI) 0.0 500.00	GRSG(GAPI) 0.0 500.00

VELOCITY SHOT

CP 28.457 FILE 3 18-SEP-86 10:05
DATA ACQUIRED 17-SEP-86 12:25



How do you calc the velocity from this?

CP 28.457 FILE 3 18-SEP-86 10:05
DATA ACQUIRED 17-SEP-86 12:21

CCL -19.00 1.0000 GR (GAPI) 0.0 500.00		GRTE(GAPI) 0.0 500.00	GRSG(GAPI) 0.0 500.00

SENSOR MEASURE POINT TO TOOL ZERO

GRTE	8.5	FEET	GR	14.1	FEET
UEI	11.1	FEET	LEI	10.3	FEET
EXP1	0.0	FEET	GRSG	1.2	FEET
EXP3	0.0	FEET	EXP2	0.0	FEET
TENS	-5.0	FEET	EXT	0.0	FEET
CCL	23.0	FEET	CVEL	0.0	FEET

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
QIOP	FLOW		TCSH	0.0	IN
VPCF	.830000		FDSH	0.0	G/C3
NTHR	-10.0000	F/MN	TIRA	.500000	
FCHD	CSID		PTHR	10.0000	F/MN
BS	8.00000	IN	BHS	CASE	
PP	OFF		DO	0.0	F

REMARKS:

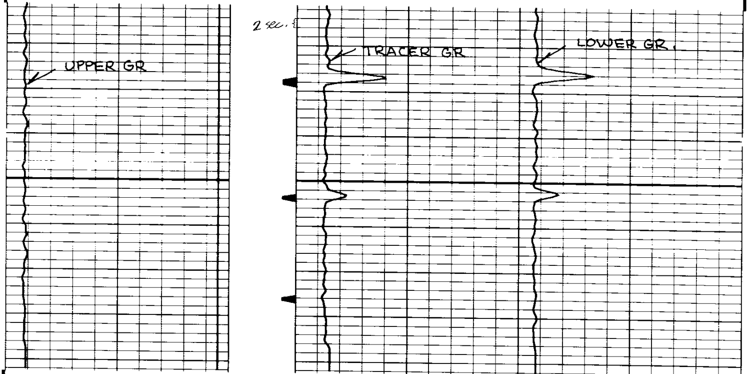
TRACER EJECTOR DEPTH AT 2330 750 BB/Day

CP 28.457 FILE 12 18-SEP-86 10:24
DATA ACQUIRED 17-SEP-86 13:59

CCL -19.00 1.0000 GR (GAPI) 0.0 500.00		GRTE(GAPI) 0.0 500.00	GRSG(GAPI) 0.0 500.00

VELOCITY SHOT

CP 28.457 FILE 12 18-SEP-86 10:14
DATA ACQUIRED 17-SEP-86 13:59



CP 28.457 FILE 12 18-SEP-86 10:14
DATA ACQUIRED 17-SEP-86 13:57

CCL -19.00 1.0000 GR (GAPI) 0.0 500.00		GRTE(GAPI) 0.0 500.00	GRSG(GAPI) 0.0 500.00

SENSOR MEASURE POINT TO TOOL ZERO

GRTE	8.5	FEET	GR	14.1	FEET
UEI	11.1	FEET	LEI	10.3	FEET
EXP1	0.0	FEET	GRSG	1.2	FEET
EXP3	0.0	FEET	EXP2	0.0	FEET
TENS	-5.0	FEET	EXT	0.0	FEET
CCL	23.0	FEET	CVEL	0.0	FEET

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
QIOP	FLOW		TCSH	0.0	IN
VPCF	.830000		FDSH	0.0	G/C3
NTHR	-10.0000	F/MN	TIRA	.500000	
FCHD	CSID		PTHR	10.0000	F/MN
BS	8.00000	IN	BHS	CASE	
PP	OFF		DO	0.0	F

REMARKS:

TRACER EJECTOR DEPTH AT 2364'. 79 BBl/day (BELOW "SPLIT" IN TUBING)

CCL		GRTE(GAPI	
-19.00	1.0000		
GR (GAPI)			
0.0	500.00	0.0	.00

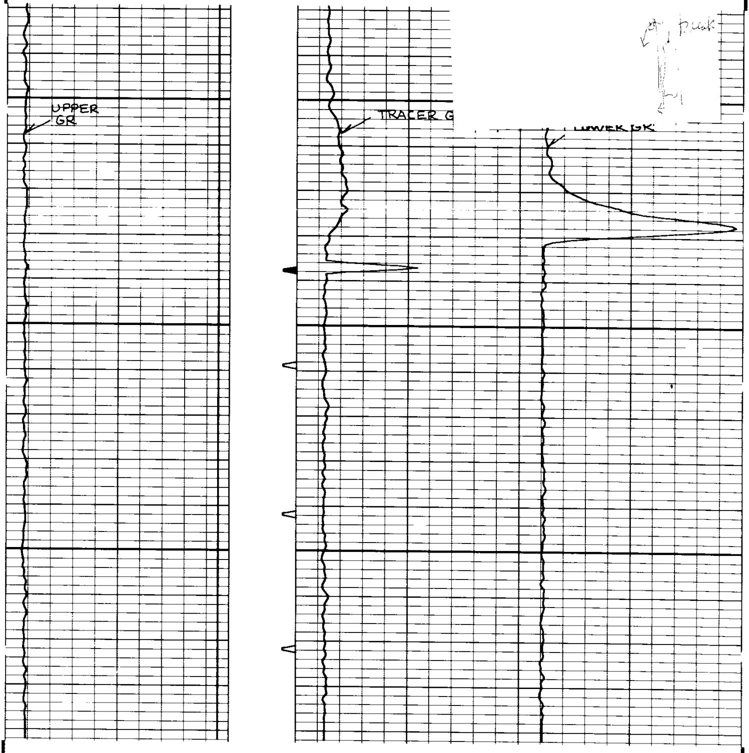
only to velocity?

is tool blocking flow.

VELOCITY SHOTS

CP 28.457 FILE 11 18-SEP-8

DATA ACQUIRED 17-SEP-8



CP 28.457 FILE 11 18-SEP-86 10:11
DATA ACQUIRED 17-SEP-86 13:52

CCL -19.00 1.0000 GR (GAPI) 0.0 500.00		GRTE(GAPI) 0.0 500.00	GRSG(GAPI) 0.0 500.00

SENSOR MEASURE POINT TO TOOL ZERO

GRTE	8.5	FEET	GR	14.1	FEET
UEI	11.1	FEET	LEI	10.3	FEET
EXP1	0.0	FEET	GRSG	1.2	FEET
EXP3	0.0	FEET	EXP2	0.0	FEET
TENS	-5.0	FEET	EXT	0.0	FEET
CCL	23.0	FEET	CVEL	0.0	FEET

PARAMETERS

NAME	VALUE	UNIT	NAME	VALUE	UNIT
QIDP	FLOW		TCSH	0.0	IN
VPCF	.830000		FDSH	0.0	G/C3
NTHR	-10.0000	F/MN	TIRA	.500000	
FCHD	CSID		PTHR	10.0000	F/MN
BS	8.00000	IN	BHS	CASE	
PP	OFF		DO	0.0	F