
INTEROFFICE CORRESPONDENCE

date November 27, 1979
to J. H. Ramsthaler
from M. R. Dolenc *MRD*
subject FRACTURE TREATMENT OF RRGP-5 - MRD-27-79

The Fracture Treatment of RRGP-5 took place on Monday, November 12, 1979. A total of 7620 barrels of guar- & polymer-treated fluid with 431,000 pounds of sand (Oklahoma #1 & 20-40 mesh) was injected through tubing into the open-hole interval from 4582' to 4800'.

A new 7" liner was set in RRGP-5 from 3158' to 4582' by RGI. This placed cemented-liner across a highly-fractured section from 4550-60', the targeted section to be stimulated. Sand was intentionally placed on the bottom of the well from 4800' to TD, to limit the fracture height.

Prior to stimulating, a retrievable packer was set in the liner to 3270' with a 4 1/2" tubing (frac string) run through the packer to a depth of 3274'. The pumping of the frac lasted from 11:00 a.m. to 2:15 p.m. with some minor stops due to leaks during the startup. A plot of pressure versus time is presented in the enclosed figure. Daily drilling reports are also appended.

The frac treatment itself was very successful. The figure of pressure vs time allows for one to readily interpret rock breakdowns (44 min., 65 min. & 170 min.) and sand pressuring up the cracks (60 min. & 125 to 170 min). At the end of the treatment (as Super Sand and the flush were added) some problems were encountered that probably contribute to the "sanding off" that has been encountered since the frac.

Well response to the frac is detailed in DMC-03-79. In addition, UURI ran background seismic checks with five portable seismic instruments, prior to and during the frac. No seismic events were recorded that could be attributed to the frac.

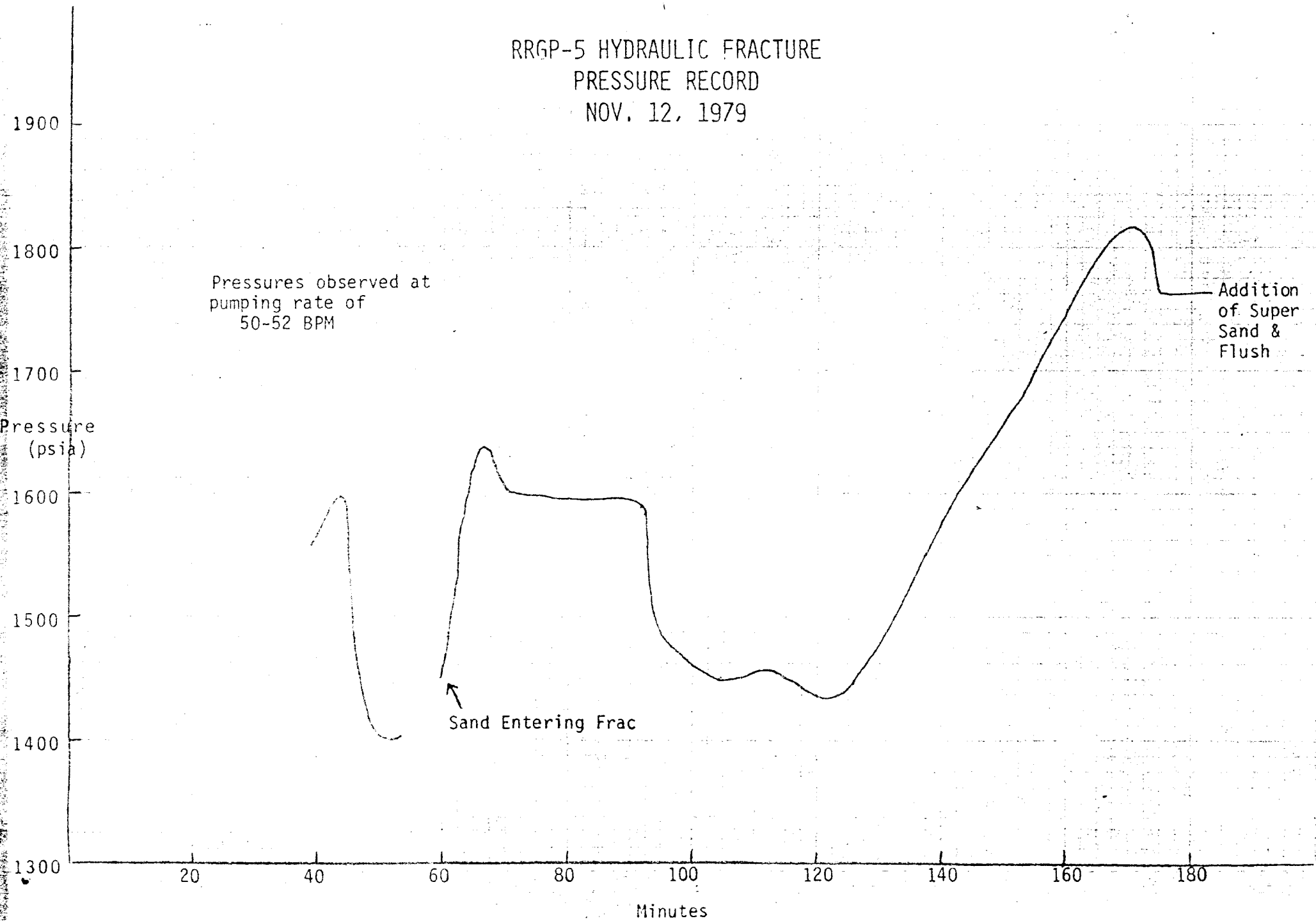
A report will be made following artesian flow testing of the well when that activity is complete.

ej.

cc: C. A. Allen K. P. McCarthy S. G. Spencer
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1212

RRGP-5 HYDRAULIC FRACTURE
PRESSURE RECORD
NOV. 12, 1979



RRGP-5 REPORTS FOR 24-Hr. PERIOD ENDING AT
6:00 A.M. (ON DATE OF REPORT)

Saturday 11/3/79

Displaced 200 barrels salt water pill to bottom of 9-5/8" liner and mixed standby kill fluid. Finished rigging up, ready to pull REDA pump. Waiting on back-up tongs and casing crew to pull pump.

Sunday 11/4/79

Unlanded pump, stripped on annular BOP, pulled and layed down pump and stinger. Pumped in 70 barrels of salt water and mixed another 70 barrels for standby. Shut down at 1:00 A.M. Sunday because Colorado Well Service relief crew did not show up.

Monday 11/5/79

Resumed operations at noon on Sunday. Began to rig up to run packer milling tool. Could not get power swivel to operate. Shut down at 6:00 P.M. Sunday, waiting on new power swivel.

Tuesday 11/6/79

Resumed operations at 7:45 A.M. Made up packer milling tool. Killed well with 50 barrels of 9.4 ppg salt water. RIH, found packer at 1284' (top of 9-5/8" liner). Milled over and freed packer. Presently POH.

Wednesday 11/7/79

POH with packer. (Had difficulty getting packer through wellhead). Killed well with 165 barrels of 9.5 ppg salt water. L. D. fishing tools and RIH with 8-1/2" bit to 4800'. Hit tight spot 4780' - 4800'. Sanded well back to 4620'. Presently POH.

Thursday 11/8/79

Finished POH with bit. Had injury accident on rig while POH. W. O. casing crew 3 hours. Rigged up and ran 7" liner. Set hanger with shoe at 4587', liner top at 3158'. Halliburton cemented liner with 280 Sx Class G cement with 1:1 Perlite, 40% silica flour, 0.5% CFR-2, 3% gel and 0.3% HR-7 (600 cu ft.). Bumped plug, reversed out approx. 20 bbls. of cement, set liner hanger packoff and POH.

REPORTS FOR 24-Hr. PERIOD ENDING AT
6:00 A.M. ON DATE OF REPORT

Friday 11/9/79 RRGP-5

Picked up 6 1/8" bit, RIH to 4480' and pressure tested casing. Well takes 2BPM at 450 psi. (Approx. 40 barrels of water were required to fill drill pipe and casing for test.) Drilled out cement and cleaned out sand to 4803'. POH

Saturday 11/10/79 RRGP-5

Finished POH. Rig went on standby at 8:00 A.M. Friday, W.O. B-J frac equipment.

Sunday 11/11/79 RRGP-5

Began rigging up frac equipment. Check well and found it dead, but fluid is standing in master valve.

Monday 11/12/79 RRGP-5

Rigging up frac equipment. Checked to see that well was dead before running frac string. Well flowed weakly. Mixed 155 barrels of 9.6 ppg salt water and pumped in 70 barrels to kill well. Rig went off standby at 10:00 P.M. Sunday. Picked up 7" packer and 4 1/2" frac string and RIH to 3274'.

Tuesday 11/13/79 RRGP-5

Finished rigging frac lines, pressure tested surface lines and frac string, set packer and began pumping frac job at 11:00 A.M. Finished job at 2:15 P.M. Total volume = 7620 barrels. Surface pressure dropped immediately to 10 psi after pumping stopped. Therefore, abandoned plans to flow back. Attempted to unset packer, found it stuck. Worked frac string, could not free packer. Attempted to pump salt water down frac string; pressured up and packer came loose. POH L.D. frac string. RIH with 6 1/8" bit on drill pipe and tagged sand at 4566'. Rigged up power swivel. Drilled out sand bridge, and circulated hole clean to 4806'.

GEOHERMAL WELL STIMULATION

RRGP-4

KIEL DENDRITIC
FRACTURE
(4 STAGE)

337,000 GAL OF FLUID
108,400 LBS. OF SAND
50 BPM PUMP RATE

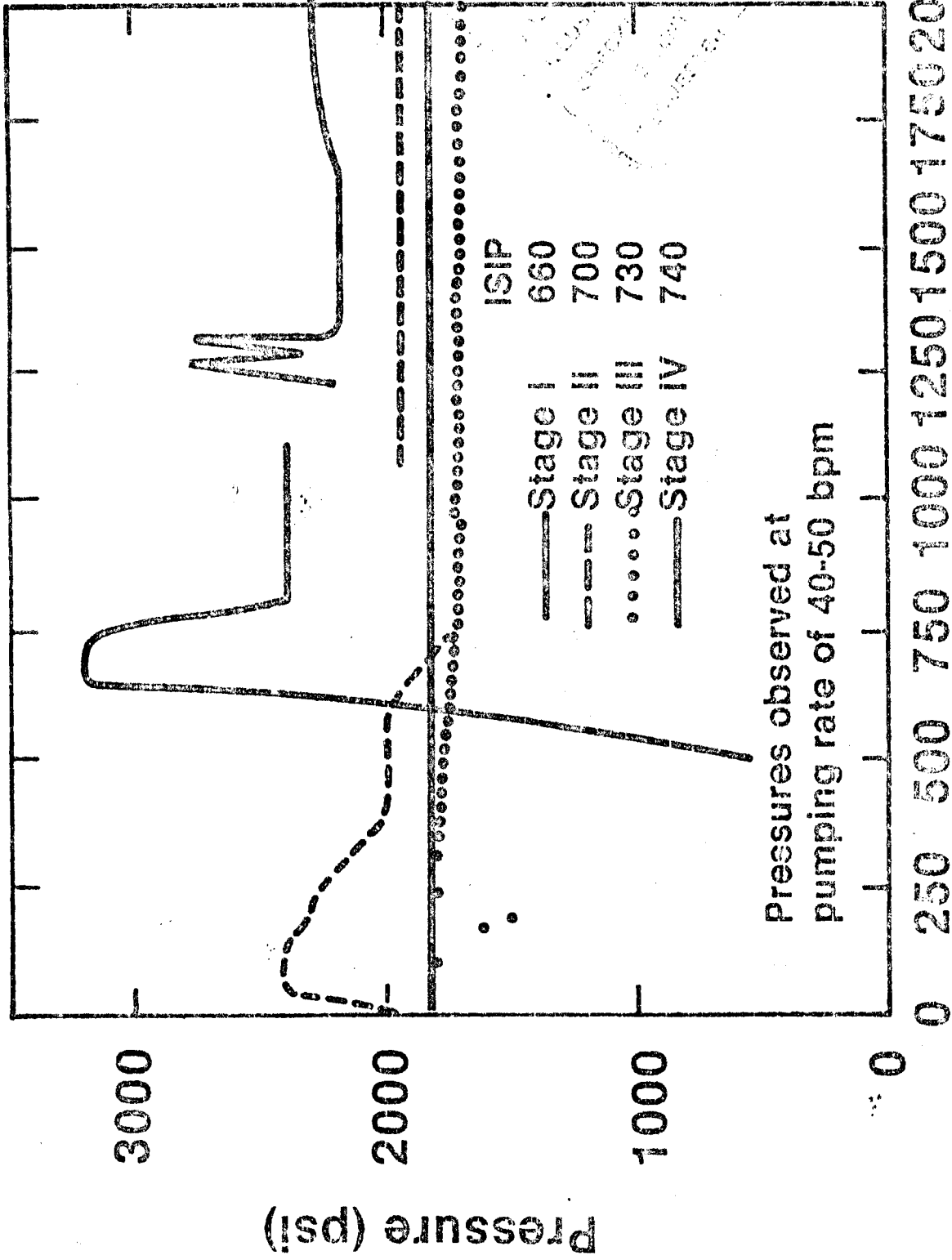
RRGP-5

PLANAR MASSIVE
FRACTURE

320,000 GAL. OF FLUID
431,000 LBS. OF SAND
52 BPM PUMP RATE

MN(GP-4) Hydraulic Fracture

Pressure Record August 20, 1979



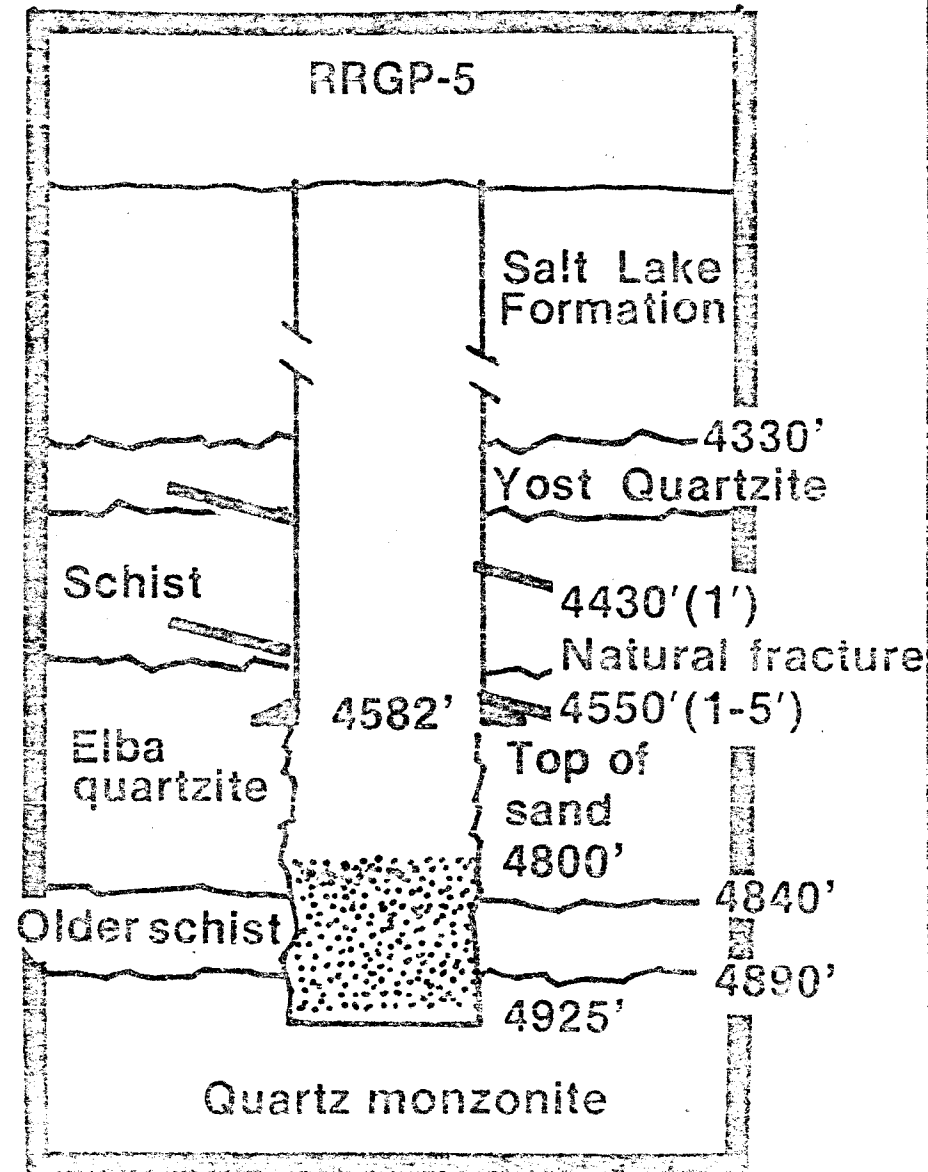
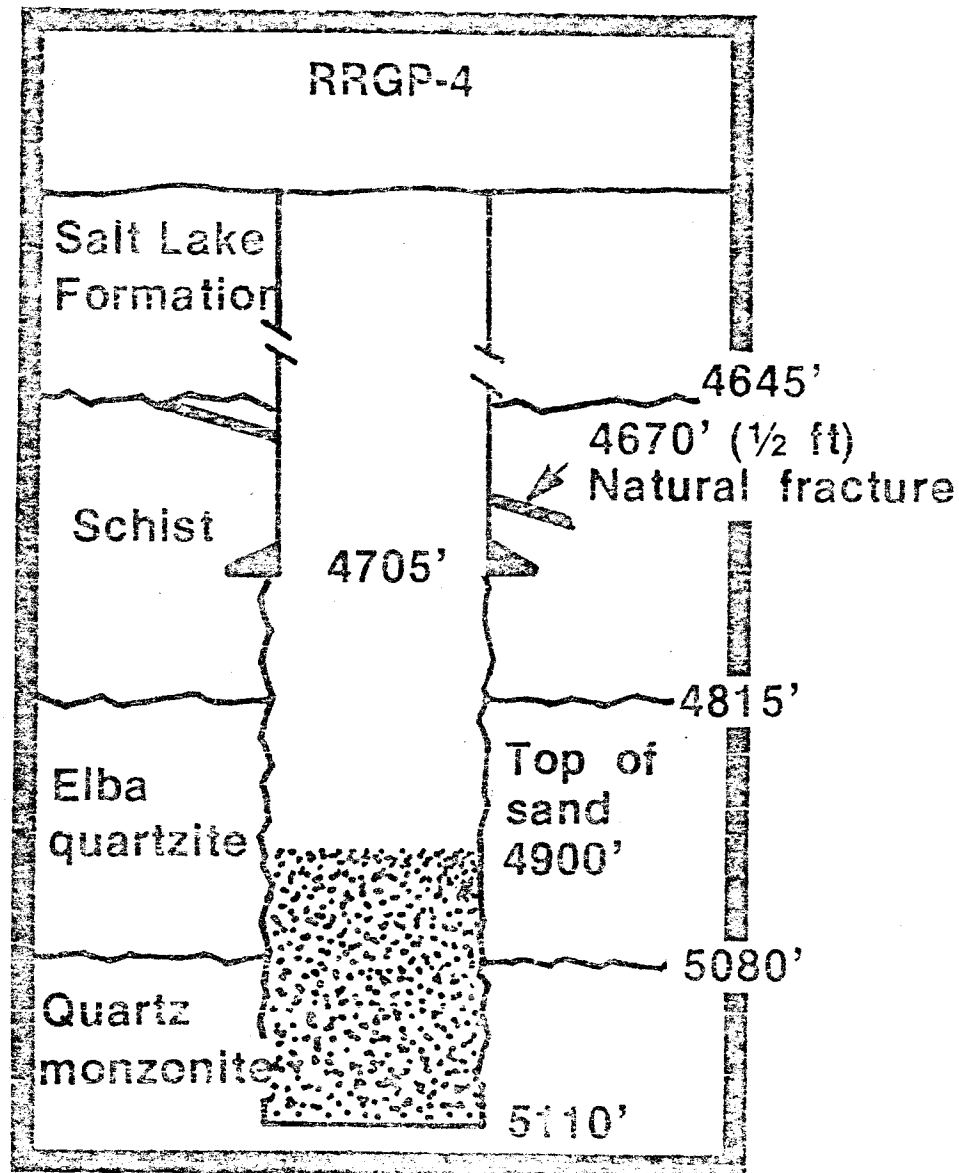
7/20/79

GRAPHIC ARTS

3966

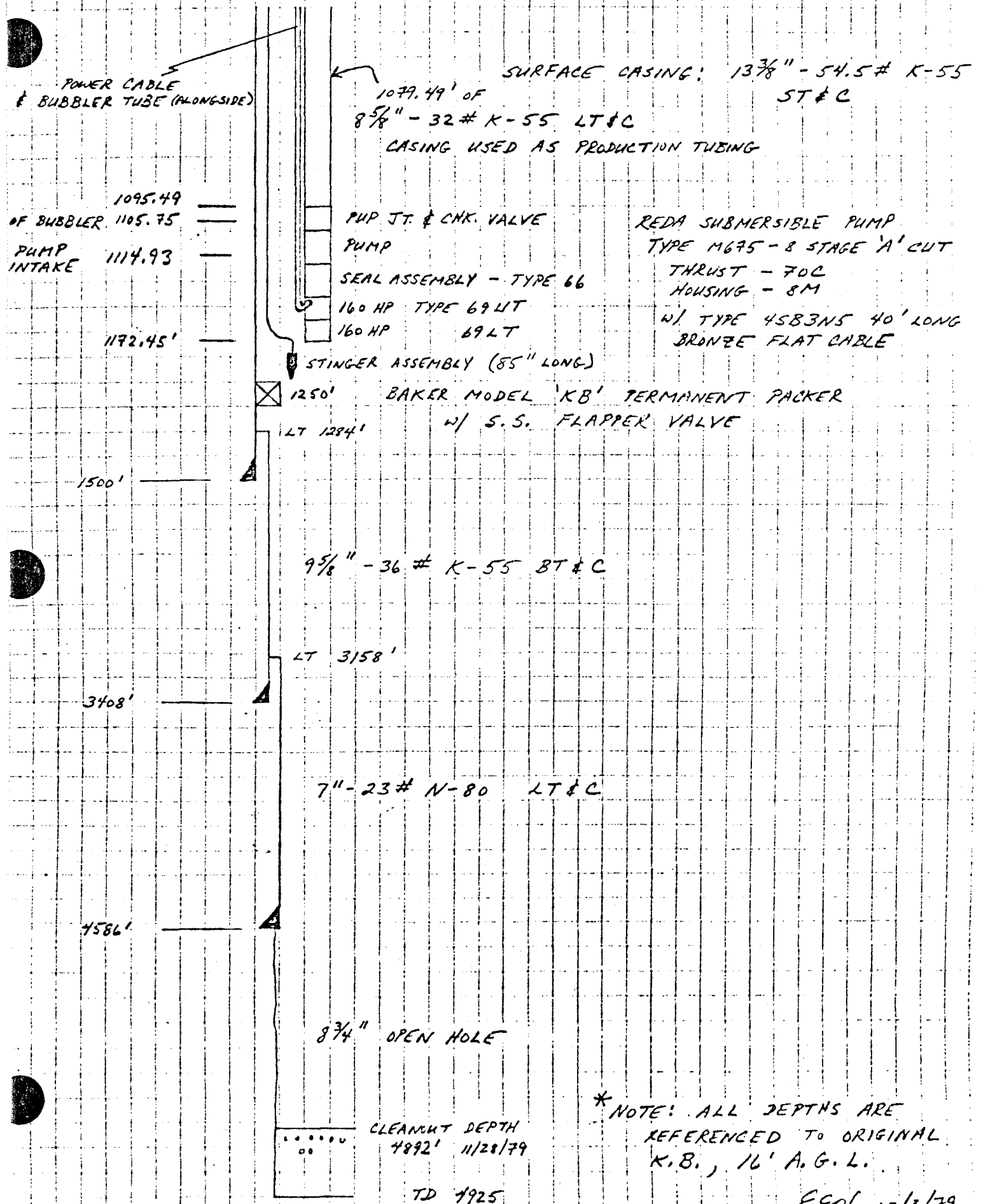
Ken

FRAC Borehole Scenarios



RRGP-5
MECHANICAL DETAIL *

12/3/79
ALSO SEE DWG. #411900



POWER CABLE & BUBBLER TUBE (ALONGSIDE)

SURFACE CASING: 13 3/8" - 54.5# K-55 ST&C

1079.49' OF 8 5/8" - 32# K-55 LT&C CASING USED AS PRODUCTION TUBING

1095.49 OF BUBBLER
1105.75 PUMP INTAKE
1172.45'

PUP JT. & CHK. VALVE
PUMP
SEAL ASSEMBLY - TYPE 66
160 HP TYPE 69 LT
160 HP 69 LT

REDA SUBMERSIBLE PUMP
TYPE M675 - 8 STAGE 'A' CUT
THRUST - 70C
HOUSING - 8M
W/ TYPE 45B3NS 40' LONG BRONZE FLAT CABLE

STINGER ASSEMBLY (85" LONG)
1250' BAKER MODEL 'KB' PERMANENT PACKER W/ S.S. FLAPPER VALVE
LT 1284'

1500'

9 5/8" - 36# K-55 BT&C

LT 3158'

3408'

7" - 23# N-80 LT&C

4586'

8 3/4" OPEN HOLE

CLEANOUT DEPTH 4892' 11/28/79

TD 1925

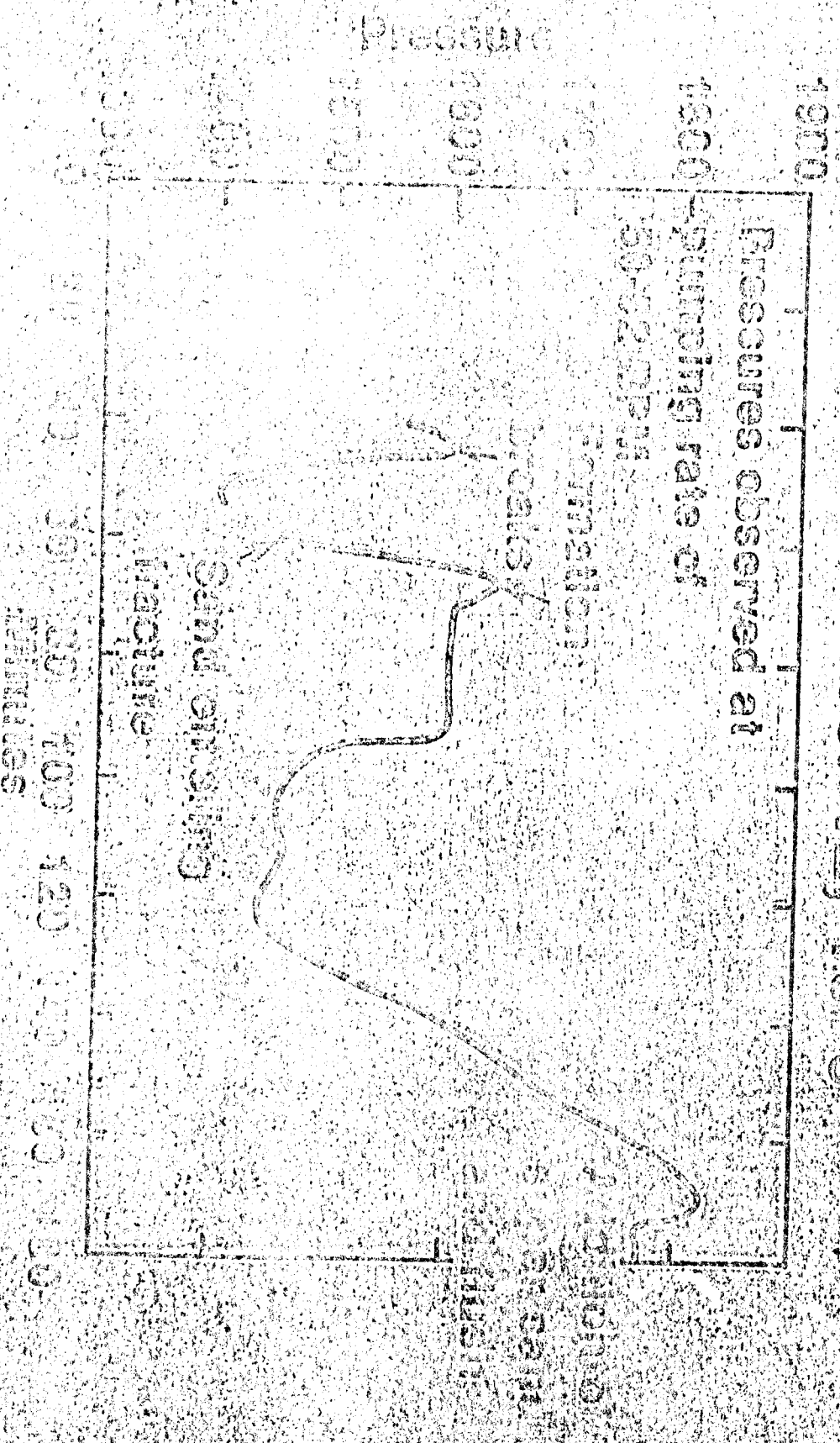
* NOTE: ALL DEPTHS ARE REFERENCED TO ORIGINAL K.B., 16' A.G.L.

EGH 12/3/79

REGIO-HYDRAULIC RECORD

Pressure Record

November 12, 1970



CONCLUSIONS

NATURAL FRACTURES WERE OPENED BY STIMULATION

POTENTIAL FOR INCREASED FLOW EXISTS

SRP-5 REQUIRES ADDITIONAL SAND RESERVOIR RATIO FOR PERMANENT RECOVERY
ADDITIONAL TESTING IS NECESSARY