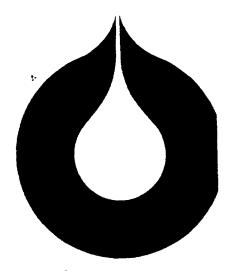
O STATOIL Denne rapport tilhører UND DOK.SENTER L.NR. 91059110 KODE <u>nr</u>27 15/9-11 Returneres etter bruk



 \overline{n}

statóil

REPORT

Repeat Formation Tester (RFT) WELL: 15/9-11 Formation: Heimdal and Jurassic/Triassic BY: LET-SVG Engineer: K.A. Grini Date: March, 1982

Den norske stats oljeselskap a.s

REPORT

· ···•

1

• 1 Repeat Formation Tester (RFT) WELL: 15/9-11 Formation: Heimdal and Jurassic/Triassic BY: LET-SVG Engineer: K.A. Grini Date: March, 1982

· · ·

CONTENTS:

2

Ĵ

Ĵ

PAGE:

مقلبين بملادي الماد سيب

Introduction	1
Operation summary, Heimdal fm.	
- Pretests	2
- Sampling	2
Conclusion	4
Pretest recorded data (table)	5
RFT-sampling data	8
Operation summary, Jurassic/Triassic fm.	
- Pretests	11
- Sampling	12
Conclusion	13
Pretest recorded data (table)	14
RFT-sampling data	16

Appendix A: Water analysis, 15/9-11, RFT sample at 2825.8 - 2826.5 m

· ---

- --

INTRODUCTION

R

Ē

The 15/9-11 well was the second well to be drilled on the Gamma structure. One of the objectives with 15/9-11, was to delinate the hydrocarbon accumulation found in the Heimdal formation of Paleocene age in 15/9-9. Heimdal formation and the Jurassic/ Triassic* sandstone, which were encountered at a depth of 2387 m RKB and 2795 m RKB respectively, are hydrocarbon bearing in 15/9-11.

1 -

As a part of the final logging program in the 12 1/4" drilling phase two RFT runs were conducted in the Heimdal fm., and for the 8.5" hole two RFT runs were completed in the Jurassic/ Triassic aged formations.

*) Top Triassic is not yet known, therefore the sand encountered at 2795 m RKB is named Jurassic/Triassic.

OPERATION SUMMARY, HEIMDAL FM.

Pretests

Two RFT runs were conducted. In the first run 31 pretests records out of 35 were obtained.

2 -

No reliable gas gradient can be established from the plot in The pressure points are too scattered to draw a fig. 1. gradient specially in the lower part of the gas zone. By plotting the RFT pressure points from well 15/9-9 and 15/9-11, which is done in fig. 2, it seems clear that the Heimdal formation in these two wells has the same pressure regime. Therefore it is reasonable to assume a gas gradient down to 2425 m RKB, which is identical to the gradient in 15/9-9 (0.0276 bar/m, 0.122 psi/ft or 0.281 g/cc). At this depth and at 2442 m RKB there are shale layers which may act as barriers. In this interval both gas and water is mobile. This is verified by a drill stem test (perf. interval 2432 - 2440 m RKB) where gas and water was produced. No gas gradient can be established from RFT alone. Extrapolated pressures P* from Horner analysis performed on data from six pressure gauges from DST no. 2. are plotted in fig. 1. Four of these pressure points indicate the same gas gradient which has been established earlier. A gas gradient equal to 0.0276 bar/m, 0122 psi/ft can be used down to the GWC which is picked at 2442 m RKB.

Sampling

A segregated sample was taken in run no. 1 after several attempts. The purpose of run 2 was sampling, but was not successful due to tight formation. Run no. 1: 8 x 0.0150" chokes were used to reduce flow and possible plugging.

l

Sampling was attempted at 2436.5 m, but aborted at the pretest stage due to slow response/low permeability.

2 3/4 gallon chamber was opened at the following depths: 2435.0, 2436.0, 2434.0, 2437.0, 2432.0, 2388.5 (m).

The tool was set at these depths, the 2 3/4 gallon chamber opened, but closed after short time due to tight formation.

Finally, at 2387.5 m the 2 3/4 gallon chamber was filled, and the 1 gallon chamber opened for a segregated sample. The 1 gallon chamber was open for flow for 80 mins. The flowing pressure was slowly increasing, 0.1 bar/min (1.5 psi/min), and was 237.172 bar (3439 psi) when shut in. Pretest pressure was 244.483 bar (3545 psi).

The 2 3/4 gallon chamber was bled off offshore.

Recovery: 5.75 l mudfiltrate (16500 ppm Cl, 1200 tot. hard.). 0.1 l condensate 0.91 m³ (32 cuft.) gas

The 1 gallon chamber no. RFS-AB 1195 was sent to PRO.LAB, Statoil, for analysis. Analysis has not yet been undertaken, and will be delayed until analysis of samples from the DST's has been conducted.

Run no. 2: 4×0.020 " chokes were used.

Sampling was attempted at 2434.0 m and 2431.5 m, but was aborted due to slow response / low permeability.

No recovery was obtained.

CONCLUSION

The pressure regime in 15/9-9 and 15/9-11 in the Heimdal fm. is the same with a gas gradient equal to 0.0276 bar/m, 0.122psi/ft. The GWC is picked at 2442 m RKB.

•4 -

With Depth Log Nydr. pr. Design of Nydr. pr. Remained in the treat test test test test test test test t	WELL: LATE: RUN NO.	21/10-81 21/10-81 21/10-81				Max. rec. temp.:	66.7 ⁰ C (152 ⁰ F)	· · ·
mRVG psig psig merc psig mr 1 2349.5 4157 / 4163 3531 3505 / 1.049 4138 / 1.24 2 2361.0 4177 / 4180 3535 3505 / 1.045 4135 / 1.24 3 2388.5 4230 / 4232 3546 3520 / 1.035 4237 / 1.24 5 2401.0 4244 / 4232 3554 3520 / 1.034 4217 / 1.24 5 2405.0 4266 / 4275 3554 3538 / 1.033 4237 / 1.24 5 2405.0 4269 / 4276 3554 3538 / 1.035 4231 / 1.24 6 2405.0 4269 / 4276 3554 3538 / 1.035 4231 / 1.24 7 2405.0 4294 3538 / 1.035 4231 / 1.24 8 2410.0 4309 / 4303 3577 3547 / 1.025 4297 / 1.24 1 2411.0 4309 / 4303 3557 3556 / 1.026 4231 / 1.24 2411.0 4309 / 4303 3577 3554 / 1.025 4297 / 1.24 2411.0 4309 /	'l'est	Depth	te.	prete ssure	Cor.pretest pressure	Cor.hydr.pr. after test	Remarks	<u>t</u>
2349.5 4157 / 4163 3531 3505 / 1.049 4138 / 1.24 2361.0 4177 / 4180 3535 3509 / 1.045 4155 / 1.24 2386.5 4230 / 4232 3546 3520 / 1.036 4207 / 1.24 2395.0 4243 / 4258 3554 3554 / 1033 4237 / 1.24 2401.0 4256 / 4256 3554 3554 / 1033 4237 / 1.24 2405.0 4269 / 4776 3564 3538 / 1.033 4237 / 1.24 2405.0 4294 / 4296 3554 3538 / 1.033 4277 / 1.24 2405.0 4294 / 4296 3554 3538 / 1.035 4277 / 1.24 2410.0 4294 / 4296 3573 3546 / 1.022 4277 / 1.24 2411.0 4296 / 4393 3573 3557 / 1.025 4277 / 1.24 2411.0 4396 / 4313 3577 3557 / 1.025 4277 / 1.24 2415.0 4396 / 4313 3557 / 1.025 4297 / 1.24 1.24 2416.0 4396 / 4313 3557 / 1.025 4297 / 1.24 1.24 2416.0 4396 / 4313 3557 / 1.025 4297 / 1.24 1.24 2416.1	NO	mRKB	psig	psig	/mp	_		• 1
2361.0 4177 / 4180 3535 3509 / 1.045 4155 / 1.24 2386.5 4230 / 4232 3546 3520 / 1.036 4207 / 1.24 2395.0 4268 / 4275 3554 3552 / 1.034 4217 / 1.24 2401.0 4268 / 4275 3554 3558 / 1.035 4207 / 1.24 2405.0 4268 / 4276 3564 3558 / 1.035 4207 / 1.24 2405.0 4268 / 4276 3564 3558 / 1.035 4271 / 1.24 2405.0 4269 / 4296 3554 3558 / 1.035 4271 / 1.24 2405.0 4294 / 4296 3554 3558 / 1.035 4271 / 1.24 2416.0 4294 / 4296 3573 3573 3557 3556 / 1.025 4271 / 1.24 2410.0 4294 / 4303 3577 3557 / 1.025 4271 / 1.24 1.24 2431.0 4309 / 4318 3577 3557 / 1.025 4271 / 1.24 2435.0 4316 / 4333 3557 / 1.025 4271 / 1.24 2436.1 4331 3557 / 1.025 4297 / 1.24 2444.0 4331 3557 / 1.025 4297 / 1.24 2409.5 4309	-	349.	157 / 416	53	1 1	1 1	Lista Formation	-
2388.5 4230 / 4232 3546 3520 / 1.036 4207 / 1.24 2401.0 4254 / 4258 3554 3522 / 1.034 4217 / 1.24 2401.0 4268 / 4275 3554 3528 / 1.033 4233 / 1.24 2405.0 4268 / 4275 3554 3538 / 1.035 4251 / 1.24 2405.0 4269 / 4276 3564 3538 / 1.035 4251 / 1.24 2405.0 4269 / 4296 3554 3538 / 1.035 4251 / 1.24 2410.0 4299 / 4296 3573 3537 / 1.032 4271 / 1.24 2411.0 4399 / 4396 3573 3546 / 1.027 4271 / 1.24 2411.0 4399 / 4318 3573 3546 / 1.027 4271 / 1.24 2411.0 4399 / 4318 3577 3551 / 1.027 4297 / 1.24 2411.0 4391 / 4393 3577 3551 / 1.027 4297 / 1.24 2439.0 4316 4316 3553 1.025 4306 / 1.24 2430.1 4316 4323 3552 1.025 4307 / 1.24 2430.5 4316 4319 3553 1.025 4307 / 1.24	2	361	177 / 41	53	1 1	1.2	Lista Formation	
2395.0 4243 / 426 3548 3522 / 1.034 4217 / 1.24 2401.0 4254 / 4258 3554 3558 / 1.033 4233 / 1.24 2400.0 4266 / 4275 3554 3558 / 1.033 4233 / 1.24 2401.0 4269 / 4276 3554 3558 / 1.035 4257 / 1.23 2410.0 4299 / 4296 3554 3556 / 1.035 4257 / 1.24 2410.0 4299 / 4196 3573 3546 / 1.032 4273 / 1.24 2431.0 4309 / 4196 3573 3546 / 1.032 4278 / 1.24 2433.0 4316 / 4303 3577 3551 / 1.025 4278 / 1.24 2439.0 4316 / 4319 3577 3551 / 1.025 4297 / 1.24 2439.0 4316 / 4313 3557 / 1.025 4306 / 1.24 2444.0 4321 / 4331 3553 / 1.025 4307 / 1.24 2445.5 4316 / 4313 3551 / 1.025 4307 / 1.24 2469.5 4369 / 4313 3551 / 1.025 4307 / 1.24 2469.5 4336 / 4333 3551 / 1.025 4307 / 1.24 2469.5 4336 / 4333 3551 / 1.025 4317 / 1.24	e	388.	230 / 423	3546	1 1	/ 1.		
2401.0 4254 4258 3554 3554 3558 71.24 2405.0 4268 4275 3564 3538 71.035 4250 71.24 2405.0 4269 4275 3564 3538 71.035 4250 71.24 2405.0 4294 4396 3573 3547 1.035 4273 71.24 2410.0 4294 4396 3573 3547 1.025 4271 71.24 2410.0 4294 4303 3573 3547 1.022 4271 71.24 2431.0 4309 4318 3573 3551 71.023 4271 71.24 2431.0 4321 4319 3577 3551 71.023 4271 71.24 2445.0 4324 4333 3553 71.025 4307 71.24 2446.0 4324 4333 3553 71.025 4307 71.24 2446.0 4324 4333 3553 71.025 4307 71.24 2446.0 4326 4333 3553	4	395.	243 / 424	54	1 1	217 / 1.		-
2405.0 4268 / 4275 3564 3538 / 1.035 4256 / 1.24 2405.0 4269 / 4276 3554 3538 / 1.035 4251 / 1.24 2410.0 4294 / 4296 3573 3573 3547 / 1.032 4271 / 1.24 2416.0 4294 / 4296 3573 3573 3546 / 1.029 4271 / 1.24 2431.0 4299 / 4303 3577 3551 / 1.029 4278 / 1.24 2431.0 4316 / 4319 3577 3551 / 1.027 4297 / 1.24 2435.5 4316 / 4319 3557 3552 / 1.025 4294 / 1.24 2439.0 4316 / 4331 3559 3554 / 1.025 4294 / 1.24 2444.0 4321 / 4331 3559 3554 / 1.025 4307 / 1.24 2446.0 4324 / 4332 3559 3554 / 1.025 4307 / 1.24 2469.5 4373 3559 3554 / 1.023 4307 / 1.24 2469.5 4336 / 4332 3621 3597 / 1.023 4367 / 1.24 2469.5 4336 / 4332 3631 / 1.023 4367 / 1.24 2488.5 4336 / 4404 367 / 1.023 367 / 1.24 2488.5	ß	401.	254 / 42	55	1 /	233 / 1.		• •
2405.0 4269 / 4276 3564 3538 / 1.035 4251 / 1.24 2410.0 4291 / 4298 - - 4273 / 1.25 2410.0 4294 / 4296 3573 3547 / 1.032 4271 / 1.24 2416.0 4294 / 4296 3573 3546 / 1.029 4271 / 1.24 2431.0 4299 / 4303 3577 3551 / 1.027 4294 / 1.24 2431.0 4399 / 4318 3577 3551 / 1.027 4294 / 1.24 2431.0 43916 / 4312 3557 3552 / 1.025 4294 / 1.24 2436.0 4316 / 4319 3553 3553 / 1.025 4294 / 1.24 2444.0 4321 / 4331 35590 3556 / 1.025 4396 / 1.24 2446.0 4324 / 4332 35590 3556 / 1.025 4396 / 1.24 2469.5 4373 / 4332 35590 3556 / 1.025 4396 / 1.24 2469.5 4373 / 3551 / 1.025 437 / 1.24 3567 / 1.025 438 / 1.24 2469.5 4373 / 3590 3567 / 1.025 438 / 1.24 248 2469.5 4373 / 3557 / 1.025 437 / 1.24 367 / 1.24 2469.5 4373	9	405.	268 / 42	56	1 /	250 / 1.	Supercharge	·
2410.0 4291 / 4298 4271 / 1.25 2416.0 4294 / 4296 3573 3547 / 1.032 4271 / 1.24 2416.0 4294 / 4296 3572 3572 3546 / 1.029 4278 / 1.24 2431.0 4309 / 4318 3577 3557 3551 / 1.027 4294 / 1.24 2436.5 4316 / 4319 3577 3552 / 1.025 4297 / 1.24 2439.0 4316 / 4319 3557 3551 / 1.025 4294 / 1.24 2439.0 4321 / 4331 3559 3553 / 1.025 4396 / 1.24 2444.0 4324 / 4332 3559 3553 / 1.025 4306 / 1.24 2446.0 4324 / 4333 3559 3559 3557 / 1.026 4306 / 1.24 2446.0 4324 / 4333 3621 3559 1.025 4306 / 1.24 2446.0 4324 / 4333 3621 3559 / 1.026 437 / 1.24 2469.5 4399 / 4373 3623 3567 / 1.022 437 / 1.24 2469.5 4399 / 4373 3623 3671 / 1.023 367 / 1.24 2488.5 4306 / 4404 3677 / 1.023 4360 / 1.24 2488.5 4404 / 4405 3650 1.023 4367 / 1.24 2488.5 4404 / 4405 3657 1.023 436 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.023 438 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.024 380 / 1.24 <td>7</td> <td>405.</td> <td>269 / 42</td> <td>56</td> <td>/ 1</td> <td>251 / 1.</td> <td>Supercharge</td> <td></td>	7	405.	269 / 42	56	/ 1	251 / 1.	Supercharge	
2416.0 4294 / 4296 3573 3547 / 1.032 4271 / 1.24 2423.0 4299 / 4303 3577 3551 / 1.029 4278 / 1.24 2431.0 4309 / 4318 3577 3551 / 1.027 4293 / 1.24 2436.5 4316 / 4322 3577 3552 / 1.025 4297 / 1.24 2430.0 4316 / 4332 3577 3552 / 1.025 4294 / 1.24 2439.0 4316 / 4332 3577 3552 / 1.025 4294 / 1.24 2439.0 4316 / 4333 3577 3554 / 1.025 4307 / 1.24 2444.0 4321 / 4331 3590 3564 / 1.025 4307 / 1.24 2469.5 4369 / 4373 3521 3555 / 1.025 4307 / 1.24 2469.5 4369 / 4373 3621 3595 / 1.022 4367 / 1.24 2469.5 4373 / 4392 3623 3651 / 1.023 4367 / 1.24 2469.5 4336 / 4393 3623 3651 / 1.023 4367 / 1.24 2469.5 4336 / 4393 3623 3671 / 1.023 4367 / 1.24 2488.5 4396 / 4404 3663 3664 / 1.023 4367 / 1.24 2488.5	8	410	291 / 42	1	1	/ 1.	Sueprcharge	
2423.0 4299 / 4303 3572 3546 / 1.029 4278 / 1.24 2431.0 4309 / 4318 3577 3551 / 1.027 4293 / 1.24 2436.5 4316 / 4322 3577 3552 / 1.025 4294 / 1.24 2439.0 4316 / 4319 3577 3551 / 1.025 4294 / 1.24 2439.0 4316 / 4319 3577 3551 / 1.025 4294 / 1.24 2444.0 4321 / 4331 3590 3563 / 1.025 4306 / 1.24 2446.0 4324 / 4332 3590 3564 / 1.025 4307 / 1.24 2469.5 4369 / 4373 3590 3564 / 1.022 438 / 1.24 2469.5 4369 / 4373 3621 3597 / 1.022 438 / 1.24 2469.5 4373 / 4376 3623 3611 / 1.023 4367 / 1.24 2481.5 4377 / - 3637 / 1.022 4317 / 1.24 2488.5 4304 / 4405 3637 / 1.023 4379 / 1.24 2488.5 4404 / 4405 3650 1.023 4379 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.023 4379 / 1.24 2488.5 4396 / 1404 3650	6	416.	294 / 42	57	1 1	11.	5 -	5 -
2431.0 4309 / 4318 3577 3551 / 1.027 4293 / 1.24 2436.5 4316 / 4322 3578 3552 / 1.025 4294 / 1.24 2439.0 4316 / 4319 3577 3551 / 1.025 4294 / 1.24 2439.0 4316 / 4319 3578 3552 / 1.025 4294 / 1.24 2444.0 4321 / 4331 3589 3564 / 1.025 4294 / 1.24 2446.0 4324 / 4332 3590 3564 / 1.025 4397 / 1.24 2469.5 4369 / 4373 3590 3564 / 1.025 4397 / 1.24 2469.5 4369 / 4373 3521 3597 / 1.022 4348 / 1.24 2469.5 4374 3523 3597 / 1.022 4348 / 1.24 2469.5 4396 / 4392 3621 3597 / 1.022 4348 / 1.24 2488.5 4397 / - - - - - 2488.5 4304 / 4405 3650 1.023 4360 / 1.24 2488.5 4396 / 4404 3671 / 1.023 4360 / 1.24 2488.5 4404 / 4405 3650 3671 / 1.023 4360 / 1.24 2488.5 4404 / 4405 3650 <td>10</td> <td>423.</td> <td>299 / 4</td> <td>57</td> <td>1 1</td> <td>/ 1.24</td> <td></td> <td>1</td>	10	423.	299 / 4	57	1 1	/ 1.24		1
2436.5 4316 / 4322 3578 3552 / 1.025 4297 / 1.24 2439.0 4316 / 4319 3551 / 1.025 4294 / 1.24 2444.0 4321 / 4319 3559 3553 / 1.025 4306 / 1.24 2444.0 4324 / 4332 3590 3553 / 1.025 4307 / 1.24 2445.0 4324 / 4332 3590 3564 / 1.025 4307 / 1.24 2469.5 4369 / 4373 3590 3595 / 1.025 4368 / 1.24 2469.5 4373 / 4376 3521 3595 / 1.022 4348 / 1.24 2469.5 4373 / 4376 3621 3595 / 1.022 436 / 1.24 2469.5 4396 / 4373 3623 3597 / 1.022 436 / 1.24 2488.5 4396 / 4404 3637 / 1.023 436 / 1.24 2488.5 4396 / 4405 3650 3624 / 1.027 4380 / 1.24	11	431	309 / 4	3577	/ 1	/ 1.24		:
2439.0 4316 / 4319 3577 3551 / 1.024 4294 / 1.24 2444.0 4321 / 4331 3589 3563 / 1.025 4306 / 1.24 2446.0 4324 / 4332 3599 3563 / 1.025 4307 / 1.24 2446.0 4324 / 4332 3590 3563 / 1.025 4307 / 1.24 2469.5 4369 / 4373 3591 7.025 4307 / 1.24 2469.5 4369 / 4373 3521 3595 / 1.025 4307 / 1.24 2469.5 4369 / 4373 3621 3595 / 1.024 4348 / 1.24 2469.5 4376 3623 3611 / 1.023 4367 / 1.24 2483.0 4386 / 4404 3637 3611 / 1.023 4367 / 1.24 2488.5 4306 / 4404 3650 3624 / 1.024 4360 / 1.24 2488.5 4306 / 4404 3650 3624 / 1.023 4367 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1.24 2488.5 4306 / 4404 3650 3624 / 1.024 4380 / 1.24	12	436.	316 / 43	3578	/ 1	11.		
2444.0 4321 / 4331 3589 3563 / 1.025 4306 / 1.24 2446.0 4324 / 4332 3590 3564 / 1.025 4307 / 1.24 2469.5 4369 / 4373 3590 3564 / 1.025 4307 / 1.24 2469.5 4369 / 4373 3521 3595 / 1.025 4307 / 1.24 2469.5 4369 / 4373 3621 3595 / 1.024 4348 / 1.24 2469.5 4369 / 4373 3621 3595 / 1.022 4348 / 1.24 2475.5 4373 / 4376 3623 3595 / 1.022 4367 / 1.24 2488.5 4397 / - - - - - 2488.5 4397 / - - - - - 2488.5 4404 / 4405 3650 3671 / 1.023 4379 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1.24	13	439	316 / 431	57	1 1	294 / 1.		•
2446.0 4324 / 4332 3590 3564 / 1.025 4307 / 1.24 2469.5 4369 / 4373 - 1.025 4378 / 1.24 2469.5 4369 / 4373 - 1.025 4378 / 1.24 2469.5 4369 / 4373 3621 3595 / 1.024 4348 / 1.24 2475.5 4373 / 4376 3623 3597 / 1.022 4367 / 1.24 2488.5 4397 / - - - - 2488.5 4397 / - - - - 2488.5 4404 / 4405 3650 3624 / 1.023 4367 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1.24	14	444	321 / 433	58	1 1	306 / 1.		÷
2469.5 4369 / 4373 - - 4348 / 1.24 2469.5 4369 / 4373 3621 3595 / 1.024 4348 / 1.24 2469.5 4373 / 4376 3621 3595 / 1.024 4348 / 1.24 2475.5 4373 / 4376 3621 3595 / 1.022 4351 / 1.24 2483.0 4386 / 4392 3637 3611 / 1.023 4367 / 1.24 2488.5 4397 / - - - - 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1.24	15	446	324 / 4		1 1	307 / 1		
2469.5 4369 / 4373 3621 3595 / 1.024 4348 / 1.24 2475.5 4373 / 4376 3623 3597 / 1.022 4367 / 1.24 2483.0 4386 / 4392 3637 3611 / 1.023 4367 / 1.24 2488.5 4397 / - - - - 2488.5 4396 / 4404 3697 3611 / 1.023 4367 / 1.24 2488.5 4396 / 4404 3697 3671 / 1.037 4379 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1.24	16a	469.	369 / 437	l	1	11		
2475.5 4373 / 4376 3623 3597 / 1.022 4351 / 1.24 2483.0 4386 / 4392 3637 3611 / 1.023 4367 / 1.24 2488.5 4397 / - - - - 2488.5 4397 / - - - - 2488.5 4396 / 4404 3697 3671 / 1.023 4379 / 1.24 2488.5 4404 / 4405 3650 3671 / 1.037 4379 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1.24	16b	469.	369 / 437	3621	1 1	11.		
2483.0 4386 / 4392 3637 3611 / 1.023 4367 / 1.24 2488.5 4397 / - - - - - 2488.5 4396 / 4404 3697 3671 / 1.037 4379 / 1.24 2488.5 4396 / 4404 3697 3671 / 1.037 4379 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1.24	17	475.	373 / 4	3623	1 1	/ 1.2		
2488.5 4397 / - <	18	483.	386 / 43	63	1 /	11.		
2488.5 4396 / 4404 3697 3671 / 1.037 4379 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1.24 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1.24	19a	488.	39	1	<u> </u>		Power shut down	•••
9c 2488.5 4404 / 4405 3650 3624 / 1.024 4380 / 1	19b	488.	396 / 44	3697	/ 1	1 1	Supercharge	. 12
	19c	488.	404 / 4	3650	/ 1	1 1		•**
								.
							-	· -
		_	_				_	

PRETEST RECORDED DATA

...

. ...

15/9-11 WELL:

DATE: RUN NO.:	21/10-81 1				Max. rec. temp.:	66.7 ⁰ C (152 ⁰ F)
	Depth	Log hydr. pr. before/after test	Log pretest pressure	Cor.pretest pressure	Cor.hydr.pr. after test	Remarks
-+	mRKB	psig	psig	psig, gm/cc	psig, gm/cc	
	2495.3	4409 / 4414	3729	3703 / 1.044	4389 / 1,24	Supercharge
20b	2495.3	4414 / 4413	3660	3634 / 1.024	4388 / 1.24	
21a	2500.0	4412 / -	1	1	I	Lost seal
21b	2500.0	4419 / 4422	3666	3640 / 1.024	4397 / 1.24	
	2517.0	4443 / 4446	3683	3657 / 1.022	4421 / 1.24	
	2522.0	4452 / 4457	3693	3667 / 1.023	4432 / 1.24	Supercharge
	2414.0	4341 / -	ι	ŀ	1	Blocked eq. valve
<u>.</u>	2410.0	4248 / 4253	3559	3533 / 1.031	4228 / 1.23	1
26a	2388.5	4205 / 4224	3556	3530 / 1.039	4199 / 1.24	6
26b	2388.5	- / 4225	3560	3534 / 1.040	4200 / 1.24	
	2351.0	4136 / 4152	3603	3577 / 1.070	4127 / 1.23	Supercharge
- <u>-</u> ,,-	2436.5	4301 / 4299	3563	3537 / 1.021	4274 / 1.23	
	2435.0	4294 / -	3563	3537 / 1.021	k	Att. sampling
	2436.0	4296 / 4301	3569	3543 / 1.023	4276 / 1.23	Att. sampling
	2434.0	4295 / -	3567	3541 / 1.023	ł	Att. sampling
	2437.0	4296 / -	3568	3542 / 1.022	L	Att. Sampling
	2432.0	4287 / 4286	3566	3540 / 1.024	4261 / 1.23	Att. Sampling
	2388.5	4201 / 4206	3548	3522 / 1.037	181 / 1.23	Att. Sampling
	2387.5	4203 / 4205	3547	3521 / 1.037	180 / 1.23	Sampling
						τ ¹
<u>.</u>						<u>.</u>

PRETEST RECORDED DATA

[

i

j

ł

15/9-11

WELL:

·	· - ····		·····		. .		_ ^	7 -	· • .	. .	satististististististististististististist	۰.	. 17	• •		aare di	e. . e	.*
	Remarks		1	Att. sampling														
Max. rec. temp.:	Cor.hydr.pr. after test	psig, gm/cc		1					-									
RECORDED DATA	Cor.pretest pressure	psig, gm/cc	3538 / 1.022	770.1 / 5555														
PRETEST RECOF	Log pretest pressure	psig	3564 3559															
	Log hydr. pr. before/after test	psig	4305 / - 4294 / -	•											-			
15/9-11 21/10-81 : 2	Depth	mRKB	2434.0 2431.5									- <u>-</u>						
WELL: DATE: RUN NO.:	'l'est	NO	- 0			· <u>····</u> ···			••••••••••••••••••••••••••••••••••••••						<u>-</u> -			

Ţ

.

1

ł

```
RFT - sampling data
```

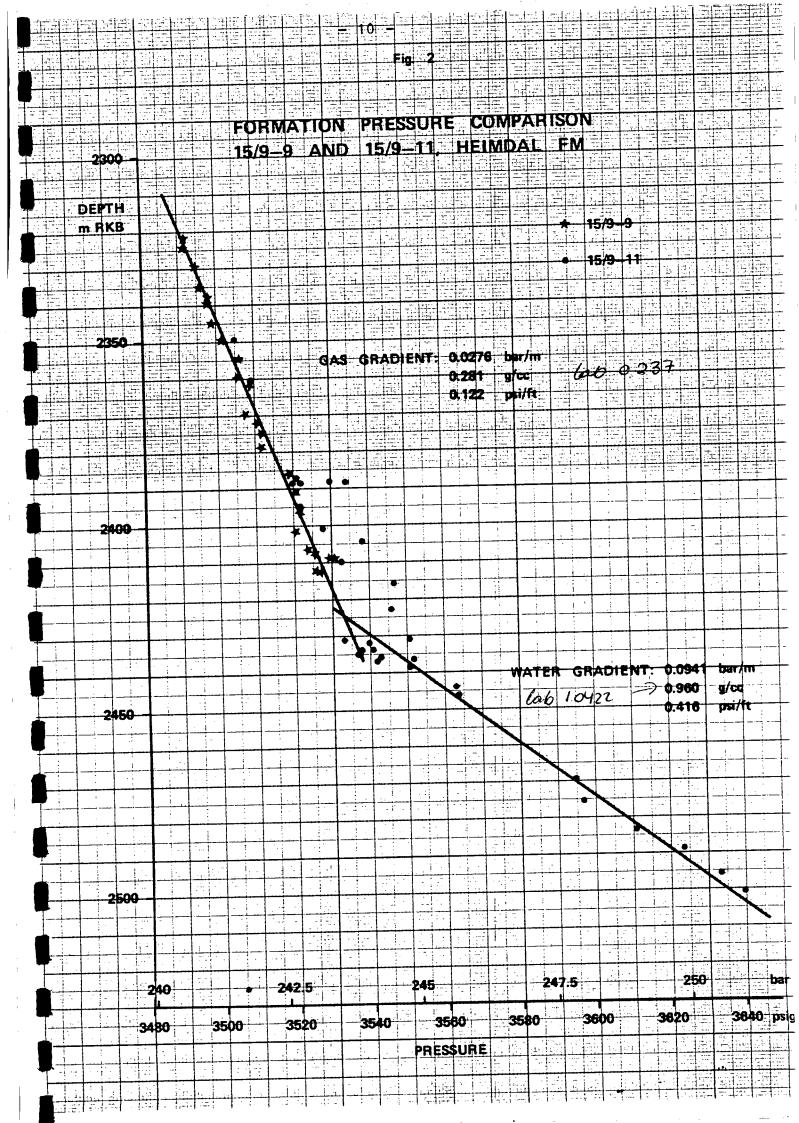
Well: 15/9-11 Date: 21/10-81 Run no: 1 Type of sample (segreg./separ Chamber sizes, lower: 2 3/4 upper: 1 gal Choke sizes: 8 x 0.015" Filter type: Standard	gal. bottle	no: no: RFS-AB 1195
Depth	m	2387.5
Log hydr. pres. bef. setting	psig	4303.
Log pretest pressure	psig	3547
Cor. pretest pressure	psig(g/cc)	3521 (1.037)
Lower/ upper chamber:		Opened for flow
time opened		at 2435.0, 2436.0,
log flowing pressure	psig	2434,0, 2437.0,
log shut-in pressure	psig	2432.0, 2388.5
time sealed		
cor. flowing pressure	psig .	
cor. shut-in pressure	psig(g/cc)	
Lower/upper chamber		
time opened		19.37
log flowing pressure	psig	-
log shut-in pressure	psiq	3439
time sealed		20.57
cor. flowing pressure	psig	-
cor. shut-in pressure	psig(g/cc)	3413
Log hydr. pres. after retracting	psig	4205
Max. recorded temp.	o _F	151 152 152
Surf. pres., lower ch.	psig	151, 152, 152 2000
Surf. pres., upper ch.	psig	2000

Comments: 1 gal. chamber RFS-AB 1195 sent to Pro.Lab, Statoil for analysis.

- 8 -

.

1			-	****	1141	u::::	1111	ti:::	<u>т</u>	1111 1111	<u>ee</u>	LEIT	111	EE.	<u> </u>		.					_						, 				*****	*****		· • · · · · ·	+	• · • •	
			<u> </u>																9			1					巨											
	15							E.						17								E	<u> </u>							1111								
												1.31	1111																			1717				÷		
													12 <u>=</u>	17			1.1.1			45					H	1011												
												5/	9			F(DR	M	41	10	N	H H H	21	13	55	U	RE	- <u></u> 										Ē.
	ns	PTI			H.				-	17	1		1.1			Η	EIJ	MC	A		E																	
	m	RKI		-10 														13 1				Ŧ	65								-							+
	1			6.7 16.7		4.5.1																																
		350	5.		$\frac{1}{\dot{\tau}}$		1			1		1										1							+									
					1		-†	1	a	ta	K	**											e k	-+					Ĩ		_			.2 200				
					1.1	IC I	17			1.	1		1																									
					+	<u> </u>					-												<u> </u>		÷		<u>а</u> , 	RF	T.							11111		
		12-				47.4					1.1	L.F.				<u></u>							355	i fi	li i									•••••				
	-		-								1.1.1																	ds' (Pf	·				T	C	AL	KG R		
								- 								.:. 					۰ <u>۰</u> ۲۰							DE										
									_				-													1				-								-
	-			5																		<u> </u>					-					••••						: .
	+-1	400	•					- 	+																	 		1. 										
	-	-1				- <u>14.</u>			-1							<u> </u>	1.7	4 4	·													 		••••	 			
						+		1		*			1			حنصنه											<u>، ، ،</u>				.]							
				····		-	<u> </u>	1	*			1	ļ										- <u></u>			·												
		·	<u> </u>	 	-	+		+			<u> </u>	*	<u> </u>	•	<u>-</u> -									: :: 	<u>-</u>		-					-		·			<u> </u>	
					-		-			1	•		 	-	•		.		·		<u></u>					- :											 i •	
				·	-		†							- <u>-</u>	R.	<u></u>				-	<u>ا</u> بند. 1	<u></u>					<u>.</u>	••••				-						
										• •		•					1	. 1	1	- 1	. .	5 J.				4							. 1					
				:					4																_	WA	TE	R	G	AF	DI	N	r:		094	· . I	bar/	
		245	9	: : :					4								¥									W/	TE	R	G	A F	חס	IN	r:	0.	960	D	g/cc	
			9	:					4	4							*									WA	TE	R	G		ווס	EN	r:	0.		D		
		45	9									1					4														חס	EN		0.	960	D	g/cc psi/	Fi
		45	9									1	1				*																r:	0.	960	D	g/cc psi/	Fi
		45			1										ai ai	_	•			-														0.	96(41(D	g/cc psi/	Fi
		245			1										· · · · ·	_																		0.	96(41(5	g/cc psi/	Fi
		245																																0	960	D 5 //	g/cc psi/	
		245																																0.	960	D 5	g/cc psi/	
																																		0.	96(D 5	g/cc psi/	
																																		0.	96(D 5	g/cc	
		59																																0.	96(g/cc psi/	
		50																																			g/cc psi/	
		59																																			g/cc psi/	
		59																																			g/cc psi/	
		50																																			g/cc psi/	
		50																																			g/cc psi/	
		50																											~								g/cc psi/	
		59						42.																					-2								9/cc psi/	
		59																											-2								g/cc psi/	
		345		35				42.				35																	-2								9/cc psi/	
		345		3				42.				35																	-2								g/cc psi/ 2.5	
		345 50 55		33				42.				35																	-2								9/cc psi/ 2.5 1	
		50						42.				35																	-21								g/cc psi/ 2.5	



OPERATION SUMMARY, JURASSIC/TRIASSIC FM.

Pretests

Two RFT runs were completed. In the first run 22 pretests records out of 23 were obtained and in the second run 9 out of 11.

- 11 -

A gas gradient of 0.0400 bar/m (0.177 psi/ft) or a gas density of 0.409 g/cc may be established down to the GWC at 2825 m RKB. No reliable water gradient can be established out of the pretest points from 2825 m to 2831 m RKB. These pretest records cause a gradient which is totally unrealistic (0.191 bar/m, 0.844 psi/ft or 1.947 g/cc)! See fig. 3. It is hard to explain this gradient. The hydrostatic pressure obtained is stable with depth indicating the RFT tool function properly. In addition, no operation problems occured and no pressures are influenced by supercharge.

The pretests records in the inerval 2925 to 2932.5 m RKB from run 2 may indicate an oil gradient (0.0814 bar/m, 0.360 psi/ft or 0.831 g/cc). This cannot be the case. The logs indicate clearly that the Triassic sand is 100 % water bearing. The interval where the pressure points are taken is simply too short to get an accurate gradient. A change in two pressure points of two psi while disregard one pressure point gives a water gradient.

The pretest records at 2791 m and 2790.8 m indicate that the sand in the Heather formation has a higher pressure than the gas bearing sand below (0.1095 g/cc eq. mud weight compared to 1.090 g/cc eq. m.w.).

The plot in fig. 4 of RFT pretest records in 15/9-11 and 15/9-9 for Jurassic/Triassic sands indicates no pressure communication between these two wells.

Sampling

One segregated sample was taken in run no. 1 at 2812 m. The 2 3/4 gallon chamber was bled off offshore with 2200 psig opening pressure at surface (for more information see attached sampling sheet). The chamber contained 2.18 m³ (77 ft³) gas and 1 l condensate.

The 1 gallon chamber was sent to PRO.LAB, Statoil, for analysis. It has been decided to performe a compositional analysis of the gas from this chamber.

In run no. 2 a new segregated sample was taken. The 2 3/4 gallon chamber was plugged at 2826.5 m and almost filled at 2826.0 m. The 1 gallon chamber was plugged at 2826.0 m and filled at 2825.8 m. The 2 3/4 gallon chamber was also opened at 2925.8 m to let the mudfiltrate first enter this chamber. Both chambers were opened and sealed several times to clear the flowlines (see the attached sampling sheet).

The 2 3/4 gallon chamber was bled off offshore with 50 psig opening pressure. The volume of the recovered water decreased from 13.5 1 to 9.5 1 when flowed out of the chamber. Dissolved gas got out of solution and the recovered water which had a white milky colour became brown. This may indicate a high CO_2 content in the solution gas. The opening pressure of 1 gallon chamber was 200 psi and it contained 3.0 1 recovered water which had the same colour and acted similar as the recovered water from the 2 3/4 gallon chamber.

Statoil production laboratory has done chemical analysis on samples from the two RFT chambers in run no. 2. The results are presented in appendix A. The samples contained probably both formation water and mudfiltrate. A thin oil film was observed on the surface of a sample from the 1 gallon chamber. The oil was extracted and analysed by gas chromatography. A comparison with the condensate chromatogram from DST no. 1, 15/9-11, 2797-2807 m shows a close similarity, specially at the higher hydrocarbon constituents (C_9-C_2) . It is reasonably to assume that the sample contained condensate and that the gas / condensate system is not underlain by an oil rim.

CONCLUSION

The sand encountered at 2795 m RKB has a gas gradient of 0.0400 bar/m, 0.177 psi/ft or a gas density equal to 0.409 g/cc. The gas/water contact is picked at 2825 m RKB. No water gradient can be established from the pretest records.

Max. rec. temp.: 190 ⁰ F (87.8 ⁰ C)	hydr. pr. Log pretest Cor.hydr.pr. Remarks re/after test pressure after test	ig psig psig, gm/cc psig, gm/cc	4 / 5126 5097 / 1.284 Tight, Heather Fm.	5 / 5048 4367 4336 / 1.090 5019 / 1.262 Heather Formation	6 / 5040 4373 4342 / 1.094 5011 / 1.262	1 / 5050 4368 4337 / 1.090 5021 / 1.262	7 / 5055 4370 4339 / 1.089 5026 / 1.262	9 / 5058 4370 4339 / 1.088 5029 / 1.261	/ 5062 4372 4341 / 1.088 5033 / 1.262	/ 5067 4373 4342 / 1.087 5038 / 1.262	9 / 5071 4374 4343 / 1.086 5042 / 1.261	1 / 5081 4377 4346 / 1.085 5052 / 1.262	6 / 5088 4380 4349 / 1.085 5059 / 1.262	0 / 5094 4383 4352 / 1.084 5065 / 1.262	2 / 5093 4384 4353 / 1.084 5064 / 1.261	4 / 5096 4386 4355 / 1.084 5067 / 1.261	8 / 5098 4388 4357 / 1.084 5069 / 1.261	0 / 5101 4397 4366 / 1.085 5072 / 1.261	2 / 5106 4397 4366 / 1.085 5077 / 1.262	4 / 5105 4398 4367 / 1.085 5076 / 1.262	9 / 5099 4392 4361 / 1.085 5070 / 1.262	8 / 5092 4382 4351 / 1.084 5063 / 1.262	4 / 5079 4379 4348 / 1.087 5050 / 1.262	6 / 5038 4380 4349 / 1.096 5009 / 1.262 Heather Formation	5 / 5060 4372 4341 / 1.086 5031 / 1.258 Sample	
	test	psig	/ 512	5045 / 5048	5036 / 5040	/ 50	>	5059 / 5058	5061 / 5062	5065 / 5067	~	5081 / 5081	5086 / 5088	5090 / 5094	5092 / 5093	5094 / 5096	5098 / 5098	5100 / 5101	5102 / 5106	-	5099 / 5099	60	07		/ 506	
15/9-11 1/11-81 .: 1	Depth	mRKB	2790.5	2796.0 '	2-791.0	2798.0 /	2801.0 M	2804.0 4	2806.0 /	2809.0	2812.0 *	2816.0	2820.0	2823.0	2825.0	2826.0	2827.0	2829.0	2830.0	2830.5	2828.0	2822.0	2813.5	2790.8	2812.0	
WELL: DATE: RUN NO.	Test	OM	-	2	3.	4	Ŋ	9	7	80	6	10	11	12	13	14	15	16	17	18	19	20	21	22	23	

PRETEST RECORDED DATA

....

PATE: 11/1- KUN NO.: 2 Test Depth No mRKB 1 2925.0 3 2925.0 4 2926.0 5 2938.0 6 2938.0 8 2932.5	11/1-81 2 Depth					
t Dept mRKB mRKB mRKB mRKB mRKB mRKB mRKB mRKB	ų				Max. rec. temp.:	: 190 ⁰ F (87.8 ⁰ C)
mRKE 1 2925 2 2926 3 2927 4 2929 5 2938 6 2938 8 2936 8 2936		Log hydr. pr. before/after test	Log pretest pressure	Cor.pretest pressure	Cor.hydr.pr. after test	Remarks
2925 2926 2924 2928 2938 2938 2938 2938		psig	psig	psig, gm/cc	psig, gm/cc	
2926 2929 2938 2938 2938 2938		5269 / 5269	1	I	5240 / 1.260	Triaht
2927 2929 2934 2938 2936 2936 2936	<u></u> ی	270 / 52	1	1	. ~	Tight
2929 2934 2938 2936 2936 2932	<u>،</u> ک	5272 / 5275	4585	4554 / 1.094	5246 / 1.260	1
293 293 293 293	0.	5275 / 5275	4586	4555 / 1.093	5246 / 1.260	
293	0.	5284 / 5279	4589	4558 / 1.092	5250 / 1.258	
293 293	0	5289 / 5289	4597	4566 / 1.093	5260 / 1.259	
293	0	5286 / 5287	4596	4565 / 1.093	5358 / 1.260	
, o, c	•5	5275 / 5279	4590	4559 / 1.093	5250 / 1.259	15
707	.5	5099 / 5153	4389	4358 / 1.084	5124 / 1.275	Sampling, plugging
2826	0.	5092 / 5084	4384	4353 / 1.083	5055 / 1.258	Sampling, plugging
11 2825	8.	5089 / 5088	4380	4349 / 1.082	5059 / 1.259	
		·				
		-				

5

- - ---

RFT - sampling data

Well:	15/9-1	1					
Date:	1/11-8	1					
Run no:	1						
Type of	sample	(segree	g.	/sepa	arate):	Segregat	ed
Chamber	sizes,	lower:	2	3/4	gallon	bottle	no:
		upper:	1	gall	lon	bottle	no:
Choke si	lzes:	4 x 0.0)2(0"			
Filter t	ype:						

Depth		m RKB	2812
Log h	ydr. pres. bef. setting	psig	5075
Log p	retest pressure	psig	4372
Cor.	pretest pressure	psig(g/cc)	4341 (1.087)
Lower	/upper chamber:		Lower
t	ime opened		13.06
Lowest 1	og flowing pressure	psig	4229
1	og shut-in pressure	psig	4359
t	ime sealed		13.16
с	or. flowing pressure	psig	4198
	or. shut-in pressure	psig(g/cc)	4334 (1.085)
Lower	/upper chamber		Upper
	ime opened		13.17
	og flowing pressure	psi9	4262
	og shut-in pressure	psi9	4360
t	ime sealed		13.22
с	or. flowing pressure	psig	4231
С	or. shut-in pressure	psig(g/cc)	4329 (1.084)
Log h	ydr. pres. after	 psig	5060
-	etracting		
	recorded temp.	° _F	190
	pres., lower ch.	psi g	2200
Surf.	pres., upper ch.	psi g	

Comments: The lower chamber was bled off offshore. The upper chamber was sent to Pro.Lab, Statoil, for analysis. Surface pressure was not checked offshore.

-

_

- 16 -

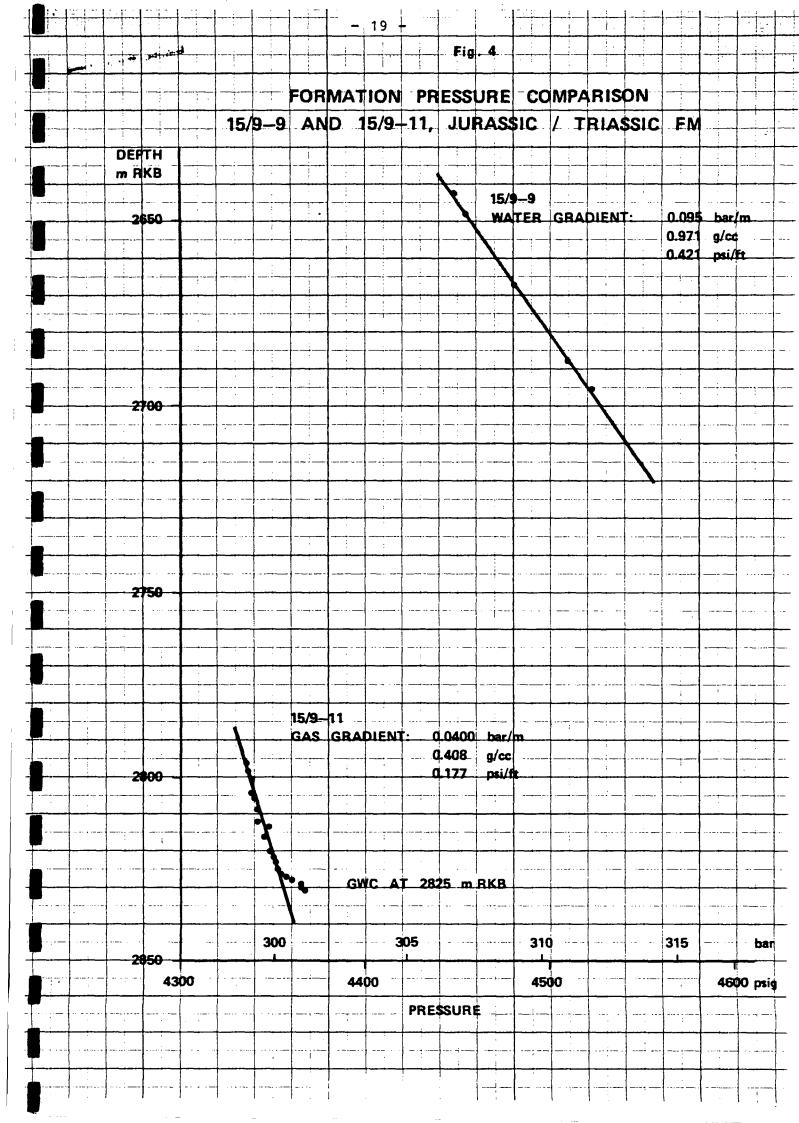
Well:	15/9-1	1					
Date:	1/11-8	1					
Run no:	2						
Type of	sample	(segreg.	/s	separ	ate):	Segre	gated
Chamber	sizes,	lower:	2	3/4	gallon	bottle	no:
		upper:	1	gal:	lon	bottle	no:
Choke si	zes:	4 x 0.020) "				
Filter t	ype:						

Depth Log hydr. pres. bef. setting Log pretest pressure Cor. pretest pressure	m RKB psig psig psig(g/ec)	2826.5 / 2826 / 2825.8 / 5099 / 5092 / 5089 4389 / 4384 / 4380 4358 / 4353 / 4349
Lower/upper chamber: time opened log flowing pressure log shut-in pressure time sealed cor. flowing pressure cor. shut-in pressure	psig psig psig psig (g/ee)	Lower 17.20 / 17.42 / 18.09 - / - / - - / 4384 / 4380 17.31 / 1747 / 18.10 - / - / - - / 4353 / 4349
Lower/upper chamber time opened log flowing pressure log shut-in pressure time sealed cor. flowing pressure cor. shut-in pressure	psig psig psig psig (g/ee) .	Upper 17.48 at 2826m/18.10 at 2825. Plugging / - - / 4380 18.02 / 18.15 - / - - / 4349
Log hydr. pres. after retracting Max. recorded temp. Surf. pres., lower ch. Surf. pres., upper ch.	psig ^O F psig psig	5153 / 5084 / 5088 190 50 200

Comments: Both chambers were bled off offshore. The 2 3/4 gallon chamber was plugged at 2826.5 m and almost filled at 2826.0 m. The 1 gallon chamber was plugged at 2826.0 m and filled at 2825.8 m.

- 17 -

18 Fig 11 FORMATION PRESSURE 15/9 TRIASSIC EM URASSIC / EF Ŧ E E DEPTH Ħ 1.1 m FKB ij‡ 頭持 Ъ фĒ Ē 17 20 ----2800 0.0401 bar/m GRADIENT GAS 1 ЭЦ ÷ 0.409 g/cc . psi/ft 0.177 4; H ii ii \$p l-r 5Ŧ ÷, 175 -----= ितः -114 a r 5116 2825 mRKB GAS CONTACT WATER - ----37 2 -1.: 1..... 土井 -----÷ =‡ Ŧ 남 1 lt: . Her : 1 1.5 33 ÷ 1-1-1 H Fit. ţ **B50** 11 i 7. . . i., ÷ 21 7 ----÷. ---------÷ 1-22 1 H 10 - [-] i d ΞH 1: -e | 35 11 3 1 i. i Ì. = 1 ۱÷ , dy Į. -----2900 4 ÷. 11 1.17 -1---- 177 討臣 닅 i:::: - 7 -12 ----÷ 4 ---8 ÷ ţ. - 4 - [± 44 - İ. 121 금물 - 1 5 -----1 1. 310 1 1 - 11 : I: 316 . -44 ba 300 05 ----i -1 11-- 11 Ŧ ti ti -1-11 2950 ï 7 1 4600 psig 4400 4500 4300 Ξ. 1 453 15 4 ÷ PRESSURE te i Ŀd 4 12-Tre: 1, 1 ţ 1: 1. 17 : 1 17 · ; $|_{2}$ 14.5 ł 2 i 1 1117 d_{14} 9-172 Ţ



APPENDIX A

.

I.

i

-



Classificatio	<u> </u>		
		•	

Requested by

K. Grini

Subtitle

Co-workers

A. Lykling Berge

Title

WATER ANALYSIS

15/9-11

RFT SAMPLE AT (2825.8-2826.5) m

STATOIL **EXPLORATION & PRODUCTION** LABORATORY

A.L. Berge

FEB. 82

LAB 82.08

Prepared 22/2-82 Ruch Lykling Bage 22/2-E2 De atte

1. INTRODUCTION

Statoil Production laboratory (Prolab) received five, 1 liters glass with RFT sample, collected from 1 gallon RFT chamber and from 2 3/4 gallon RFT chamber after run 2, at 2825.8 m - 2826.5 m on 1.11.81 in well 15/9-11. The RFT sample was probably a mixture of formation water and mudfiltrate.

Prolab was asked to do a chemical analysis on the RFT samples, to see if the samples from the two chambers were significant different and to what degree any formation water was contaminated by mud filtrate.

2. SAMPLE DESCRIPTION

The water samples were dark brown, clody with high content of solid. In the 1 gallon chamber a thin oil film was observed on the surface of the samples. A portion of the filtrate in the 1 gallon chamber was extracted by dichloromethane to extract the oil compounds analysis on the residue.

One of the sample from 2 3/4 gallon chamber was polluted by H_2S .

LAB 82.08

3. METHODS OF ANALYSIS USED BY PROLAB

The sample was filtrated through a 0.45 μ m millipore filter. Most of the analysis were carried out according to ASTM methods, using atomic absorption.

The following ions were determined by wet chemistry techniques:

ions C1⁻⁴ (including Br and I) ASTM D 512 Lignosulphonate (LS) Light absorption at 280 nm (1)

Total dissolved solids is determined by drying the residue at 120[°]C over night. Density was measured by PAAR 401 densiometer. Conductivity was determined by using a Philips Conductivity Meter PW 9501/01. These measurements were done at carefully controlled temperatures.

The oil in the dichloromethane extract were analysed by gas chromatography.

Relativ standard deviation, RSD, is determined (experimentally and/or theoretically on) every measured value.

RSD = $\frac{\sigma}{x}$ where $\bar{x} = \frac{\sum_{i=1}^{n}}{n}$, x_i (i=1...n)

is measured values in n independent measurements and, $\sigma = \begin{bmatrix} \frac{p}{2}(x_i - \bar{x})^2 \\ \frac{i=1}{n-1} \end{bmatrix}$ 1/2

LAB 82.08

4. RESULTS

Table 1 gives the results of the water analysis. In table 2 a comparison of the calculated and the measured values of the total dissolved solid is given. Fig. 1 shows a chromatogram of the oil extracted from 1 gallon chamber.

In appendix 1 the daily mud report is found. Appendix 2 shows a UV specter of Lignosulphonate compared with a UV specter of RFT sample.

Appendix 3 shows a chromatogram of oil from 15/9-11 compared with a chromatogram of oil extracted from 1 gallon chamber.

Table 1. Results of selected ion analysis of RFT samples.

Sample	2 3/4 gallon chamber	1 gallon chamber
Density at 20 ⁰ C, g/cm ³	1.0367	1.0344
рн	7.78	11.0
Total dissolved solid, 7.	5.25	4.99
Conductivity at 20°C, mmho/cm	n 59.5	53.1
Ion	concentration (ppm)	
Ca ²⁺	443	64
Mg ²⁺	205	0.2
Cl (including Br and I)	20517	16809
Lignosulphonate	1030	1260
Sum ion, %	2.22	1.81

5. DISCUSSION

5.1 Analysis of RFT sample

In addition to the normal ion analysis we have also measured the amount of Lignosulphonate (LS) present in the samples.

4

Table 1 clearly demostrates a difference between 1 gallon and 2 3/4 gallon chamber. The low pH (7.78) in the 2 3/4 gal chamber probably explain the high Ca⁺⁺ and Mg⁺⁺ concentration found in the sample. The difference in Cl⁻ concentration between the 2 3/4 gallon and 1 gallon chamber is probably to small to decide if the chambers contains two different formation water in addision to the mudfiltrate.

Table 2. Comparison of calculated and measured values for the total dissolved solids.

Sample	2 3/4 gallon chamber	1 gallon chamber	RSD&
Residue after evaporation	5.25	4.99	1
Correlated from density*	5.37	5.05	0.1
Correlated from conductivity	4.16	3.68	.3

* Handbook

The results from table 2 futher confirm that there is a difference between the two chambers. A slight ionbalance was also found in the measured and calculated values of TDS.

The data from the mud report Table 3 only indicate that the pH in 2 3/4 gallon chamber is much lower than in the

LAB 82.08

mudfiltrate, where as the the ion composition do not clearly tell anything about the dilution grad of formation water by mudfiltrate.

Table 3. Data taken from mudreport No. 46, Appendix 1

PH			11.0	
ION			Concentration	mg/l
c1 ⁻			21000	
Ca^+	(total	hardness	180	

5.2 Oil extract from 1 gallon chamber

The oil was extracted from 1 gallon chamber and analysed by gas chromatography. (Fig. B in appendix 3) shows a close similarity with a similar oil chromatogram from 15/9-11 DST 1, 2797m - 2807m. The distribution at the higher oil constituents in both chromatograms are rather similar (C₉ - C₂). The lighter components in the oil is lacking in the extraction, so a good correlation is not possible to do.

LAB 82.08

CONCLUSION

The RFT sample from 1 and 2 3/4 gallon chamber probably contain both mudfiltrate and formation water. It is difficult to decide if the chambers contain different formation water, based on the ion analysis performed. Both samples contain high amount of lignosulphonate which tells that they are contaminated with mudfiltrate. Since we have not received any mudfiltrate we can not make any comparison between the two samples.

The oil extracted from 1 gallon chamber seems to contain the components of heavier hydrocarbons as found in oil from well 15/9-11 DST 1.

REFERENCES

- Spectrophometric Determination of Lignosulphonicacid and Humic acid in water. Fregenius Z, Anal. Chem. 296,406 - 407 (1979).
- 2) CRC Handbook of Chemistry and Physics 60th edition page D-261.

MUD TELEX

.

:

.

• · · ·

DATE: 1/11/81 REPORT NO: 46-

1 NUD PROPERTIES

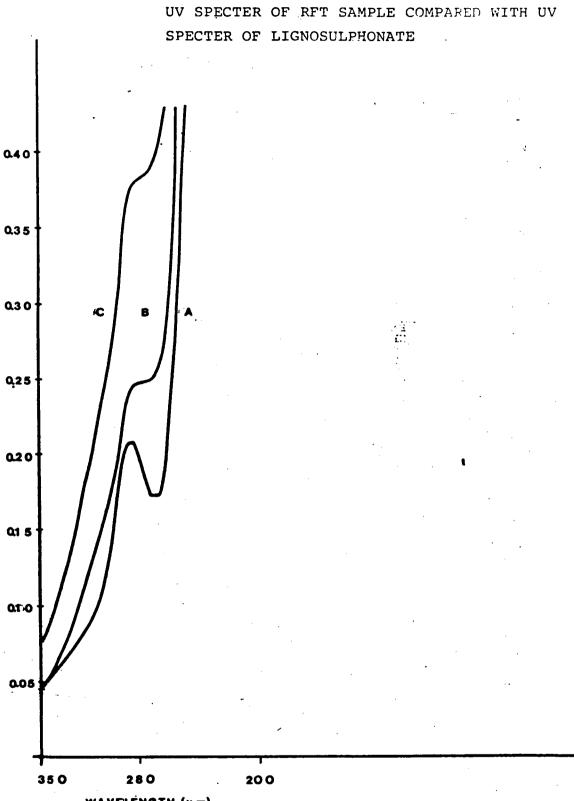
TINE: DEPTH: -	1200 2950	2200 2950
TEMP: WT: FURMEL VISC: A.V.: P.V.: Y.P.: GELS: P4: FILTRATE:	23 21 14 4/9 - 4.6	1.27 46 20 21 14 4/2 11.0 4.6 1
CAKE: HPHT: CAKE: PF/MF: CL:	·	12.6 2 .5/1.2 21000
T.H.: SOLIDS: DIL: SAND: NOT:	•	180 11 - TR 32.5

2 INVENTORY

BARITE SXS: DENTONITE MT: DENTONITE SX: CAUSTIC: SODA ASH: DICAR3: CHROME LIGNO: DRISPAC SL/REG: CMC LV/HV: MICA F/M:	ANCE 230 100 1(9 361 218 80 71 174 63/86 67/51 45/108 51/130		U329
HICO SPOT: B FREE/PIPELAX: DRLG DET: TORQ TRIM: K LIG/LIGNITE:	46/27 120 10/5 11 23/403 23 2 2 3: 37/3	-6 ⁻	

3 CONTENTS:

LOGGING. DUMPED AND CLEANED THE HEADER BORE AND CLEANED UNDER SHAKERS. PUT MUD GUNS ON RESERVE MUD TANK.



WAVELENGTH (nm)

A) LIGNOSUL PHONATE : 2 2 mg/i

B) 2 3 4 GALLON CHAMBER 1 100 DILUTED

C) 1 GALLON CHAMBER 1 100 DILUTED

_.[.] . . .

