0G31545

MINERVA-1

DEPT. NAT. RES & ENV
PE600590

BHP

WELL SUMMARY

PETROLEUM PERMIT: VIC/P31, OTWAY BASIN

SURFACE LOCATION

SEISMIC REFERENCE: LINE: OE81A-2028 SP:2232
LONGITUDE: 142 57 12.34"E; X: 669,862.5mE
LATITUDE: 38 42 12.23"S; Y: 5,714,311.0mN

PRIMARY TARGET:

TOP LOWER SHIPWRECK GROUP FORMATION
DEPTH: 2112mRT, 2080.3mTVDSS
LONGITUDE: 142 57 11.5"E X: 669,839.8mE
LATITUDE: 38 42 15.8"S Y: 5,714,199mN

SECONDARY TARGET:

UPPER SHIPWRECK, WANGERIPP AND SHERBROOK GROUPS

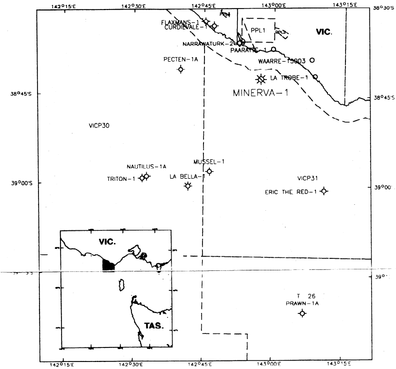
WELL STATUS: GAS DISCOVERY - SUSPENDED

ELEVATION: DATUM: MEAN SEA LEVEL
LOG REF.: RT, 25m ABOVE DATUM
SEA BED: 57m BELOW DATUM

DATES: ON LOCATION: 0852hrs, 06-MAR-1993
SPUDDED: [illegible]hrs, 08-MAR-1993
TOTAL DEPTH: 1230hrs, 04-APR-1993
RIG RELEASED: 1600hrs, 17-APR-1993

TOTAL DEPTH: 2425mRT 2385.2mTVDSS

DRILLED BY: BYFORD DOLPHIN
DOLPHIN DRILLING



WIRELINE SUMMARY

	Suite 1	Suite 2	Suite 3	Suite 4	Suite 5	Suite 6
Date	14-MAR-1993	21-MAR-1993	25-MAR-1993	04-APR-1993		
First Reading	1199.0M	2019.0M	2098.0M	2419.5M		
Last Reading	549.0M	1189.0M	1800.0M	2109.5M		
CSG (Logger)	549.0M	1189.0M	1189.0M	2108.0M		
CSG (Driller)	550.0M	1189.0M	1189.0M	2108.0M		
Depth (Driller)	1204.0M	2031.0M	2107.0M	2425.0M		
Mud Type	KCL-PHPA	KCL-PHPA	KCL-PHPA	KCL-PHPA		
Mud Resistivity	0.169 ohmm at 22.0C	0.100 ohmm at 21.0C	0.099 ohmm at 18.0C	0.091 ohmm at 24.0C		
Rmf	0.144 ohmm at 22.0C	0.084 ohmm at 22.0C	0.089 ohmm at 18.0C	0.080 ohmm at 24.0C		
Rmc	0.210 ohmm at 22.0C	0.120 ohmm at 22.0C	0.128 ohmm at 18.0C	0.105 ohmm at 20.0C		
Max. Rec. Temp.	58.0 C	83.0C	81.0C	90.0C		
Bit Size	12 1/4"	8 1/2"	8 1/2"	6"		
Casing Size	13 3/8""	9 5/8"	9 5/8"	7" LINER		
Wireline Logs	DLL-MSFL-AS-GR-SP-AMS	DLL-MSFL-AS-GR-AMS	DLL-MSFL-AS-GR-SP-AMS	DLL-MSFL-SDT-GR-CAL-AMS		
	VSP	FMS-LDL-CNL-GR-AMS	CST-GR (60 SHOT)	LDL-CNL-FMS-GR-AMS		
	CST-GR (46 SHOT)	VSP		VSP		
		RFT-HP-GR (3 RUNS)		CST-GR (21 SHOT)		
				CBL-VDL-USI		

LITHOLOGY AND ENGINEERING LEGEND

CLASTICS

- CONGLOMERATE
- SANDSTONE - COARSE
- SANDSTONE - MEDIUM
- SANDSTONE - FINE
- SILTSTONE
- CLAYSTONE
- CALCAREOUS CLAYSTONE

CARBONATES

- CALCARENITE
- CALCILUTITE
- CALCISILTITE
- LIMESTONE
- DOLOMITE
- ANHYDRITE
- GYPSUM

OTHERS

- BRECCIA
- CHERT
- VOLCANICS
- METASEDIMENTS
- IGNEOUS
- DOLERITE
- INDETERMINATE

ACCESSORIES

- ARGILLACEOUS
- CALCAREOUS
- DOLOMITIC
- F FOSSILIFEROUS
- FORAMINIFERA
- GASTROPODS
- PLANT REMAINS
- O RADIOLARITES
- FELDSPATHIC
- FRACTURES
- ✕ RECRYSTALLIZED
- 9 GLAUCONITIC
- S SIDERITIC
- SILICEOUS

ENGINEERING

- ◢ CASING SHOE
- ◥ CASING HANGER
- ○ RFT PRETEST
- ● RFT SAMPLE
- HYDROCARBON SHOW
- PERFORATIONS
- ■ CORED INTERVAL
- ☒ CORE LOSS

▤ SHALE

■ COAL

HALITE

MARL

A AMBER

F FERRUGINOUS

BIVALVE

BRYOZOA

⊕ CORAL

INOCERAMUS

CARBONACEOUS

m MICACEOUS

◊ LITHIC FRAGMENTS

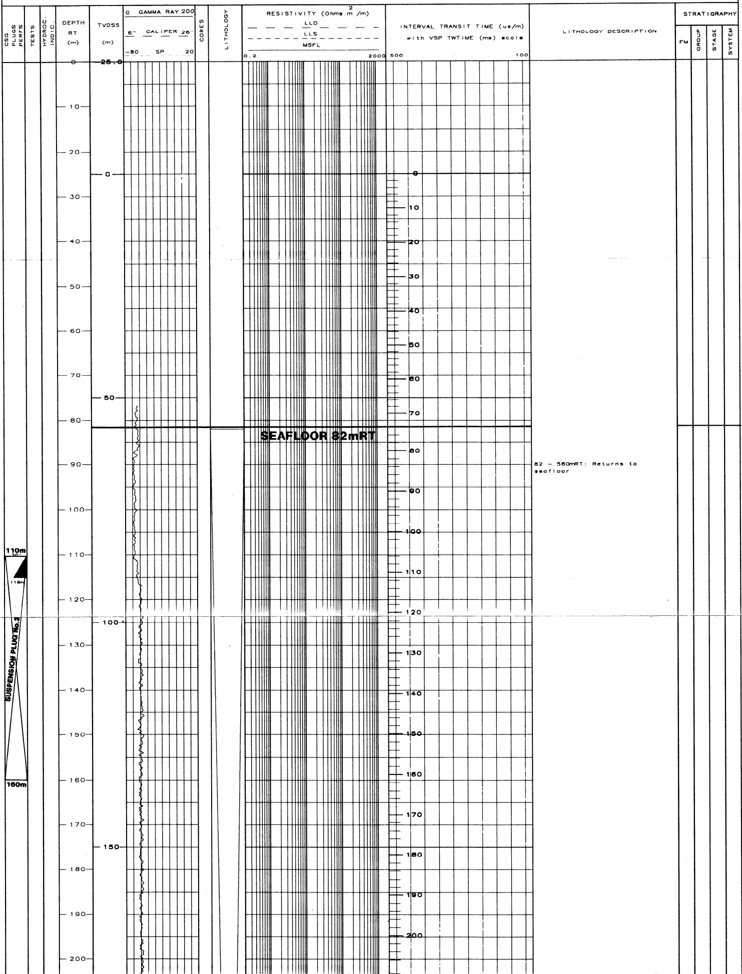
◆ PYRITE

▶ SIDEWALL CORE

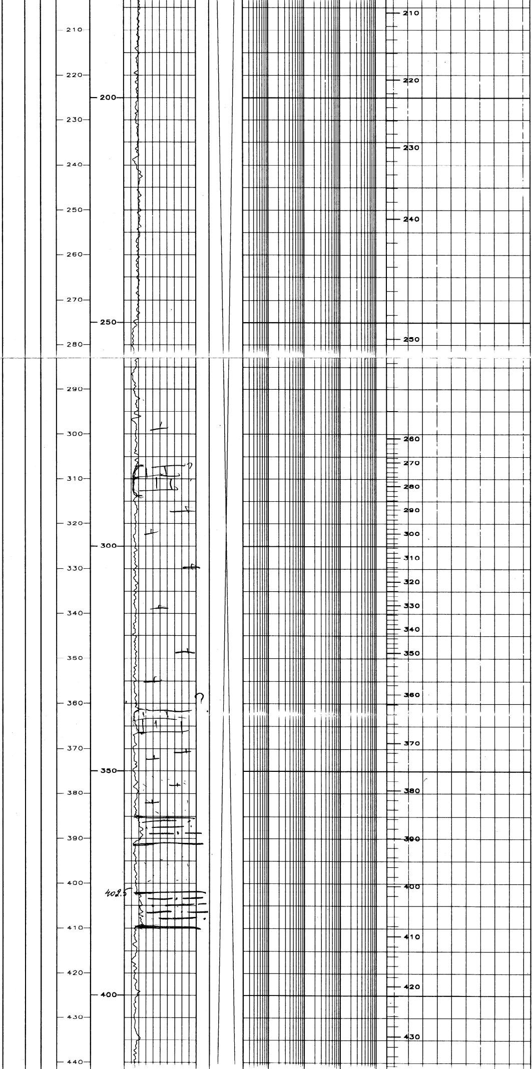
▷ SIDEWALL CORE – NO RECOVERY

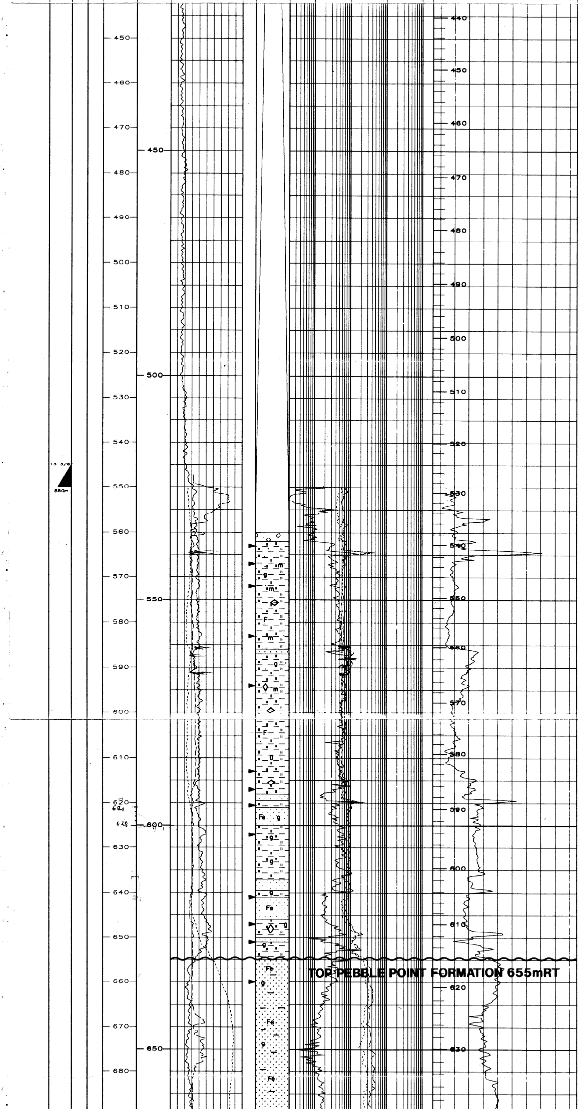
⧗ PLUGGED INTERVAL

INTERPRETATION BY: A.LOCKE/S.HORAN
COMPILED BY: M.LEMAIRE
DRAWN BY:
SCALE: 1:500



82 – 580mRT: Returns to seafloor





560 – 655mRT: INTERBEDDED PEBBLY CONGLOMERATE, FERRUGINOUS SANDSTONE AND SILTY CLAYSTONE

PEBBLY CONGLOMERATE: (0–30%) off white to light grey to occasionally light yellow, extremely hard, medium to occasionally large pebble, subrounded to rounded, moderately sorted quartz, abundant siliceous cement, trace calcareous cement, trace to rare pyrite cement, rare rounded calcite pebbles, nil visual porosity; No show.

FERRUGINOUS SANDSTONE: (0–80%) light brownish grey, occasionally medium brownish grey and light grey, ferruginous near top, moderately hard to hard, friable with loose grains in part, dominantly medium to coarse, dominantly subrounded, very poorly sorted, common medium to dark brown argillaceous matrix, trace strong pyrite and moderately weak calcareous cement, trace to rare iron oxide/hydroxide cement, trace to occasionally common medium to coarse grained iron oxide/hydroxide pellets, trace pyrite nodules, occasionally replacing fossil fragments, trace medium grained glauconite pellets, rare foram and shell fragments, very poor visual porosity; No Show.

SILTY CLAYSTONE: (20–100%) medium to dark brown, soft, dispersive in part, sticky in part, grading to argillaceous siltstone in part, rare medium grained glauconite pellets, rare carbonaceous flakes, non calcareous, trace fossil fragments; No show.

655 – 785mRT: SANDSTONE WITH INTERBEDDED CLAYSTONE AND MINOR DOLOMITE

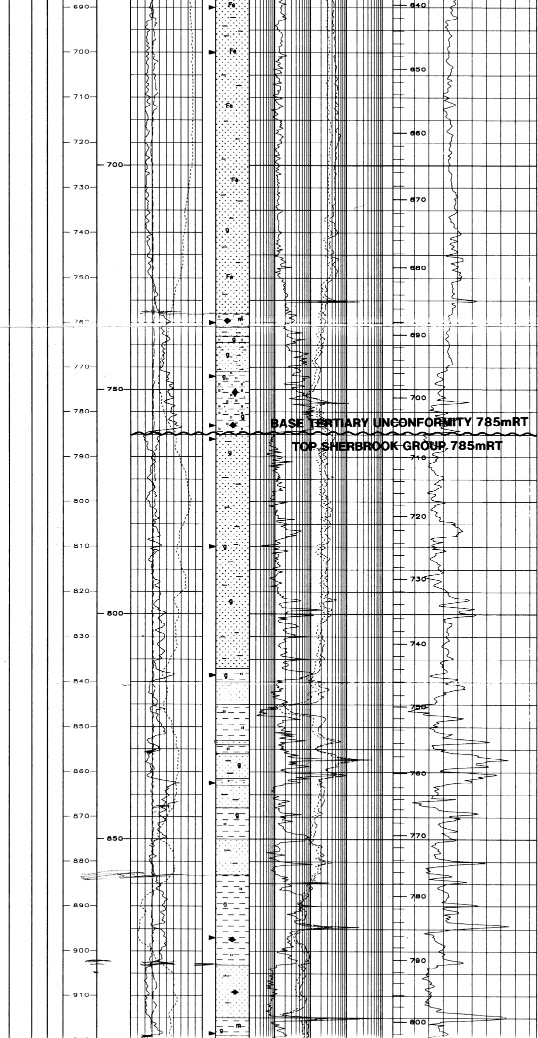
SANDSTONE: (0–100%) clear to opaque, light green in part, becoming red to brown with depth, friable with loose grains, medium/coarse to very coarse grained, bimodal, occasionally granule/pebble grade, subrounded to rounded, moderately well sorted quartz grains, ?minor medium brownish green argillaceous matrix, trace pyrite cement in part, rare glauconite, trace siliceous cement, very good inferred porosity; No show.

PEMBER MUDSTONE

WANGERRIP GROUP

LATE PALEOCENE – EARLY EOCENE

TERTIARY



CLAYSTONE: (10–100%) medium greyish brown to greyish green, soft, sticky, dispersive in part, micromicaceous, trace carbonaceous matter, trace glauconite pellets, trace to rare quartz silt and very fine sand grains, grading to very fine sandstone; No show

DOLOMITE: (0–10%) buff with peppery appearance, very hard, blocky, rare dispersed very fine glauconite pellets and trace carbonaceous specks giving a peppery effect; No show.

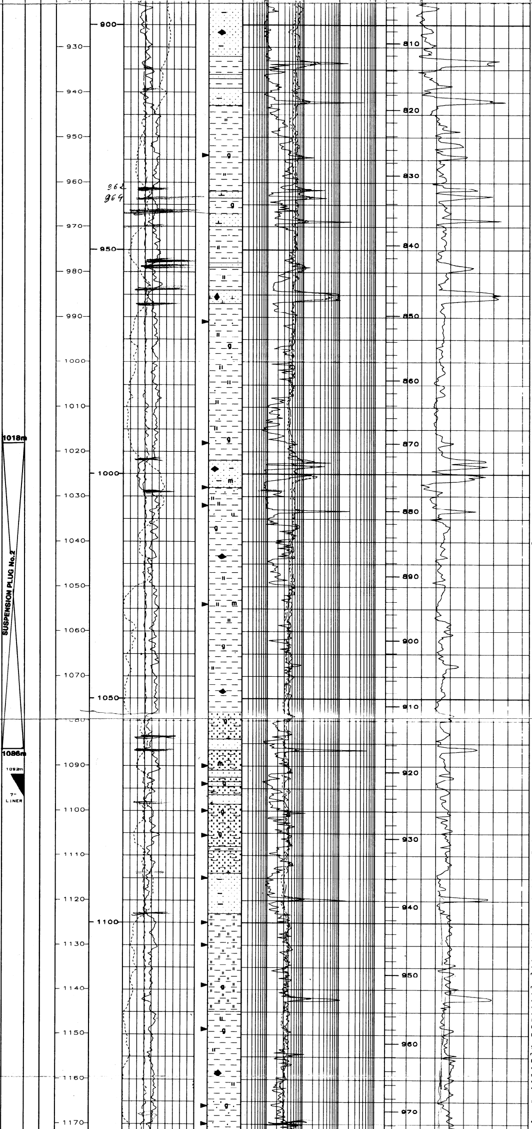
785 – 1028mRT: SANDSTONE INTERBEDDED WITH CLAYSTONE

SANDSTONE: (10–100%) light grey to clear, occasionally very light greenish grey in part, friable with abundant loose grains, medium to granule grade, dominantly medium to coarse grained, subangular to dominantly subrounded, poorly sorted quartz, trace to common medium grey to brownish grey occasionally greenish grey dispersive argillaceous matrix, rare moderately weak siliceous cement in part, rare coarse to granule grade light yellow, grey, green and brown lithics, trace fine glauconite pellets, rare mica, trace to rare pyrite nodules, rare interbedded medium brown dolomitic bands, fair to occasionally good visual/inferred porosity.

CLAYSTONE: (0–90%) generally as above, medium to dark brownish grey, soft, dispersive in part, sticky in part, common micromica, trace to rare silt and very fine sand grains, non calcareous, rare carbonaceous flecks, rare fine glauconite pellets, grades to silty arenaceous claystone.

PEBBLE POINT FORMATION

LATE MAASTRICHTIAN – LATE PALEOCENE



SHERBROOK GROUP

LATE SANTONIAN – EARLY MAASTRICHTIAN

LATE CRETACEOUS

1028 – 1100mRT: CLAYSTONE INTERBEDDED WITH MINOR SANDSTONE

CLAYSTONE: (80–100%) light grey to medium brownish grey, soft, dispersive in part, sticky in part, moderately silty, trace micromica, trace fine carbonaceous flecks and laminae, trace very fine quartz grains, non calcareous.

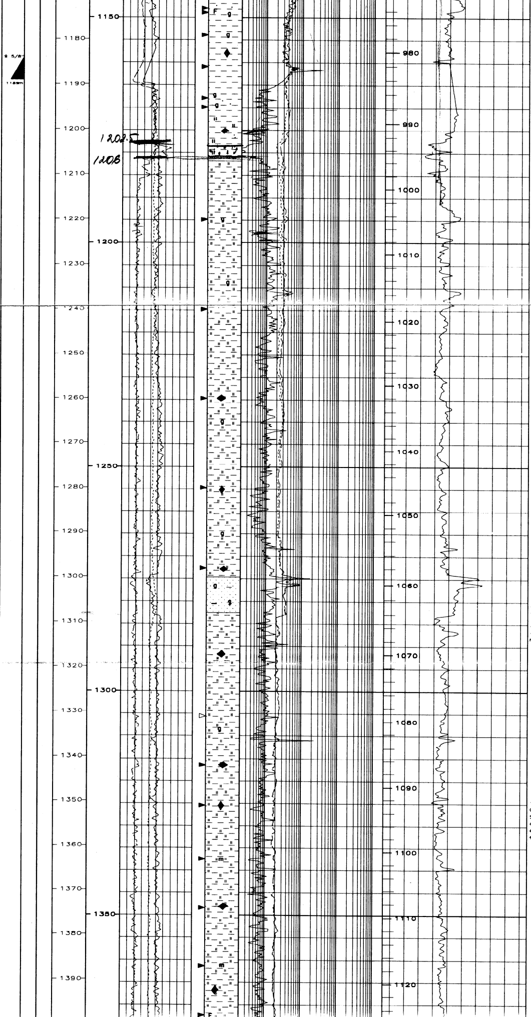
SANDSTONE: (0–20%) as above.

1100 – 1148mRT: ARGILLACEOUS SILTSTONE INTERBEDDED WITH SANDSTONE AND SILTY CLAYSTONE

ARGILLACEOUS SILTSTONE: (0–100%) light grey to medium brownish grey, soft, dispersive in part, abundantly argillaceous, trace micromica, trace fine carbonaceous flecks and laminae, trace very fine quartz grains, non calcareous.

SANDSTONE: (0–40%) off-white to light grey, occasionally very light greenish grey, moderately hard to occasionally hard, rarely friable with trace loose grains, dominantly fine, occasionally medium in part, dominantly subrounded, well sorted quartz, trace light grey dispersive argillaceous matrix, common to occasionally abundant moderately weak to moderately strong calcareous cement, rare moderately strong siliceous cement, trace to common fine glauconite, trace mica, trace grey lithics, trace carbonaceous detritus, trace hard medium brown dolomite band, poor to very poor visual porosity.

SILTY CLAYSTONE: (80–100%) medium to dark grey and brownish grey, occasionally off-white to light grey in part, soft, rarely firm, dominantly dispersive, occasionally sticky, commonly to occasionally abundantly silty, trace fine glauconite, trace carbonaceous flecks and laminae, trace micromica, non calcareous.



1148 – 1208mRT: CLAYSTONE INTERBEDDED WITH SANDSTONE

CLAYSTONE: (85–100%) medium to dark grey and brownish grey, occasionally off-white to light grey in part, soft, rarely firm, dominantly dispersive, occasionally sticky, moderately silty, trace fine glauconite, trace carbonaceous specks and laminae, trace micromica, non calcareous.

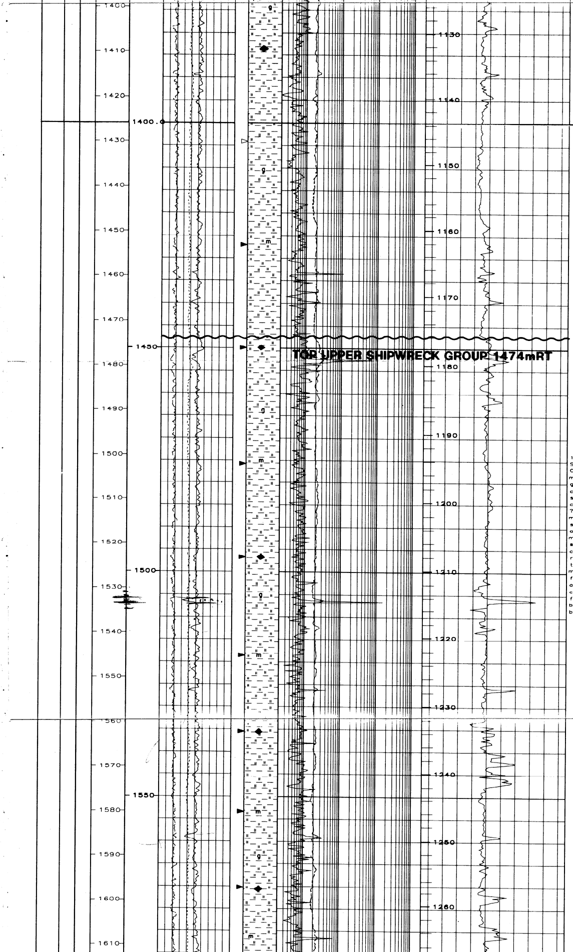
SANDSTONE: (Tr–15%) clear, friable with abundant loose grains, fine to medium grained, becoming dominantly medium to coarse grained with depth, subangular, becoming dominantly subrounded with depth, poorly to moderately sorted quartz, no apparent matrix or cement at top, trace light grey argillaceous matrix at depth, good to very good inferred porosity.

1208 – 1300mRT: SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE

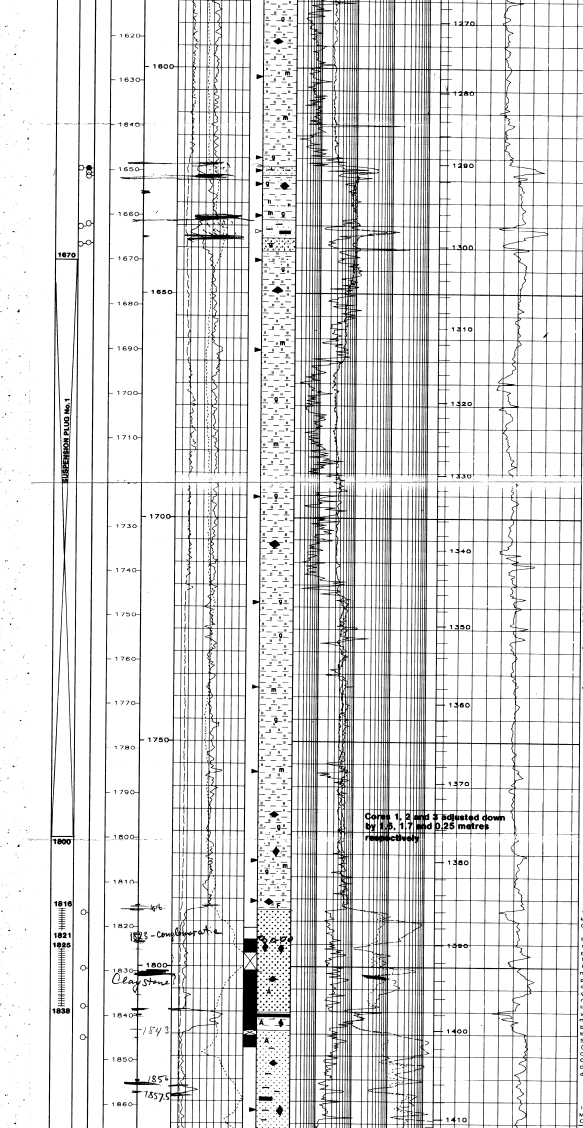
SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE: (100%) medium/light to dark grey, occasionally medium to dark brownish grey and greenish grey, firm to moderately hard, blocky, rarely subfissile in part, moderately silty, common glauconite, rare micromica, trace to rare carbonaceous flecks and laminae, rarely finely arenaceous in part, slightly calcareous, rare bands of medium brown moderately hard dolomite (with trace glauconite), trace fractures filled with calcareous material, grades to argillaceous siltstone, trace moderately bright yellowish white mineral fluorescence.

1300 – 1309mRT: SANDSTONE (100%) clear, translucent to very light grey in part, friable with common loose grains, dominantly fine to occasionally medium grained, trace very light grey to greenish grey dispersive argillaceous matrix, common medium grained glauconite, good to very good inferred porosity.

1309 – 1474mRT: SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE: (100%) generally as above, dominantly medium to dark brownish grey and greenish grey.



1474 – 1649mRT: ARGILLACEOUS SILTSTONE GRADING TO SILTY CLAYSTONE: (100%) medium to medium/dark greyish brown to grey, firm to slightly hard, commonly moderately hard, subblocky to blocky, rare calcareous cement, trace ?siliceous cement, abundant medium/dark greyish brown slightly calcareous argillaceous matrix, commonly matrix supported and grading to silty claystone, rarely to commonly finely arenaceous, rare carbonaceous flecks, trace to rare glauconite, common micromica and trace mica flakes, trace microcrystalline and fine grained cryptocrystalline pyrite, trace fossil fragments, trace medium brown moderately hard dolomite bands



Cores 1, 2 and 3 adjusted down by 1.6, 1.7 and 0.25 metres respectively

1649 – 1667mRT: CLAYSTONE INTERBEDDED WITH SANDSTONE AND SILTSTONE.

CLAYSTONE: (0–80%) medium to dark grey, firm to moderately hard, subblocky to dominantly blocky, rarely to moderately silty in part, trace carbonaceous flecks, trace to rare glauconite, non calcareous.

SANDSTONE: (0–100%) two varieties: (i) clear to light grey to very light brownish grey, friable with abundant loose grains, very fine to coarse grained, predominantly fine to medium grained, dominantly subrounded, moderately sorted quartz, trace light grey dispersive argillaceous matrix, good to very good inferred porosity. (ii) generally as above, hard to very hard, common to abundant strong calcareous siliceous and rare to common pyritic cement, nil to poor visual porosity.

SILTSTONE: (10–100%) medium grey to occasionally medium brownish grey, firm to moderately hard, blocky, abundantly argillaceous, trace to rare moderately strong calcareous cement, trace to rare glauconite and carbonaceous flecks, trace mica, trace partially altered feldspar, commonly to abundantly arenaceous, grading in part to fine argillaceous sandstone, nil to very poor

1667 – 1816mRT: CLAYSTONE INTERBEDDED WITH ARGILLACEOUS SANDSTONE/SILTSTONE

CLAYSTONE: (40–80%) medium to dark grey, firm to moderately hard, subblocky to dominantly blocky, rarely to moderately silty in part, trace carbonaceous flecks, trace to rare glauconite, non calcareous. Becoming silty with depth.

ARGILLACEOUS SANDSTONE GRADING TO ARGILLACEOUS SILTSTONE: (1800 – 1812m, 0–60%) light to medium grey to occasionally medium brownish grey, moderately hard, rarely friable with rare to common loose sand grains, very fine to fine, dominantly subrounded, moderately well sorted, abundant off-white to light grey argillaceous matrix, trace calcareous cement, trace to rare glauconite and carbonaceous flecks, trace mica, trace partially altered feldspar, commonly to abundantly arenaceous, grading in part to argillaceous siltstone, poor to very poor visual porosity.

1816 – 1847mRT: SANDSTONE WITH MINOR INTERBEDDED CLAYSTONE AND COAL.

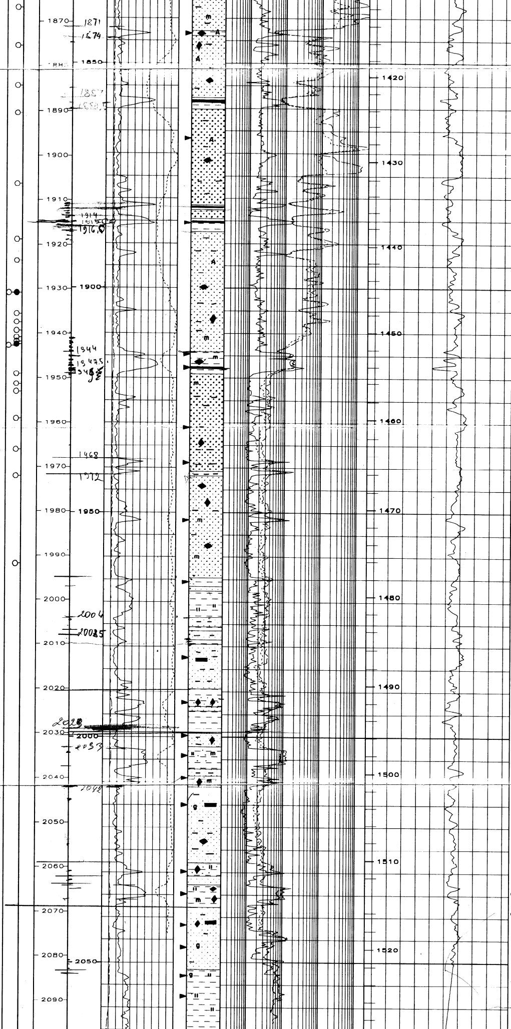
SANDSTONE: (0–100%), clear to translucent, fine grained to pebbles, predominantly medium to coarse grained, subangular to subrounded, poor to moderately sorted, predominantly massive with common trough cross beds and granule to pebble beds; SHOW: no direct, nil to slow dull brown.yellow to greeny/white to yellow/white cut, very slow to moderately fast yellow/white to brown/yellow crush cut, thin bluish/white residual ring. See Core Chip description (Minerva-1 Basic Well Completion Report) and Minerva-1 Conventional Core Descriptions (Arditto 1994) for detailed descriptions.

1847 – 1998mRT: SANDSTONE WITH MINOR INTERBEDDED CLAYSTONE AND CARBONACEOUS CLAYSTONE.

LATE CRETACEOUS

UPPER SHIPWRECK GROUP

TURONIAN - EARLY SANTONIAN



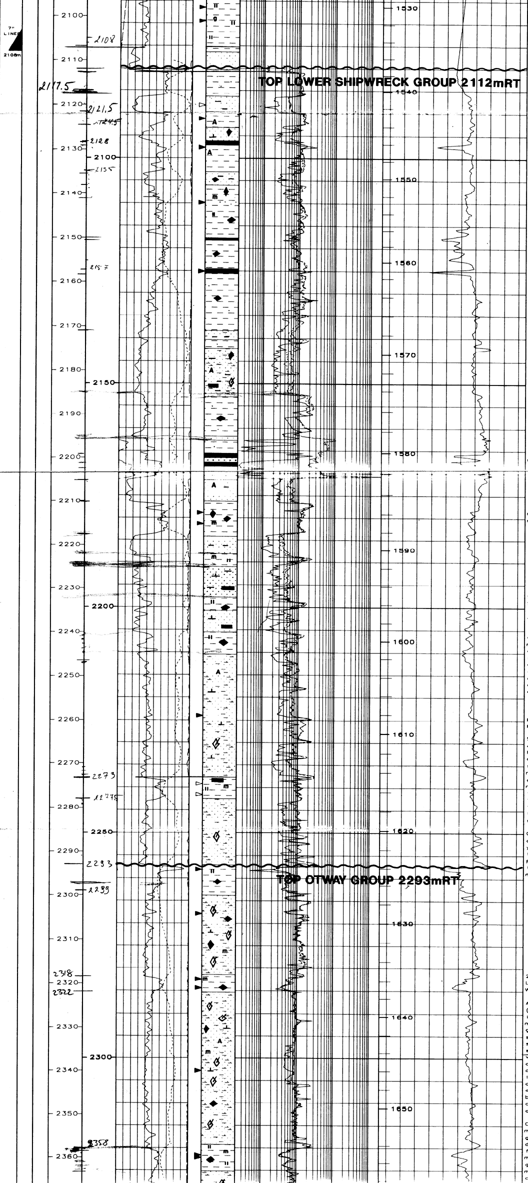
SANDSTONE: (TR–100%), clear to light grey, friable to moderately hard, abundant loose grains, very fine grained to granules, predominantly medium to coarse grained, subangular to subrounded, poorly to moderately sorted, trace to abundant off white kaolinitic/argillaceous matrix, trace to rare moderately strong siliceous cement, trace carbonaceous specks, trace microcyrstalline pyrite, trace pyritized plant fragments, trace lithics, trace micromicaceous, trace coaly detritus, fair to good visula porosity; SHOWS: 1907–1949, 1979–1998, no direct, nil to very slow bleeding pale blue/white cut in SWCs, very slow pale white/bluish to yellow/white crush cut, thin bluish white residual ring.

CLAYSTONE: (TR–100%), medium to dark grey, occassionally browny/grey, firm to moderately hard, rarely arenaceous to occassionally silty in part, trace micromicaceous, rare mica flakes, trace carbonaceous material, trace disseminated microcyrstalline pyrite, non-calcareous, trace coaly fragments, grades to carbonaceous claystone in places; SHOW: no direct, no cut, no crush cut, very thin moderately dull white residual ring.

?
1988 – 2112mRT: SANDSTONE INTERBEDDED WITH CLAYSTONE

SANDSTONE: (TR–100%), clear to light grey, occasionally off white to browny grey, trace light green/grey, friable to moderately hard with abundant loose grains, very fine to very coarse grained, predominantly fine to medium, subangular to subrounded, poor to well sorted, trace to abundant light grey to off white kaolinitic and argillaceous matrix, trace to rare moderate silleceous cement, trace to rare pyrite cement, trace micromicaceous, trace lithics, trace carbonaceous to coaly fragments, trace to rare glauconite grains 2030–2112mRT, trace amber, trace microcrystalline pyrite, fair to good inferred porosity, SHOWS: 2006–2105m cuttings, 2013–2101 SWCs, cut, nil to very slow bluish/white crush cut, very thin to thin bluish/white residual ring.

CLAYSTONE: two types, predominantly type 1; 1: medium to dark grey, commonly medium/dark brown/grey, grades to argillaceous siltstone, trace very fine grained sand, trace micromicaceous, trace very fine grained mica flakes, trace disseminated pyrite, trace carbonaceous flakes, trace coaly particles, trace grey lithics, trace very fine grained off white feldspar, trace very fine grained glauconite; Type 2: off white, soft to moderately hard, silty to commonly fine areanceous grains, trace carbonaceous specks, possibly sandstone matrix?, SHOWS: 2006–2009m and SWCs cut, no crush cut, very thin moderately dull bluish white residual ring.



2112 – 2205mRT: CLAYSTONE INTERBEDDED WITH SANDSTONE, ARGILLACEOUS SANDSTONE, SILTSTONE AND COAL

CLAYSTONE: (10–100%), medium to dark grey, browny grey in part, soft to firm, commonly silty, abundant carbonaceous flakes, trace plant remains, rare amber, trace very fine grained sand, micromicaceous, blocky to subfissile, non calcareous, trace nodular pyrite, trace siliceous cement.

SANDSTONE: (0–90%), very light grey, clear to translucent, friable to moderately hard, abundant loose grains, very fine to medium grained, common coarse to very coarse, subangular to subrounded, occasionally angular moderately sorted, trace to abundant light grey argillaceous matrix, common silica cement, trace to rare pyrite cement/nodules, trace coal fragments, rare amber, trace to minor lithic grains, rare feldspathic grains, poor to moderate visual porosity, no show.

ARGILLACEOUS SILTSTONE: (2171–2186m, 0–100%), light grey, clear to translucent grains, friable to moderately hard, fine to medium grained, occasionally coarse, subangular to subrounded, moderately sorted quartz grains, trace silica cement, abundant argillaceous matrix, trace amber, poor visual porosity, no show.

SILTSTONE: (0–10%), medium dark grey, moderately hard, micromicaceous, trace carbonaceous flecks, grading to very fine grained sandstone in part, blocky, non-calcareous.

COAL: (Tr), greyish black to black, sub vitreous–dull with minor vitreous bands, moderately hard to brittle, subconchoidal fracture.

2205–2293mRT: ARGILLACEOUS SANDSTONE INTERBEDDED WITH SANDSTONE AND CLAYSTONE.

ARGILLACEOUS CLAYSTONE: (0–100%), light grey to translucent, occasionally greenish grey, friable to moderately hard, fine to coarse grained, predominantly fine, subangular to subrounded, trace angular grains, moderately sorted quartz and lithics, abundant argillaceous matrix, abundant firm calcareous cement, abundant lithics increasing with depth, common feldspar, common carbonaceous flecks, trace amber, trace pyrite, nil to very poor visual porosity, no show.

SANDSTONE: (10–100%), light grey to translucent, friable to hard, fine to medium grained, occasionally coarse grained, subangular to subrounded, moderately sorted quartz grains, common argillaceous matrix, common silica cement, trace weak calcite cement, trace lithics, trace amber, trace carbonaceous specks, nil to poor visual porosity, no show.

CLAYSTONE: (TR–100%), medium to dark grey, commonly brown to yellowish brown, soft to hard, trace silica cement, trace pyrite nodules and cement, trace carbonaceous flecks, micromicaceous.

2293 – 2425mRT: ARGILLACEOUS LITHIC SANDSTONE INTERBEDDED WITH CLAYSTONE AND TRACE COAL

ARGILLACEOUS LITHIC SANDSTONE: (60–95%) light grey to medium light grey, friable to moderately hard, fine to medium grained, subangular to subrounded, moderately well sorted, common moderately strong calcareous cement, trace very weak silica cement, abundant very light grey argillaceous matrix, abundant lithic grains, predominantly dark grey to greyish black, occasionally moderate reddish brown, rare pyrite, rare carbonaceous flecks, rare amber, poor inferred porosity.

CLAYSTONE: (5–40%) 2 types (i): medium light grey to light greenish grey, soft, dispersive, rare carbonaceous flecks, non calcareous; (ii): medium dark grey to brownish grey, moderately hard, micromicaceous, rare carbonaceous flecks, occasional

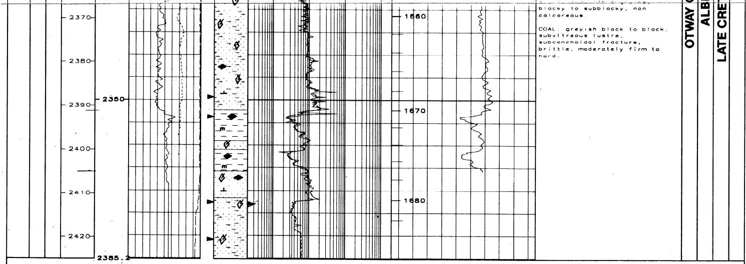
LOWER SHIPWRECK GROUP

CENOMANIAN

GROUP

AN

TACEOUS



blocky to subblocky, non calcareous.

COAL: greyish black to black, subvitreous lustre, subconchoidal fracture, brittle, moderately firm to hard.

DST PRODUCTION RATE SUMMARY

Flow Period	Start Time	Choke (inches)	Average Gas Rate (MMscf/d)	Separator Pressure (psig)	WHP (psig)	Gas Specific Gravity
Perforated Interval: 1816 - 1821mRT and 1825 - 1838mRT						
10 April (Clean-up)	15:45	64/64	28.25	620	1190	0.63 0.61
11 April - 1	03:20	20/64	5.76	210	2319	0.61
11 April - 2	09:59	38/64	16.96	443	2013	0.61
11 April - 3	15:20	48/64	23.14	608	1726	0.61
11 April - 4	21:20	64/64	28.80	699	1243	0.61

MINERVA-1 OPEN HOLE RFT RESULTS

Test No.	Depth		Time	Initial Hydrostatic Pressure		Formation Pressure		Temperature	Final Hydrostatic Pressu		Mobility	Permeability*	Comments
				Strain Gauge	HP Gauge	Strain Gauge	HP Gauge		Strain Gauge	HP Gauge			
	mTVDDF	mTVDSS	hh:mm	psig	psia	psig	psia	DegC	psig	psia	mD/cp	mD	
0	1161.7	1139.2	15:00	1933.2	1944.2	0		58.8	1931.0	1944.7			Good test on casing
1	1651.5	1624.6	15:37	2721.5	2736.4	0	13.0		2719.7	2736.8			Tight
2	1650.8	1623.9	15:43	2718.8	2733.8	--	--	79.8	2717.8	2734.0			Tight
3	1649.8	1623.0	15:55	2716.1	2731.8	2678.9	2694.59	80.2	2715.8	2731.6	12.3	30	Good Test
4	1662.8	1635.8	16:05	2736.5	2752.4	2689.8	2705.43	80.7	2736.2	2752.1	7.8	20	Good Test
5	1662.2	1635.2	16:23	2741.6	2757.5	2739.9	2755.80	81.0	2741.5	2757.3	1.3	5	Possible lost seal
6	1666.5	1639.5	16:37	2742.1	2758.1	2740.5	2756.55	81.3	2741.8	2757.8	1.1	5	Possible lost seal
7	1666.8	1639.8	16:52	2742.5	2758.6	--	--	81.4	2742.3	2759.2			Tight
8	1817.0	1788.7	17:17	2983.4	2998.9	2709.5	2725.09	87.1	2982.5	2999.0	9.2	20	Good Test
9	1829.5	1801.0	17:30	3002.2	3017.7	2711.5	2726.08	87.2	3002.0	3017.8	1565	1800	Good Test
10	1838.0	1809.5	17:43	3015.3	3031.7	2713.1	2728.28	87.5	3015.3	3031.3	66	150	Good Test
11	1845.0	1816.4	17:55	3026.4	3043.7	2714.3	2729.17	88.3	3026.2	3042.4	1040	1200	Good Test
12	1867.0	1838.2	18:20	3061.8	3079.5	2718.3	2733.38	89.6	3061.5	3077.9	876	1000	Good Test
13	1875.5	1846.6	18:44	3075.5	3093.0	2719.3	2733.96	90.4	3075.4	3091.2	815	900	Good Test
14	1884.5	1855.5	19:00	3089.7	3106.9	2721.2	2736.13	91.1	3089.5	3105.8	105	240	Good Test
15	1890.6	1861.6	19:30	3099.8	3116.1	2722.3	2737.20	91.9	3099.7	3115.8	91	210	Good Test
16	1906.5	1877.3	19:45	3125.4	3143.4	2724.5	2739.36	92.6	3125.2	3141.5	426	970	Good Test
17	1919.0	1889.7	20:05	3145.5	3162.5	2726.7	2741.91	93.3	3145.5	3161.9	21	50	Good Test
18	1923.8	1894.5	20:35	3154.0	3169.4	2727.7	2742.19	94.1	3153.7	3169.7	114	260	Good Test
19	1931.0	1901.6	20:50	3165.1	3181.5	2728.6	2743.36	94.0	3165.2	3181.7	116	260	Good Test
20	1935.7	1906.3	21:00	3172.9	3189.6	2729.9	2744.70	94.5	3172.7	3189.5	266	600	Good Test
21	1937.6	1908.2	21:17	3176.3	3193.2	2730.0	2744.80	94.4	3175.9	3192.5	460	1000	Good Test
22	1939.5	1910.1	21:30	3179.3	3196.0	2730.6	2745.70	94.7	3179.2	3195.7			Good Test
23	1942.8	1913.3	21:40	3184.9	3202.2	2730.3	2746.01	95.0	3184.7	3201.2	3.4	10	Good Test
24	1949.2	1919.7	22:01	3195.8	3211.8	2738.2	2752.48	95.6	3195.6	3211.5	557	1300	Good Test
25	1941.9	1912.4	22:20	3184.2	3200.0	2731.2	2745.86	95.6	3183.0	3200.2	268	610	Good Test
26	1939.5	1910.1	22:40	3180.2	3196.3	2730.9	2745.92	95.2	3180.2	3196.9	20	45	Good Test
27	1941.0	1911.5	23:00	3182.6	3199.0	2730.4	2745.22	95.4	3182.5	3199.0	39.7	90	Good Test
28	1951.5	1921.9	23:14	3199.4	3216.7	2741.0	2755.98	95.4	3199.3	3216.1			Good Test
29	1953.2	1923.6	23:33	3202.4	3219.1	2743.5	2758.30	95.6	3202.3	3218.8	270	610	Good Test
30	1959.2	1929.6	23:45	3212.0	3229.4	2751.9	2766.66	96.0	3212.0	3228.8		0	Good Test
31	1966.2	1936.5	00:15	3223.7	3239.9	2761.7	2775.91	96.4	3223.6	3239.6	580	1100	Good Test
32	1972.2	1942.5	00:33	3233.3	3249.9	2769.9	2784.55	96.6	3233.4	3249.7	220	500	Good Test
33	1992.0	1962.1	00:55	3265.5	3282.3	2797.2	2811.95	97.4	3265.5	3281.9			Good Test
34	1931.0	1901.6	01:25	3167.5	3182.2	2729.0	2743.36		3167.1	3183.9			Sample Taken
35	1942.5	1913.0	05:46	3187.6	3203.2	2731.9	2746.28		3185.4	3201.6			Sample Taken
36	1649.8	1623.0	10:37	2718.3	2733.9	2679.2	2694.70		2716.8	2732.6			Sample Taken

Filtrate:	Temp	194 Deg F
	% NaCl	25000
	Pressure	2700 psia
	Viscosity	0.34

*N.B. Permeabilities rounded.
K(h)/k(v)=1
Filtrate Viscosity = 0.34 cP
k(rw)=0.15 for k<1000 mD
k(rw)=0.30 for k>1000 mD

Table 2.

RFT Sample Data Sheet

Table 3.

Well: Minerva-1 **Date:** 22nd March 1993

KB: 25.0 m
Sample No: 1 **Depth:** 1931.0 **mAHKB**

Formation Pressure: 2743.36 **psia**

	Lower	Upper	
Chamber No:		RFS-1227	
Chamber Size:	6	1	gal
Flowing Pressure:	Approx 2500	Approx 2450	psig
Time To Fill:	25	6	minutes
Opening Pressure:	1850	1800	psig
Gas Volume:	113	Preserved for	ft^3
Total Liquids:	570	PVT Analysis	cc
Oil/Condensate Volume:	15		cc
Filtrate/Water Volume:	555		cc
Gas Oil Ratio:	--		Scf/Stb
Condensate Gas Ratio:	0.8		Stb/MMscf

Oil/Condensate Analysis

Specific Gravity:	Too small to measure		Air=1, Temp
Colour:	Too small to measure		
Fluorescence:	Bright Blue		

Gas Analysis:

C1:	90.55		%
C2:	3.72		%
C3:	3.27		%
iC4:	0.36		%
nC4:	0.37		%
C5+:	0.62		%
CO2:	1.70		%
H2S:	0		ppm
Specific Gravity	0.65		Air=1.0

Water/Filtrate Analysis:

			Filtrate		
	Lower	Upper	Drilled	Logged	
Rw:	0.134		0.084		
pH:			9.5		
Cl-:					mg/l
Total Hardness (Ca/Mg):					
KCl:	24000		25000		

Tritium Analysis:

Average Activity:	N/A	N/A	N/A	N/A	Bq/cc
Returns:					Bq/cc
% Filtrate:					

RFT Sample Data Sheet

Table 4.

Well: Minerva-1

Date: 22nd March 1993

KB: 25.0 m
Sample No: 2 **Depth:** 1942.5 mAHKB

Formation Pressure: 2746.3 psia

	Lower	Upper	
Chamber No:		RFS-1157	
Chamber Size:	6	1	gal
Flowing Pressure:	Aprox 2200	Aprox 2500	psig
Time To Fill:	50	10	minuites
Opening Pressure:	2050	2000	psig
Gas Volume:	78	Preserved for	ft^3
Total Liquids:	830	PVT Analysis	cc
Oil/Condensate Volume:	20		cc
Filtrate/Water Volume:	810		cc
Gas Oil Ratio:	--		Scf/Stb
Condensate Gas Ratio:	1.6		Stb/MMscf

Oil/Condensate Analysis

Specific Gravity:	Too small to measure		Air=1, Temp
Colour:	Too small to measure		
Fluorescence:	Bright Blue		

Gas Analysis:

C1:	90.35		%
C2:	3.70		%
C3:	3.11		%
iC4:	0.38		%
nC4:	0.62		%
C5+:	0.16		%
CO2:	1.7		%
H2S:	0		ppm
Specific Gravity	0.64		Air=1.0

Water/Filtrate Analysis:

			Filtrate		
	Lower	Upper	Drilled	Logged	
Rw:			0.084		
pH:	6.8		9.5		
Cl-:	42000				mg/l
Total Hardness (Ca/Mg):					
KCl:	38000		25000		

Trituim Analysis:

Average Activity:	N/A	N/A	N/A	N/A	Bq/cc
Returns:					Bq/cc
% Filtrate:					

RFT Sample Data Sheet

Table 5

Well: Minerva-1

Date: 23rd March 1993

KB: 25.0 **m**
Sample No: 3 **Depth:** 1649.8

Formation Pressure: 2694.59 **psia**

	Lower	**Upper**	
Chamber No:		RFS-AD-1123	
Chamber Size:	6	1	gal
Flowing Pressure:	Approx 2100	Approx 2500	psig
Time To Fill:	25	6	minuites
Opening Pressure:	2100	2100	psig
Gas Volume:	77.7	Preserved for	ft^3
Total Liquids:	7500	PVT Analysis	cc
Oil/Condensate Volume:	film		cc
Filtrate/Water Volume:	--		cc
Gas Oil Ratio:	--		Scf/Stb
Condensate Gas Ratio:	--		Stb/MMscf

Oil/Condensate Analysis

Specific Gravity:	Too small to measure		Air=1, Temp
Colour:	Too small to measure		
Fluorescence:	,Blue/White		

Gas Analysis:

C1:	89.14		%
C2:	4.47		%
C3:	4.24		%
iC4:	0.65		%
nC4:	0.72		%
C5+:	0.19		%
CO2:	0.6		%
H2S:	0		ppm
Specific Gravity	0.65		Air=1.0

Water/Filtrate Analysis:

	Lower	Upper	Filtrate Drilled	 Logged	
Rw:	0.089		0.084		
pH:	6.4		9.5		
Cl-:	45000				mg/l
Total Hardness (Ca/Mg):					
KCl:	42000		25000		

Trituim Analysis:

Average Activity:	N/A	N/A	N/A	N/A	Bq/cc
Returns:					Bq/cc
% Filtrate:					

SIDEWALL CORE SUMMARY

Suite	Run	Bullets	Depth From	Depth To	No. Fired	No. Misfires	No. Empty	No. Lost	No. Recovered
1	1	46	1193	563	46	0	0	0	46
3	2	60	2101	1195	60	0	0	3	57
4	3	21	2421	2120	21	0	3	0	18
	TOTAL	90	2421	563	127	0	3	3	121

Sample Number	Depth mRT	Recovery (mm)	Lithology	Sample Number	Depth mRT	Recovery (mm)	Lithology
1	1193	30	ARENACEOUS CLAYSTONE GRADING TO ARGILLACEOUS SANDSTONE	65	1947.5	25	COAL GRADING TO CARBONACEOUS CLAYSTONE
2	1186	28	ARENACEOUS CLAYSTONE	66	1944.5	25	INTERLAMINATED KAOLINITIC SANDSTONE AND SILTY CLAYSTONE
3	1179	30	ARENACEOUS CLAYSTONE WITH LENSES OF ARGILLACEOUS SANDSTONE	67	1915	25	INTERLAMINATED SANDSTONE AND COALY CLAYSTONE
4	1174	45	INTERBEDDED ARGILLACEOUS SANDSTONE AND ARENACEOUS CLAYSTONE	68	1896	15	SANDSTONE
5	1173	35	ARENACEOUS CLAYSTONE	69	1872.5	25	SILTY CLAYSTONE
6	1170	20	ARENACEOUS CLAYSTONE GRADING TO ARGILLACEOUS SANDSTONE	70	1861	15	KAOLINITIC SANDSTONE
7	1166	25	ARENACEOUS CLAYSTONE WITH ARGILLACEOUS SANDSTONE	71	1814	25	SILTY CLAYSTONE
8	1149	25	SILTY CLAYSTONE	72	1805	25	SILTY CLAYSTONE
9	1139	25	SANDSTONE	73	1785	25	ARGILLACEOUS SILTSTONE
10	1130	30	ARENACEOUS CLAYSTONE	74	1766	25	ARGILLACEOUS SILTSTONE
11	1125	35	INTERLAMINATED ARGILLACEOUS SANDSTONE AND CLAYSTONE	75	1747	30	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
12	1115	28	SANDSTONE	76	1723	25	SILTY CLAYSTONE
13	1105.5	30	ARENACEOUS CLAYSTONE	77	1690	30	ARGILLACEOUS SILTSTONE
14	1100	25	ARGILLACEOUS SANDSTONE	78	1670	25	SANDSTONE
15	1094	30	ARGILLACEOUS SANDSTONE	79	1663.5	0	BULLET LOST
16	1090	38	ARGILLACEOUS SANDSTONE GRADING TO / INTERLAMINATED WITH ARENACEOUS CLAYSTONE	80	1660	25	SANDSTONE GRADING TO ARENACEOUS CLAYSTONE
17	1054	28	SILTY CLAYSTONE	81	1653	20	SANDSTONE GRADING TO ARENACEOUS CLAYSTONE
18	1032	50	SANDSTONE	82	1650	35	SANDSTONE
19	1028	30	SANDSTONE	83	1647	30	SILTY CLAYSTONE
20	1018	37	SILTY CLAYSTONE INTERLAMINATED WITH MINOR SANDSTONE	84	1629	38	ARGILLACEOUS SILTSTONE GRADING TO SILTY CLAYSTONE
21	991	70	ARENACEOUS CLAYSTONE	85	1597	30	ARGILLACEOUS SILTSTONE GRADING TO SILTY CLAYSTONE
22	954	70	INTERLAMINATED SILTY CLAYSTONE	86	1580	40	ARGILLACEOUS SILTSTONE GRADING TO SILTY CLAYSTONE
23	918.5	70	ARGILLACEOUS SANDSTONE	87	1562	25	ARGILLACEOUS SILTSTONE GRADING TO SILTY CLAYSTONE
24	897	70	CLAYSTONE	88	1545	35	ARGILLACEOUS SILTSTONE GRADING TO SILTY CLAYSTONE
25	862.5	40	ARGILLACEOUS SANDSTONE	89	1523	40	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
26	838.5	40	MASSIVE CLAYSTONE	90	1502	30	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
27	810	45	ARGILLACEOUS SANDSTONE INTERLAMINATED WITH MINOR CLAYSTONE	91	1476	30	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
28	786	60	MASSIVE SANDSTONE	92	1453	35	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
29	783	55	CARBONACEOUS CLAYSTONE	93	1430	0	BULLET LOST
30	772	40	SILTY CLAYSTONE	94	1398	30	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
31	760	35	ARENACEOUS CLAYSTONE	95	1387	30	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
32	700	70	MASSIVE SANDSTONE	96	1374	30	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
33	690	55	MASSIVE SANDSTONE	97	1363	30	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
34	660	50	ARGILLACEOUS SANDSTONE	98	1351	35	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
35	651	57	ARENACEOUS CLAYSTONE	99	1341	45	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE

36	647	70	SILTY CLAYSTONE
37	641	72	ARENACEOUS CLAYSTONE
38	627	62	SILTY CLAYSTONE
39	620.5	60	INTERLAMINATED SILTY CLAYSTONE
40	617	60	SILTY CLAYSTONE
41	613	70	SILTY CLAYSTONE INTERLAMINATED WITH MINOR SANDSTONE
42	594	70	SILTY CLAYSTONE INTERLAMINATED WITH MINOR SANDSTONE
43	583	65	SILTY CLAYSTONE INTERLAMINATED WITH MINOR SANDSTONE
44	572	65	SILTY CLAYSTONE INTERLAMINATED WITH MINOR SANDSTONE
45	567	70	SILTY CLAYSTONE
✓ 46	563	50	SILTY CLAYSTONE INTERLAMINATED WITH MINOR SANDSTONE
47	2101	25	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
48	2098	15	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
49	2089	30	ARGILLACEOUS SANDSTONE GRADING TO ARENACEOUS CLAYSTONE
50	2084.5	25	ARGILLACEOUS SANDSTONE
51	2078	20	ARGILLACEOUS SANDSTONE
52	2073	15	SILTY SANDSTONE
53	2066	20	INTERLAMINATED ARGILLACEOUS SILTY SANDSTONE AND SILTY CLAYSTONE
54	2061	25	SILTY CLAYSTONE WITH THIN LAMINAE OF KAOLINITIC SANDSTONE
55	2046	20	SANDSTONE
56	2040	25	SANDSTONE WITH VERY THIN ARGILLACEOUS LAMINAE
57	2035	25	INTERLAMINATED SILTY CLAYSTONE AND SANDSTONE
58	2030.5	20	SANDSTONE
59	2023	20	PYRITIC SANDSTONE AND KAOLINITIC SANDSTONE
60	2013	15	SANDSTONE
61	1996	20	KAOLINITIC SANDSTONE WITH THIN INTERLAMINATED CLAYSTONE
62	1982	20	SANDSTONE WITH INTERLAMINATED COAL
63	1969	20	SANDSTONE
64	1961	15	KAOLINITIC SANDSTONE
100	1331	0	BULLET LOST
101	1298	30	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
102	1280	40	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
103	1260	40	SILTY CLAYSTONE GRADING TO ARGILLACEOUS SILTSTONE
104	1240	45	ARGILLACEOUS ARENACEOUS SILTSTONE GRADING TO ARGILLACEOUS SILTY SANDSTONE
105	1220	40	ARGILLACEOUS ARENACEOUS SILTSTONE
✓ 106	1195	30	ARGILLACEOUS SILTSTONE GRADING TO SILTY CLAYSTONE
107	2420.5	9	WEATHERED ARGILLACEOUS LITHIC SANDSTONE
108	2412	15	ARENACEOUS CLAYSTONE
109	2392.5	20	CLAYSTONE
110	2388	12	WEATHERED ARGILLACEOUS LITHIC SANDSTONE
111	2360	20	SILTY CLAYSTONE
112	2359.5	15	CLAYSTONE
113	2340	15	ARGILLACEOUS LITHIC SANDSTONE
114	2321	25	CLAYSTONE
115	2319	15	CLAYSTONE
116	2304	17	ARGILLACEOUS SANDSTONE
117	2294	25	CLAYSTONE
118	2277	0	BULLET EMPTY
119	2274.5	0	BULLET EMPTY
120	2259	20	ARGILLACEOUS LITHIC SANDSTONE
121	2215	10	CLAYSTONE
122	2212.5	5	CLAYSTONE
123	2157.5	25	COAL
124	2142	5	CLAYSTONE WITH INTERLAMINATED SANDSTONE
125	2129.5	15	CLAYSTONE
126	2123	15	CLAYSTONE WITH INTERLAMINATED SANDSTONE
127	2120	0	BULLET EMPTY

Core Summary and Descriptions

Interval Cored

Core No.	Bit Size	Drillers Depths	Recovered Core Depths	Log Correlation Depths	Recovery
1	8.5"	1821 - 1828 m	1821 - 1824.04 m	1822.5 - 1825.5 m	43% (3.04m)
2	8.5"	1828 - 1842.5 m	1828 - 1841.27 m	1829.75 - 1843.02 m	91% (13.27m)
3	8.5"	1842.5 - 1847 m	1842.5 - 1846.87 m	1844.25 - 1848.75 m	100% (4.37m)

Description

CORE 1

Lithological Description

The interval 1821.00m to 1823.35m is sandstone, predominantly very coarse grained and poorly sorted, comprised of six upward fining units separated by scour surfaces with pebble lags. Internally it is homogeneous with minor trough cross bedding and sporadic shale rip up clast horizons. Abundant disseminated pyrite cement is present over the interval 1821.50m to 1822.75m. Unfortunately about one third of this part of the core is preserved as rubble which does not make more detailed observations possible.

The interval 1823.35m to 1824.04m is sandstone, medium grained and homogeneous with minor shale rip up clast horizons and pebble lags on scour surfaces. This entire interval is core rubble.

Environmental Interpretation

The relatively short length of core together with almost 50% of it preserved as rubble makes it difficult to be categoric on inferring depositional environments. The available evidence points to the cored section being cut in a succession of stacked lower point bar or braid bar channel units deposited during flood to early falling stage of a low sinuosity fluvial system. Core gamma ray and wireline log data are consistent with this interpretation.

CORE 2

Lithological Description

Core 2 was cut over the interval 1828.00m to 1841.27m and core 3 over the interval 1842.50m to 1846.87m. The interval 1828.00m to 1829.50m is sandstone, very coarse grained to granule at the base (scour surface) fining upwards to medium to coarse grained at the top. The sandstone is well sorted and predominantly homogeneous with minor trough cross bedding in the upper half. The interval 1829.50m to 1833.15m is sandstone, predominantly very coarse grained, pebbly and very poorly sorted, comprising seven units separated by scour surfaces. Internally the units are homogeneous with minor planar inclined laminations (? trough cross bedding). The basal portion of each unit contains a concentration of pebbles and sporadic shale rip up clasts.

The interval 1833.15m to 1836.90m is sandstone, predominantly medium to coarse up to very coarse grained and moderately well sorted, comprising eleven upward fining units separated by scour surfaces. Internally these units are trough cross bedded with minor current ripple and carbonaceous to shaly flaser laminations at the top. Rare pillow and flame features and dewatering features are evident over the interval 1835.15m to 1835.30m. The lowermost metre of sandstone is very well sorted.

The interval 1836.90m to 1837.06m is shale, highly carbonaceous, with sporadic resin blebs and pyrite cement near the top contact (scour surface). The interval 1837.06m to 1837.23m is coal, black, brittle and sub bituminous with pyrite cement. The interval 1837.23m to 1838.85m is shale, dark grey to black and highly carbonaceous with rootlets, plant stems and abundant resin blebs in the upper third and dark grey and homogeneous with minor plant stems and sporadic resin blebs in the lower two thirds.

The interval 1838.85m to 1839.70m is siltstone to very fine grained sandstone comprising two upward fining units. Internally the siltstone is homogenised through rootlet bioturbation and dewatering. The interval 1839.70m to 1840.35m is predominantly shale, dark grey with a thin coal and resin blebs in the upper half and becoming silty with microfoundering features in the lower half. The base is wavy and gradational into the unit below.

The interval 1840.35m to 1841.27m (base of core 2) is sandstone, predominantly fine to medium grained, comprising two upward fining units separated by a scour surface. The units are planar bedded to current ripple laminated in the lower half and flaser bedded to rooted with dewatering features in the upper half.

Environmental Interpretation

The interval 1828.00m to 1833.40m is interpreted as a stacked high energy channel succession deposited during late flood to early falling stage cycle in a low sinuosity fluvial system. The interval 1833.40m to 1836.90m is interpreted as a succession of lower point bar channel units deposited during the falling stage cycle in a low sinuosity fluvial system. The interval 1836.90m to 1838.85m represents deposition of overbank/abandoned channel fill during the low stage cycle of a low sinuosity fluvial system. The interval 1838.85m to 1840.35m is interpreted to represent deposition of distal crevasse splays and abandoned channel fill during a low stage cycle. The interval 1840.35m to 1841.27m (base of core 2) is interpreted to represent stacked middle point bar channel units deposited during a falling stage cycle.

CORE 3

Lithological Description

Core 3 commences at 1842.50m and the entire interval to 1846.87m (base) is sandstone, predominantly medium to coarse grained up to very coarse grained and well sorted, comprised of multiple upward fining cycles separated by scour surfaces and pebble lags. Internally the units are trough cross bedded and some unusually high angle trough cross bed laminae may indicate slump rotation during initial compaction.

The sandstone throughout this core has a sucrosic texture and the sand grains sparkle through abundant overgrowth development. Several subhorizontal to near vertical fractures healed by silica cement are developed over the interval 1844.21m to 1844.40m and 1845.60m to 1846.30m.

Environmental Interpretation

The entire interval of core 3 (1842.50m to 1846.87m) is interpreted to be a succession of stacked channel units deposited during late flood to early falling stage cycle in a low sinuosity fluvial system.