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REPORT ON A STUDY OF MINERVA-1 and MINERVA-2

CONVENTIONAL CORE, VIC/P31, OTWAY BASIN

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TABLE OF CONTENTS

1 INTRODUCTION

This report is based on the detailed examination and description/interpretation of some 123 metres of conventional core cut in Minerva-1 and Minerva-2A in the BHP Petroleum operated permit VIC/P31 within the offshore eastern Otway Basin. The study was undertaken by Messrs P.A. Arditto and S. Horan initially on Minerva-2A core at the AMDEL laboratories in Adelaide (10-12 November, 1993) and later on Minerva-1 core at the Kestral warehouse in Melbourne (24 November, 1993). Minerva-1 had 20.67m of core recovered and Minerva-2A had 101.97m of core recovered for study.

Lithological description and environmental interpretation of each cored interval are followed by core description sheets at 1:25 scale, core gamma ray log data and a selection of wireline log data over and adjacent to the cored interval. A key to the symbols used on the core description sheets is given at the end of the report. Where available, depositional environment inferences from palynological data by Roger Morgan were used to augment environmental interpretation made from core observations.

The results and conclusions of this study form an integral part of the evaluation and characterisation of the reservoir section in the Minerva Gas Field as well as contributing to the regional geology of the basal portion of the Upper Shipwreck Group in the eastern Otway Basin.

2 SUMMARY

The main reservoir interval cored in Minerva-1 and Minerva-2A comprises an overall upward shoaling estuarine to fluvial succession of medium to very coarse grained sandstone channel fill lithofacies with minor preserved finer grained estuary bay and fluvial overbank lithofacies. The depositional model for the reservoir interval is that of a high energy fluvial system dumping significant quantities of coarse quartz detritus as it encroached into a nearshore marine setting along an embayed coastline.

The reservoir quality of these multistorey high energy channel sandstone successions is excellent as they are commonly coarse grained and very well sorted. The depositional setting inferred for the reservoir interval predicts that individual sandstone channel units will be highly interconnected across the field. The minor thin overbank shales present within the high energy fluvial succession comprising the upper portion of the reservoir interval would not be individually extensive as these would be incised and breached by successive channel cuts.

3 MINERVA-1

3.1 Core 1

3.1.1 Description and Interpretation

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.

3.2 Cores 2 and 3

3.2.1 Description and Interpretation

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.

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 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.

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.

4 MINERVA-2A

4.1 Core 1

4.1.1 Description and Interpretation

Lithological Description

The entire cored interval, 1728.50m to 1733.60m is sandstone, very fine grained and silty towards the base, grading upwards to very fine to fine grained muddy sandstone at the top. It is very poorly sorted through intensive bioturbation with sparse sand-filled dwelling burrows developed near the top of the interval. Faint subhorizontal disturbed laminations are developed throughout although primary sedimentary features are largely destroyed through biological churning of the original sediment. Sporadic sideritic nodular mudstone intervals are developed within some burrow features.

Environmental Interpretation

The relatively short length of core together with the homogeneity of lithology and structures make it difficult to be categoric in the discussion of depositional environment. The relatively fine grained and intensely bioturbated nature of the interval, combined with an absence of wave generated features, indicate a possible offshore open marine setting. Wireline log data indicates that core was taken from near the base of a grossly upward coarsening (progradational) cycle some 70 m thick. The

inferred environmental setting is that of a distal toe of a prograding shoreface (or ?deltaic) unit just below wavebase.

Samples for palynology taken at 1733.50m and 1733.60m had a high ratio and diversity of dinoflagellates and were inferred to be nearshore marine.

4.2 Cores 2 and 3

4.2.1 Description and Interpretation

Lithological Description

The interval 1838.80m to 1839.67m is sandstone, medium up to coarse grained and granule, comprised of fining upward cycles 0.1m to 0.3m in thickness separated by scour surfaces and pebble lags. The sandstone is well sorted and trough cross bedded with minor flasers towards the top of each unit. The interval 1839.67m to 1840.77m is shale, medium grey, mottled with sparse carbonaceous rootlets. It is generally homogeneous with minor starved ripple and microfoundering features in the lower half. Sparse scattered resin blebs occur in the upper half of the interval. The interval 1840.77m to 1840.79m is coal, black and sub bituminous. The interval 1840.79 to 1841.15m comprises shale, silty, with starved ripples and microfoundering features. Rare resin blebs occur at the top of the unit.

The interval 1841.15m to 1841.82m is sandstone, very coarse grained to granule, moderately sorted and trough cross bedded to planar laminated with rip up clasts and flasers near the top which is transitional into the overlying unit. The base of the unit rests on a scour surface. The interval 1841.82m to 1842.80m is sandstone, coarse to very coarse grained and well sorted with minor granule trains along sporadic lamina. Internally it is trough

cross bedded with minor high angle carbonaceous flaser drapes. The base of the unit rests of a prominent scour surface.

The interval 1842.80m to the base of core 2 (1855.05m) is sandstone, predominantly coarse to very coarse grained and well sorted. This interval is comprised of stacked upward fining units, typically 0.2m to 0.5m in thickness, separated by scour surfaces. Internally the sandstone units are trough cross bedded and typically have basal pebble lags and minor carbonaceous flaser laminated tops.

Core 3 commences at 1855.60m and the interval 1855.75m comprises grey argillaceous siltstone core rubble. The interval 1855.75m to 1860.23m is sandstone, fine to medium up to very coarse grained and comprised of upward fining units 0.15m to 0.70m in thickness separated by scour surfaces and pebble or shale rip up clast lags. Internally these units are trough cross bedded with several containing flaser laminations or lenticular bedded sandstone near the top. Several units over the interval 1858.90m to 1857.55m contain sparse up to abundant ophiomorpha burrows along with an overall upward fining throughout.

The interval 1860.23m to 1861.75m is shale, highly carbonaceous with sparse rootlets and minor thin coals, black and sub bituminous. Small resin blebs occur within the shale adjacent to the coaly horizons. Internally the shale is homogeneous throughout.

The interval 1861.75m to 1865.30m is predominantly sandstone, medium up to coarse grained, comprised of upward fining units 0.4m to 0.7m in thickness capped by carbonaceous flaser laminations or, more rarely, flasered thin shale intervals. Internally these units are trough cross bedded and separated by scour surfaces with sporadic basal shale rip up clast lags.

The interval 1865.30m to 1866.00m is sandstone, coarse grained at the base and fining up to fine to medium grained at the top. The lower one third contains shale rip up clasts and pebbles overlain by a trough cross bedded zone grading upward to flaser to lenticular bedded sandstone with burrows at the very top. The interval 1866.00m to 1866.75m is sandstone, predominantly fine to medium grained and muddy, comprised of three upward fining units. Internally it is heavily burrowed to bioturbated with recognisable ophiomorpha burrows. The lower half is flaser to lenticular bedded.

The interval 1866.75m to 1869.55m is sandstone, predominantly fine to medium grained, trough cross bedded in the lower half and flaser to current ripple laminated in the upper half. The interval 1869.55m to 1871.70m is sandstone, medium up to coarse grained, comprised of three upward fining units separated by scour surfaces. Internally the bulk of each unit is trough cross bedded with the uppermost part flaser laminated. The interval 1871.70m to 1873.90m is sandstone, predominantly coarse to very coarse grained up to granule and pebbly, comprised of four upward fining units, around 0.55m in thickness, separated by prominent scour surfaces and pebble lags. Internally these units have well developed trough cross bedding. The interval 1873.90m to 1876.35m is sandstone, predominantly medium to coarse grained, comprised of six upward fining units separated by scour surfaces and pebble lags. Internally these units are trough cross bedded and some have thin flaser laminated tops.

The interval 1876.35m to 1876.58m is shale, black and carbonaceous with silty starved ripples. The interval 1876.58m to 1880.63m is predominantly sandstone comprised of a series of stacked units, separated by scour surfaces, ranging in thickness from 0.40m to 0.90m. This interval displays an overall upward fining stacked succession from coarse to very coarse grained at the base to fine to medium grained at the top. Internally the

basal 0.80m is trough cross bedded (basal 0.30m pyrite cemented) and well sorted and grades upwards into muddy poorly sorted burrowed to bioturbated finer grained sandstone for the remainder of the interval. Recognisable ophiomorpha burrows occur throughout.

The interval 1880.63m to 1881.05m is shale, black and highly carbonaceous with fine silty starved current ripple flasers. It is pyritic throughout with a layer of resin blebs at the very top. The remainder of the core (1881.05m to 1882.50m) is sandstone, predominantly medium to coarse grained and moderately well sorted, comprised of five upward fining units separated by scour surfaces. Internally the units are homogeneous to current ripple and flaser laminated with local development of ophiomorpha burrow horizons.

Environmental Interpretation

The interval 1838.80m to 1839.67m is interpreted to be a series of stacked basal channel fill units deposited during the late flood to early falling stage cycle within a low sinuosity fluvial system. The interval 1839.67m to 1841.80m is interpreted to represent a relatively complete accretionary point bar cycle deposited during low stage within a high sinuosity fluvial system. The cycle grades up from a lower through middle to upper point bar/abandoned channel fill succession. The interval 1841.80m to 1855.05m (base core 2) is interpreted to be a succession of stacked basal channel fill units deposited during late flood to early falling stage in a low sinuosity fluvial system. Palynological studies on shale samples from 1839.75m, 1841.00m and 1843.20m interpreted the environment to be that of a slightly brackish oxic to anoxic lake setting.

The interval 1855.75m (in situ top of core 3) to 1860.23m is interpreted to be a series of stacked basal channel fill units. Much of the succession is interpreted to be deposited in a low sinuosity fluvial dominated system

although the 1857.55m to 1858.90m contains good ophiomorpha burrows which indicate shallow water marine conditions. This latter interval is interpreted to be deposited as a series of channel units building out into a shallow water estuary at the mouth of a fluvial complex and represents a small transgressive pulse into a predominantly fluvial system. A palynological study of a shale sample from 1857.30m gave a slightly brackish anoxic lake setting.

The interval 1860.23m to 1862.45m is interpreted to represent a relatively complete accetionary point bar cycle deposited during low stage within a high sinuosity fluvial system. This cycle grades relatively abruptly from lower point bar channel fill to upper point bar/abandoned channel fill with very little middle point bar preserved. A palynological study of a shale sample from 1860.30m was interpreted to be a brackish lake (tidal influence) setting. The interval 1862.45m to 1864.60m is interpreted as a series of stacked basal channel fill units deposited during late flood to early falling stage in a low sinuosity fluvial system.

The interval 1864.69m to 1866.00m contains two upward fining, trough cross bedded, sandstone channel fill units with flasered and burrowed tops. These are interpreted as a stream mouth bar or proximal estuary channel succession deposited in a nearshore marine setting at the mouth of a low sinuosity fluvial system. The interval 1866.00m to 1866.75m a distal tidal (estuary) stacked channel succession as indicated by the intensity of burrowing and bioturbation throughout. This interval represents the maximum extent of a minor marine transgression into a predominantly fluvial dominated system. A palynological study on a shale sample from 1866.50m was interpreted to be marginal marine lagoon or estuary.

The interval 1866.75m to 1871.70m is interpreted as a succession of stacked tidal/estuarine channel units within the mouth of a fluvial system entering a

bay. Although no burrows are evident the entire interval is highly flasered indicative of episodic (?tidal) flow. The interval also demonstrates an overall upward fining pattern suggestive of a rise in base level (onset of a transgression).

The interval 1871.70m to 1876.35m is interpreted as a succession of stacked basal channel fill units deposited during a late flood stage cycle in a low sinuosity fluvial system. This interval gradually coarsens up through the successive stacking of coarser grained channel units to 1872.80m followed be a gradual fining upwards through the successive stacking of finer grained channel units. This vertical grainsize distribution is interpreted as initial prograding of the fluvial system over the underlying more marine units followed be a retreat of the fluvial system during a transgressive phase into the overlying more marine units.

The interval 1876.35m to 1882.50m is interpreted to be a succession of stacked tidal estuarine channel units deposited beyond the mouth of the feeding fluvial system. These channels typically have unidirectional current flow structures in the lower half with burrowed to bioturbated zones in the upper half. This estuary setting interpretation is further re-enforced by the presence of common ophiomorpha burrows within the channel sandstones.

Minor overbank/abandoned channel fill units occur over the interval 1876.35m to 1876.55m and 1880.63m to 1881.05m. These are interpreted to have been deposited during the low stage cycle of a high sinuosity tidal/estuary system and are preserved erosional remnants.

Palynological studies on shale samples taken over the above interval gave the following interpretations; 1876.50m (marginal marine lagoon or

estuary), 1879.00m (nearshore ?tidal lagoon or estuary) and 1881.00m (very nearshore anoxic ?stagnant brackish lagoon or estuarine backwater).

4.3 Cores 4 and 5

Lithological Description

The interval 1915.00m (top of core 4) to 1916.57m is sandstone, coarse grained up to very coarse grained and pebbly, comprised of several units separated by scour surfaces. Upward fining character is evident the upper units. Internally these units are trough cross bedded to flaser laminated with minor shale rip up clast horizons.

The interval 1916.57m to 1917.13m is sandstone, predominantly very coarse grained, muddy and poorly sorted, comprised of three units separated by scour surfaces. Internally the sandstone contains discontinuous flaser laminations and minor burrows. The interval 1917.13m to 1918.30m is sandstone, predominantly fine to medium grained, muddy and very poorly sorted. The upper 0.15m is pebbly and grades up to very coarse grained. Internally the interval is homogeneous and heavily burrowed with ophiomorpha burrows.

The interval 1918.30m to 1920.33m is sandstone, fine to medium grained up to medium to coarse grained, comprised of five units of variable thickness separated by scour surfaces. Internally these units are trough cross bedded with flaser laminated tops. The interval 1920.33m to 1921.75m is sandstone, predominantly fine to medium grained (ranging from very fine to coarse grained) muddy and very poorly sorted. Internally the sandstone contains minor trough cross bedding, flaser laminations and

burrows (including ophiomorpha) and can be divided into several units separated by scour surfaces.

The interval 1921.75m to 1926.20m is sandstone, predominantly medium to coarse grained and well sorted, comprised of nine upward fining units of variable thickness separated by scour surfaces. Internally these units are trough cross bedded with minor carbonaceous flaser laminations towards the top. Shale rip up clast horizons form basal lags in a few of these units.

The interval 1926.20m to 1926.75m is siltstone grading upwards to shale. The lower half is lenticular bedded with minor rootlets and the upper half is carbonaceous with common rootlets and minor resin blebs. The entire interval contains sparse nodular pyrite cement. The interval 1926.75m to 1928.90m is siltstone to very fine grained sandstone grading upwards into very fine grained sandstone. Internally the lower half of the interval contains abundant sandy microfoundering structures with minor current ripple to flaser laminations, rare wave oscillation ripple laminations, and minor pyrite cement. The upper half has better developed and common current ripple to flaser laminations and is burrowed to bioturbated. The topmost part contains carbonaceous rootlets.

The interval 1928.90m to 1930.35m is sandstone, comprised of three upward fining units fine to medium grained at the base grading upwards to very fine grained at the top and separated by scour surfaces. Internally they are current ripple to flaser laminated with minor microfoundering features and rare mud cracks. Rare burrows occur towards the base of the units. The interval 1930.35m to 1932.30m is sandstone, predominantly fine to medium up to coarse grained, comprised of eight units of variable thickness separated by scour surfaces. Overall the interval has an upward fining character developed through the stacking of successively finer grained units. Internally individual units are trough cross bedded or current ripple

laminated to flaser or lenticular bedded with burrows developed in the upper four units.

The interval 1932.30m to 1933.20m is sandstone, very fine grained and silty, lenticular bedded in the lower half and current ripple to flaser laminated in the upper half. The interval 1933.20m to 1933.97m is sandstone, fine to medium up to coarse grained and muddy, comprised of four upward fining units of varying thickness separated by scour surfaces. Internally these units are lenticular bedded and burrowed. The interval 1933.97m to 1934.50m is sandstone, coarse to very coarse grained and well sorted. Internally it is trough cross bedded with minor shale rip up clasts and flaser to lenticular bedded at the very top. The interval 1934.50m to 1935.55m is sandstone, fine up to fine to medium grained, muddy and poorly sorted. Internally it is flaser laminated to burrowed and bioturbated with a 15cm long sand-filled burrow projecting down from the top of the interval. Minor pyrite occurs throughout the interval.

The interval 1935.55m to 1937.25m is sandstone, predominantly medium to coarse grained, well sorted and trough cross bedded. The very top of the interval is burrowed. The basal 0.25m of this interval fines from very coarse grained, with a pebble lag above a scour surface upwards to medium to coarse grained. The interval 1937.25m to 1939.35m is sandstone, medium to coarse up to very coarse grained, comprised of five upward fining units separated by scour surfaces and basal pebble lags. Internally these units are homogeneous to trough cross bedded with rare flaser laminations and rip up clasts.

The interval 1939.35m to 1941.35m is sandstone, fine to medium towards the base fining upwards to very fine grained silty sandstone at the top through a succession of stacked progressively finer grained upward fining units. Internally the interval is flaser bedded and burrowed in the lower

half and burrowed to bioturbated with carbonaceous flasers and pyrite cemented towards the top. Overall the interval is muddy and very poorly sorted. The interval 1941.35m to 1942.70m (base of core 4) is sandstone, predominantly medium grained up to very coarse grained, comprised of seven upward fining units of variable thickness separated by scour surfaces. Internally these units and homogeneous to trough cross bedded with minor burrows and flaser laminations.

The interval 1943.00m (top of core 5) to 1943.20m is shale, dark grey with abundant silty microfoundering features. The interval 1943.20m to 1945.07m is sandstone, fine grained up to very coarse grained, comprised of a succession nine upward fining units of variable thickness separated by scour surfaces and pebble lags. Internally the units are homogeneous to trough cross bedded within the basal coarser grained part and are flaser to lenticular bedded in the finer grained upper part. The interval displays an overall upward fining character through the vertical stacking of successively finer sandstone units.

The interval 1945.07m to 1947.95m is sandstone, medium up to coarse grained and well sorted, comprised of six upward fining units separated by scour surfaces. The entire interval displays an overall upward fining through the stacking of successively finer units. Internally these units are trough cross bedded with flaser and lenticular bedding and dewatering features in the uppermost unit. The interval 1947.95m to 1949.25m is sandstone, medium to coarse grained at the base and grading upwards to very fine grained at the top. Internally the basal portion is trough cross bedded with the bulk of the interval current ripple to flaser laminated. The uppermost portion is lenticular bedded with microfoundering features. Sporadic pyrite cement is dispersed throughout the interval.

The interval 1949.25m to 1951.05m is sandstone, fine up to coarse grained, comprised of four upward fining units separated by scour surfaces. Internally these units are current ripple to flaser laminated or lenticular bedded with sporadic microfoundering features in the finer grained units. The interval 1951.05m to 1952.95m is sandstone, predominantly medium grained up to coarse grained and moderately well sorted, comprised of four upward fining units separated by scour surfaces. Internally these units are trough cross bedded in the lower half and current ripple to flaser laminated in the upper half. Shale rip up clasts occur as a basal lag in the lowest unit and the top of the uppermost unit is burrowed.

The interval 1952.95m to 1956.95m is sandstone, predominantly fine grained grading up to very coarse grained, comprised of a succession of upward fining units. The entire interval displays an upward fining character through the stacking of successively finer grained units. Internally the interval is muddy and very poorly sorted through intense bioturbation. Rare load (pillow) features, dewatering features and current ripple to flaser laminations occur towards the base. The basal 7 cm of the interval contains quartz pebble and shale rip up clast lag material. The interval 1956.95m to 1959.35m is a repeat of the above interval with coarse to very coarse grained sandstone at the base grading upwards,the stacking of successively finer units, to fine grained sandstone at the top. The basal half of the interval contains recognisable burrows and current ripple laminations while the upper half is bioturbated with thin lenticular bedded horizons and load cast (pillow) horizons.

The interval 1959.35m to 1960.60m is sandstone, predominantly coarse to very coarse grained and well sorted, comprised of four upward fining units separated by scour surfaces. Internally these units are trough cross bedded with thin flaser to lenticular bedded tops. The interval 1960.60m to 1960.78m is sandstone, coarse grained and heavily burrowed. The interval

1960.78m to 1962.24m is sandstone, predominantly medium grained, comprised of four upward fining units separated by scour surfaces. Internally the basal unit is homogeneous to trough cross bedded with successive overlying units having flaser to lenticular bedding with burrows to finally becoming bioturbated towards the top.

The interval 1962.24m to 1964.32m is sandstone, predominantly fine grained, comprised of eight fining upward units separated by scour surfaces. Internally the interval is homogeneous to current ripple laminated to lenticular bedded with rare burrows and bioturbation. The interval 1964.32m to 1967.03m is sandstone, medium grained, comprised of at least seven units separated by scour surfaces or load and flame surfaces. Internally the interval is current ripple to flaser laminated with rare trough cross bedding. The basal unit contains inclined flaser draped accretionary surfaces. The uppermost 0.4m of the interval contains long dwelling burrows. The interval 1967.03m to 1969.00m (base of core 5) is sandstone, comprised of stacked upward fining units, (separated by scour surfaces), varying in grainsize from very coarse grained and pebbly to very fine to fine grained. Internally these units are trough cross bedded to current ripple and flaser laminated with sparse ophiomorpha burrows. Minor dewatering, load and flame features are locally developed.

Environmental Interpretation

The interval 1915.00m to 1917.13m is interpreted as a succession of stream mouth bar channel units deposited in a inner bay setting proximal to a fluvial system (only rare burrows are recognised). The interval 1917.13m to 1918.30m is interpreted to represent more distal tidal/estuary channel deposition as evidenced by the presence of abundant ophiomorpha burrows. This interval represents a small marine transgressive cycle into a

predominantly fluvially dominated system. A palynological study on a shale sample taken at 1917.35m gave a brackish swamp setting for the environment. The interval 1918.30m to 1920.33m is interpreted as a succession of stream mouth bar channel units deposited in an inner bay setting proximal to a fluvial setting (rare burrows preserved). The interval 1920.33m to 1921.75m is interpreted to represent more distal tidal/estuary channel deposition as evidenced by the presence of ophiomorpha and other non identifiable dwelling burrows.

The interval 1921.75m to 1926.20m is interpreted to represent a succession of stacked channel units deposited in a high energy low sinuosity fluvial system during the late flood stage cycle. The interval 1926.20m to 1926.75m is interpreted as deposition of overbank or abandoned channel fill during the low stage of a high sinuosity fluvial system. A palynological study of a shale sample taken at 1926.25m gave a non-marine (?levee bank or freshwater swamp) setting for the environment. The interval 1926.75m to 1930.35m is interpreted as a succession of proximal to distal crevasse splay units deposited during the falling stage cycle of a high sinuosity fluvial system.

The interval 1930.35m to 1932.30m is interpreted as a succession of stream mouth bar channels building into a proximal estuary setting. The interval 1932.30m to 1933.20m is interpreted to represent more distal deposition of the overlying channel units. A palynological study on a shale sample taken at 1933.10m gave a brackish swamp setting for the environment. The interval 1933.20m to 1934.50m is interpreted to be a succession of stacked stream mouth bar or tidal/estuary channel units building into a proximal bay setting. The interval 1934.50m to 1935.55m is interpreted as a succession of distal tidal/estuary channel units related to the overlying interval. A palynological study on a shale sample taken at 1935.50m gave a nearshore marine lagoon or estuary setting for the environment.

The interval 1935.55m to 1939.35m is interpreted as a succession of stacked channel units deposited in a high energy low sinuosity fluvial system during the late flood stage cycle. The interval 1939.35m to 1942.70m (base of core 4) is interpreted to represent a succession of stacked tidal/estuarine channel units deposited during an overall waning fluvial (early falling cycle grading upwards to late falling or low stage cycle). A palynological study made on shale samples taken at 1939.35m and 1941.65m gave a nearshore marine lagoon or estuary setting for the environment.

The interval 1943.00m (top of core 5) to 1945.07m is interpreted to be a succession of stacked channel units grading upwards from high energy basal channel fill to abandoned channel fill deposited during a flood to falling and low stage cycle within a low sinuosity fluvial system. A palynological study made on a shale sample taken at 1943.00 gave a non-marine (freshwater lake) setting for the environment. The interval 1945.07m to 1947.95m is interpreted to be a repeat of the above cycle. The interval 1947.95m to 1952.95m is interpreted to represent the deposition of three waning fluvial to estuary channel successions building into an inner bay setting. A palynological study made on a shale sample taken at 1948.00m gave a non-marine (freshwater lake or swamp) setting for the environment.

The interval 1952.95m to 1956.95m is interpreted to represent a succession of proximal to distal estuary channel units, which display an overall upward waning in energy, deposited in an inner to middle bay setting. A palynological study of shale samples over this interval made the following interpretation; 1953.00m (brackish lagoon or estuary) and 1955.60m (very nearshore - near normal salinity estuary). The interval 1956.95m to 1959.35m is a repeat of the above depositional setting. The interval 1959.35m to 1960.60m is interpreted to be a succession of stacked basal channel units deposited during the late flood stage of a low sinuosity fluvial system.

The interval 1960.60m to 1962.25m is interpreted to be a succession of stacked proximal estuary basal channel units deposited in an inner bay setting (good ophiomorpha and other dwelling burrows occur throughout). A palynological study made on a shale sample taken from 1961.25m inferred a very nearshore (?backbarrier tidal lagoon) setting for the environment. The interval 1962.25m to 1964.32m is interpreted as a succession of stacked middle to upper point bar tidal channel units deposited around the bay fringe near the mouth of a fluvial system. The interval 1964.32m to 1966.75m is interpreted as a succession of stacked middle point bar estuary channel units deposited at the mouth of a fluvial system. The interval 1966.75m to 1969.00m (base of core 5) is interpreted to be a succession of stacked proximal estuary basal channel units deposited at the mouth of a fluvial system. A palynological study made on a shale sample taken from 1968.25m inferred a very nearshore (?backbarrier tidal lagoon) setting for the environment and a study from a swc sample taken from 1996.50m inferred a nearshore marine setting for the environment.

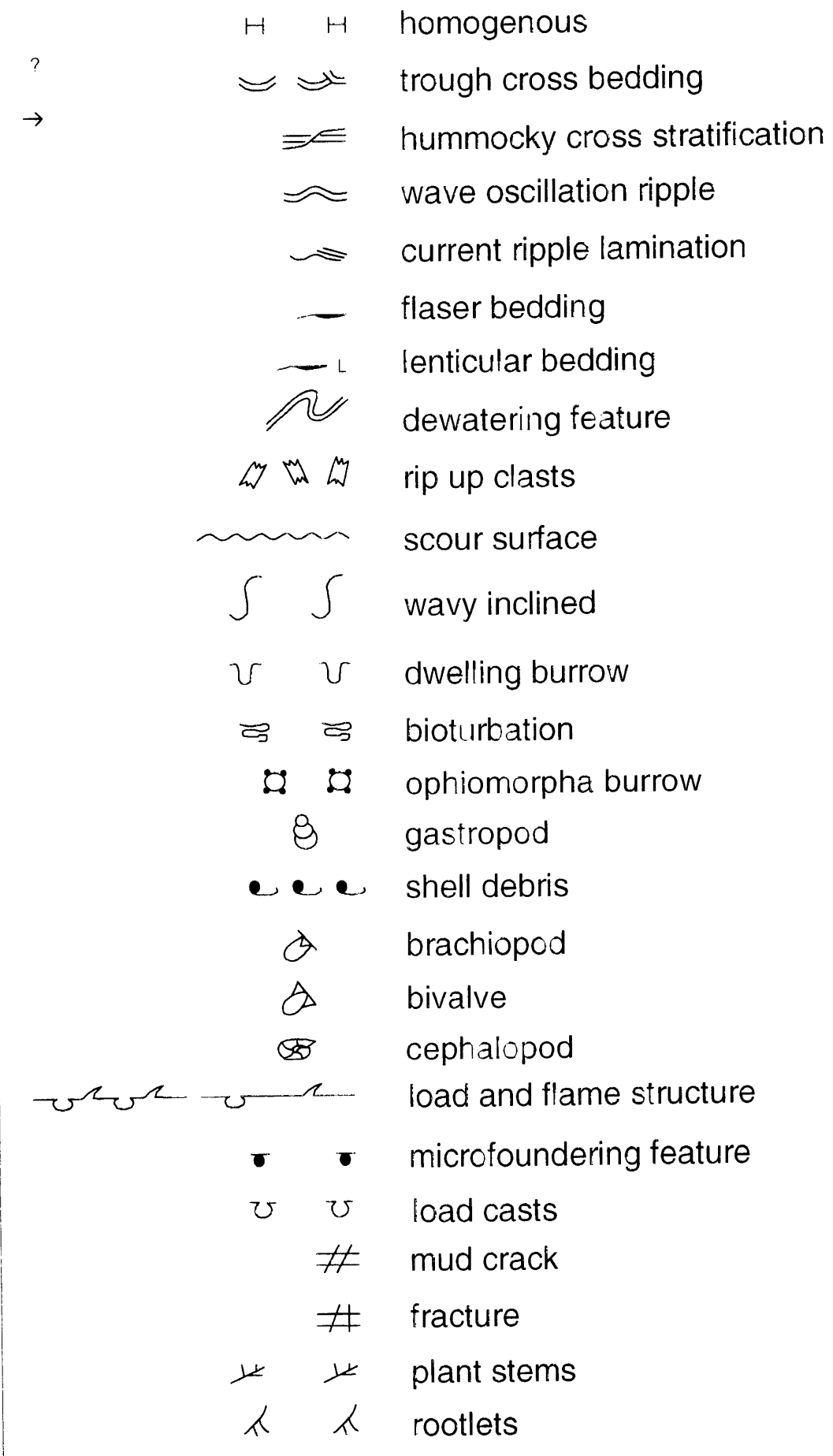
5 REFERENCES

MORGAN, R., 1994: Minerva-2A interim palynology report. - MORGAN PALAEO ASSOCIATES, January, 1994, report for BHP Petroleum (Unpubl.).

6 FIGURES

BHP Petroleum

KEY TO SEDIMENTARY STRUCTURES



BHP Petroleum

LITHOLOGY MODIFIER ONLY

concretions
siderite cement
calcite cement
dolomite cement
glauconite
carbonaceous
coal
pyrite
pebble lag
shale
sand
siltstone
limestone

PE800189

This is an enclosure indicator page.
The enclosure PE800189 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800189 has the following characteristics:

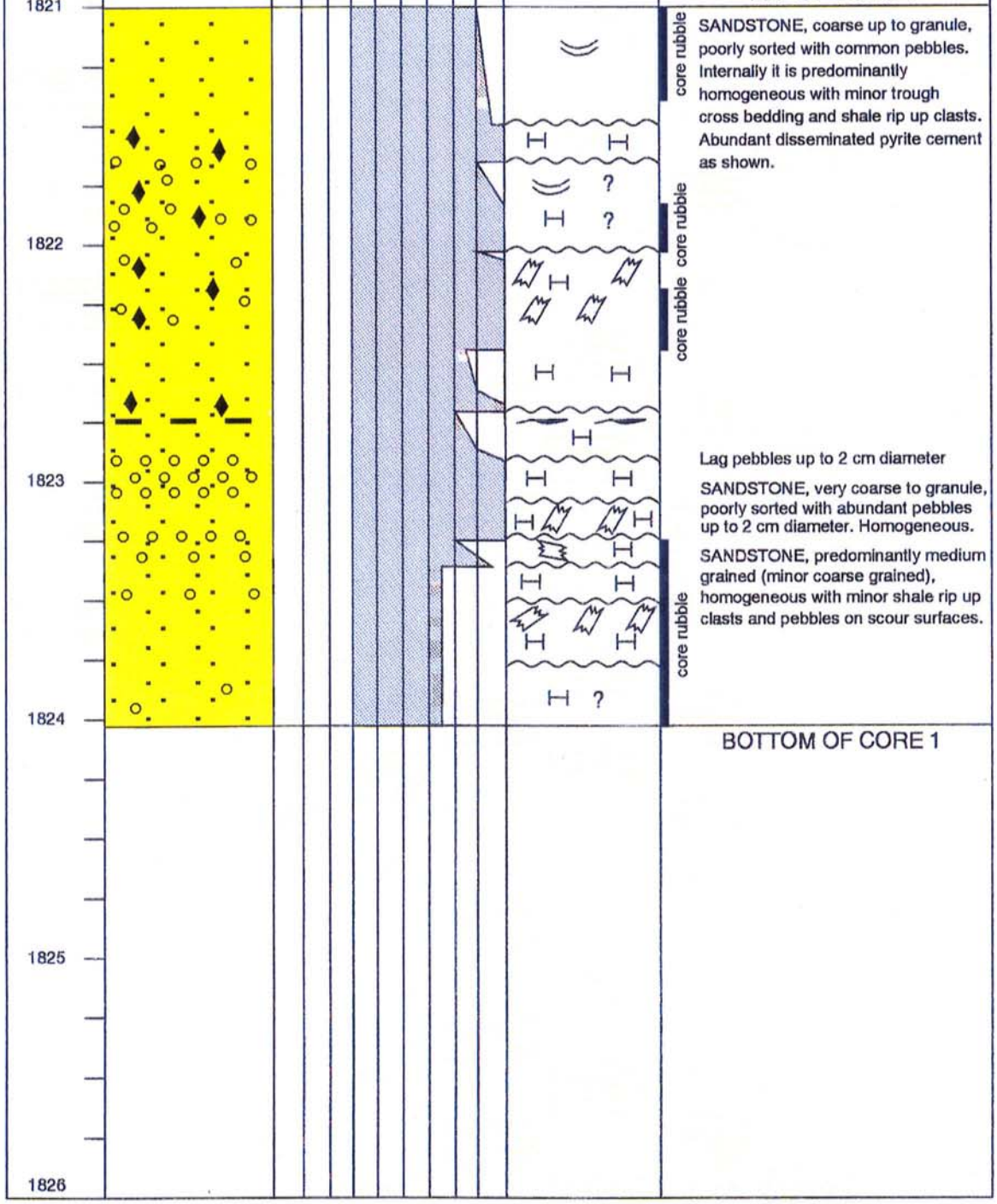
ITEM_BARCODE	= PE800189
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-1 Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-1 Core 1 Graphic Log Description Page 1 of 5
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-1
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	= 0
BOTTOM_DEPTH	= 0
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA-1

PERMIT: VIC / P31		DATE:	CORE NO.: 1 Page: 1/5
AUTHOR: P.Arditto / S.Horan		INTERVAL:	
RIG:		CUT:	
K.B.:	W.D.:	CORE BARREL & MUD TYPE:	



November 1993

Base drawing No.F988
F1034

PE800190

This is an enclosure indicator page.
The enclosure PE800190 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800190 has the following characteristics:

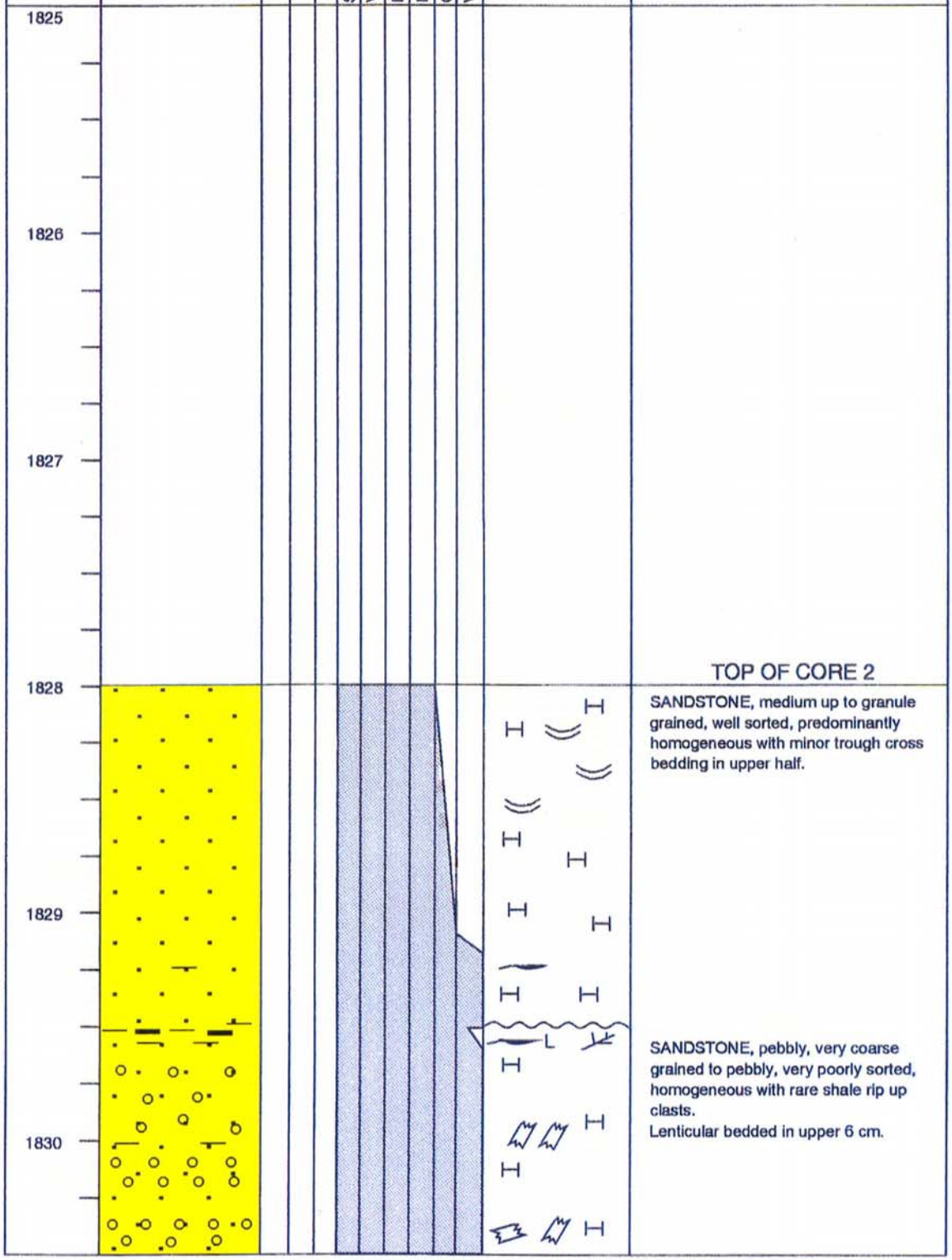
ITEM_BARCODE	= PE800190
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-1 Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-1 Core 2 Graphic Log Description Page 2 of 5
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-1
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	= 0
BOTTOM_DEPTH	= 0
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA-1

PERMIT: VIC / P31		DATE:	CORE NO.: 2 / Page: 2/5
AUTHOR: P.Arditto / S.Horan		INTERVAL:	
RIG:		CUT:	
K.B.:	W.D.:	CORE BARREL & MUD TYPE:	



November 1993

Base drawing No.F988
F1035

PE800191

This is an enclosure indicator page.
The enclosure PE800191 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800191 has the following characteristics:

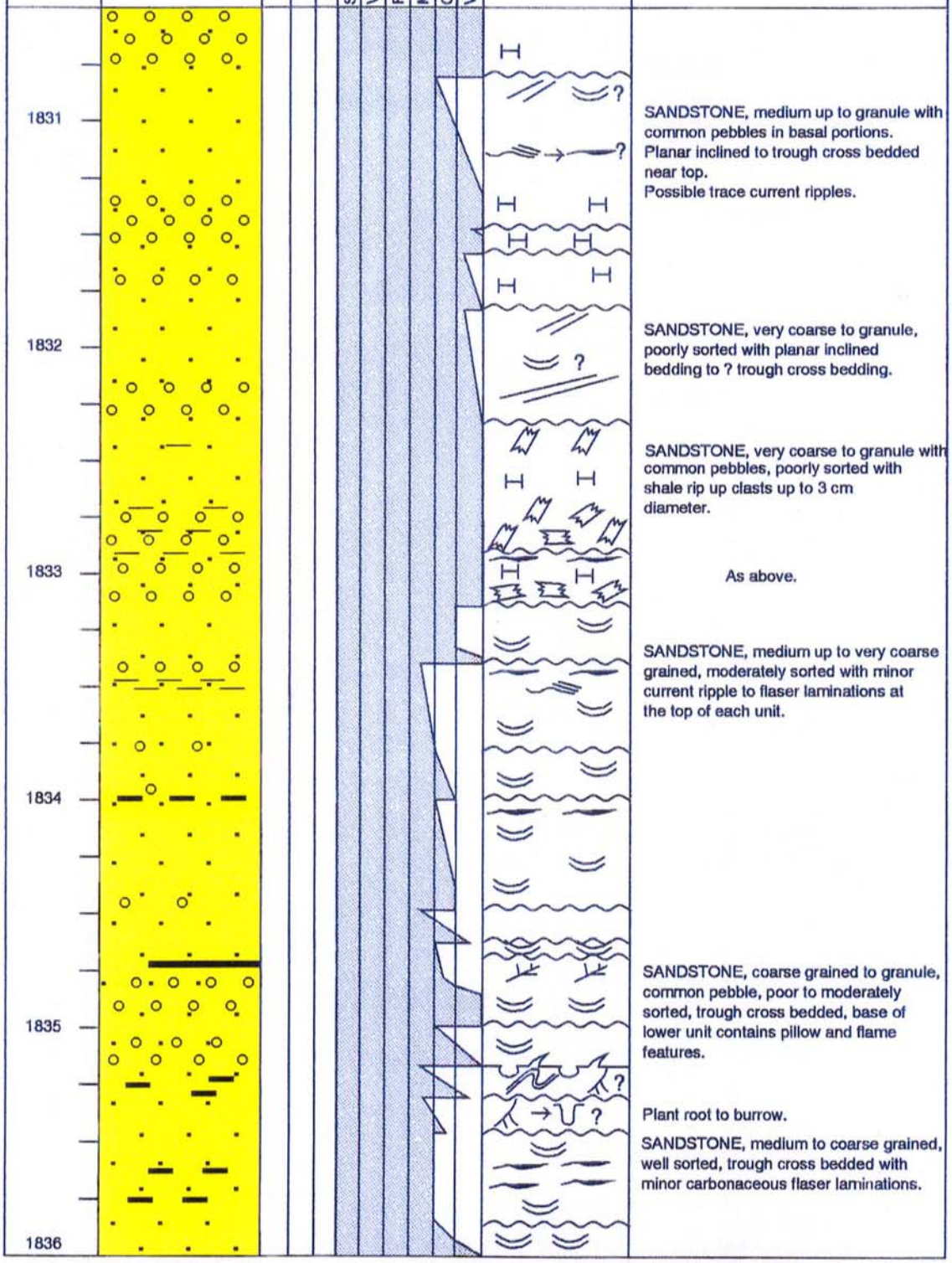
ITEM_BARCODE	= PE800191
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-1 Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-1 Core 2 Graphic Log Description Page 3 of 5
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-1
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	= 0
BOTTOM_DEPTH	= 0
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA-1

PERMIT: VIC / P31	DATE:	CORE NO.: 2	Page: 3/5
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG:	CUT:		
K.B.: W.D.:	CORE BARREL & MUD TYPE:		



November 1993

Base drawing No.F988
F1036

PE800192

This is an enclosure indicator page.
The enclosure PE800192 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800192 has the following characteristics:

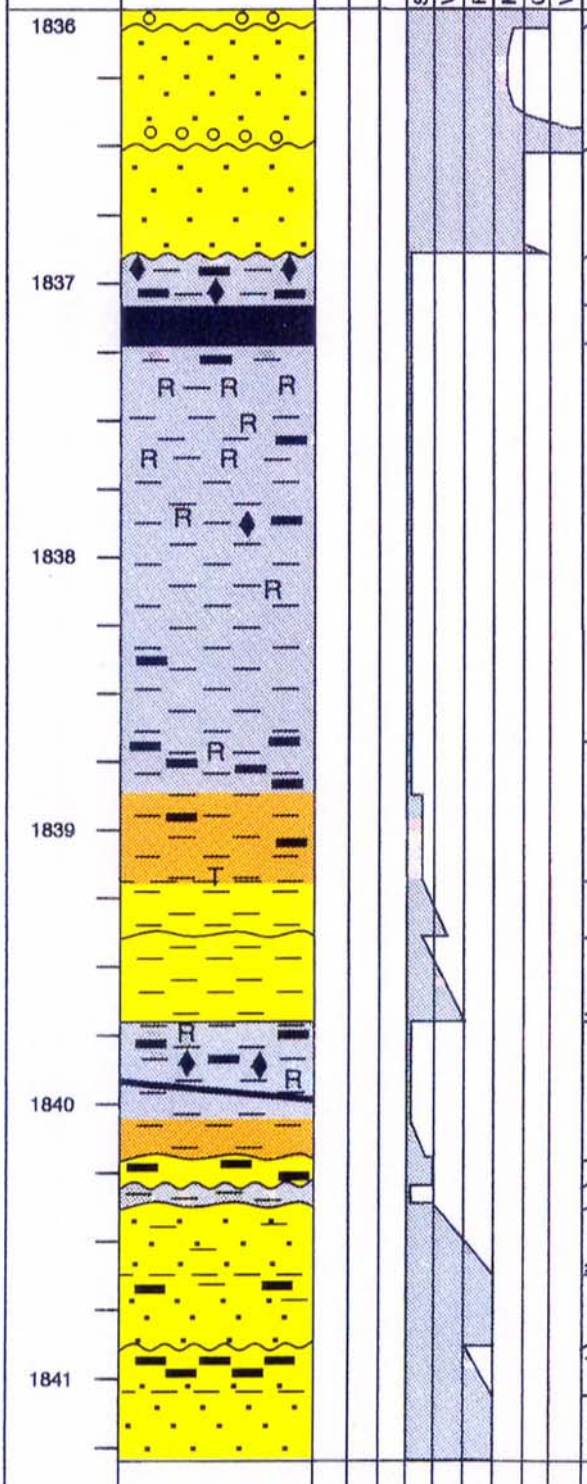
ITEM_BARCODE	= PE800192
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-1 Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-1 Core 2 Graphic Log Description Page 4 of 5
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-1
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	= 0
BOTTOM_DEPTH	= 0
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA-1

PERMIT: VIC / P31	DATE:	CORE NO.: 2	Page: 4/5
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG:	CUT:		
K.B.: W.D.:	CORE BARREL & MUD TYPE:		



SEDIMENTARY STRUCTURE	LITHOLOGICAL DESCRIPTION
	SANDSTONE, medium to coarse, very well sorted, trough cross bedded.
H	COAL, black, brittle, sub bituminous pyrite cemented in upper part of coal.
	SHALE, dark grey, highly carbonaceous with abundant rootlets and sterns abundant resin blebs.
H	SHALE, dark grey, homogenous with minor carbonaceous plant stems, sporadic pyrite nodule cemented, sporadic resin blebs, minor dewatering feature.
H	
T	Highly carbonaceous shale.
	SILTSTONE
T	Wavy
	Saw cut
	SHALE, dark grey, subfissile in lower half, upper half carbonaceous with coaly streaks and resin blebs, with minor pyrite nodules base gradational with underlying unit.
	Wavy
T	Flaser (carbonaceous) to current ripple laminated.
T	
	BOTTOM CORE 2

November 1993

Base drawing No.F988
F1037

PE800193

This is an enclosure indicator page.
The enclosure PE800193 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800193 has the following characteristics:

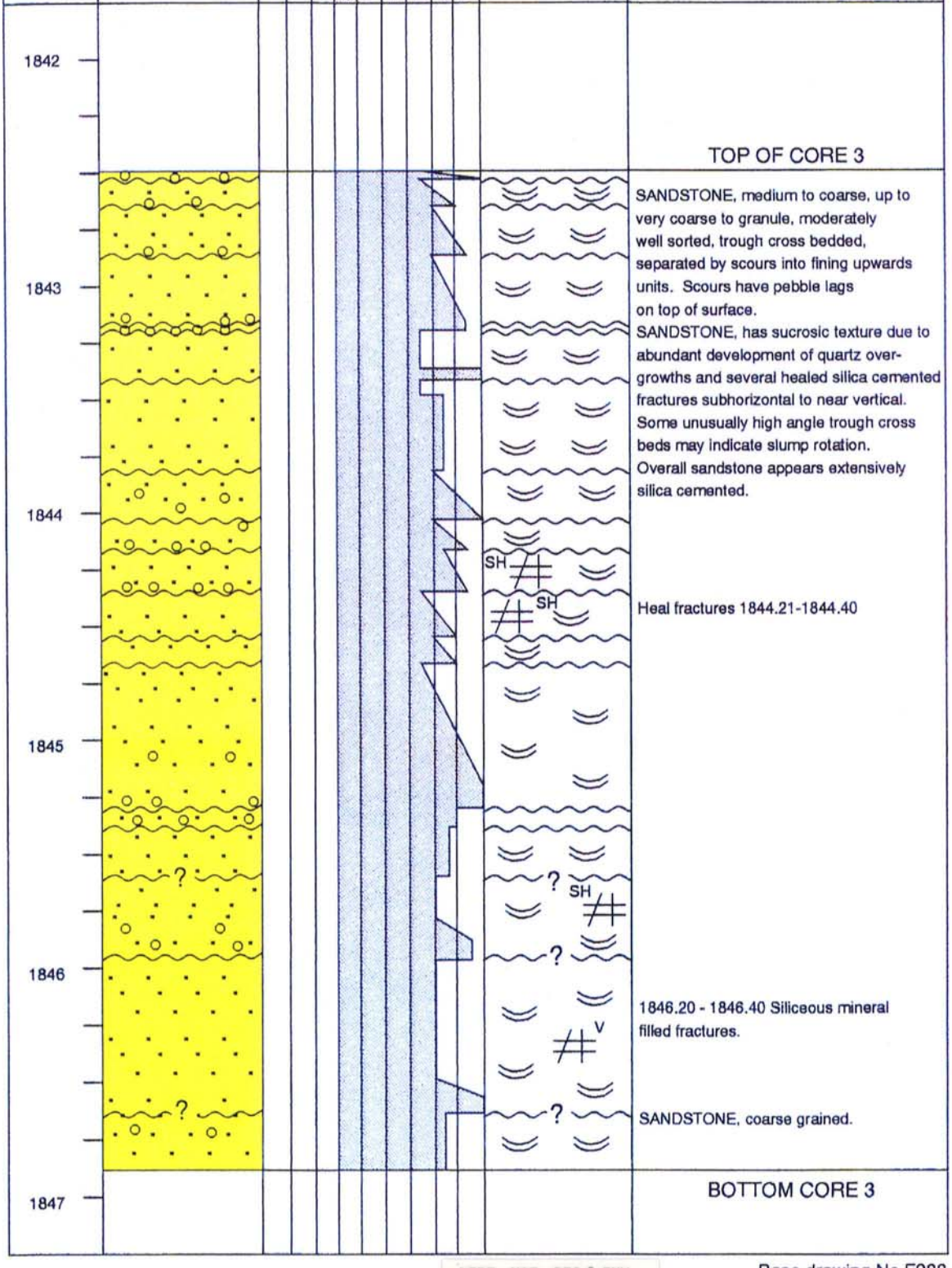
ITEM_BARCODE	= PE800193
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-1 Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-1 Core 2 Graphic Log Description Page 5 of 5
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-1
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	= 0
BOTTOM_DEPTH	= 0
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA-1

PERMIT: VIC / P31	DATE:	CORE NO.: 2	Page: 5/5
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG:	CUT:		
K.B.: W.D.:	CORE BARREL & MUD TYPE:		



November 1993

Base drawing No.F988
F1038

PE800194

This is an enclosure indicator page.
The enclosure PE800194 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800194 has the following characteristics:

ITEM_BARCODE	= PE800194
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-1 Core Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= WELL_LOG
DESCRIPTION	= Minerva-1 Core 1, 2, 3 Gamma Ray Plot Scale 1:200
REMARKS	=
DATE_WRITTEN	=
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	=
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	=
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

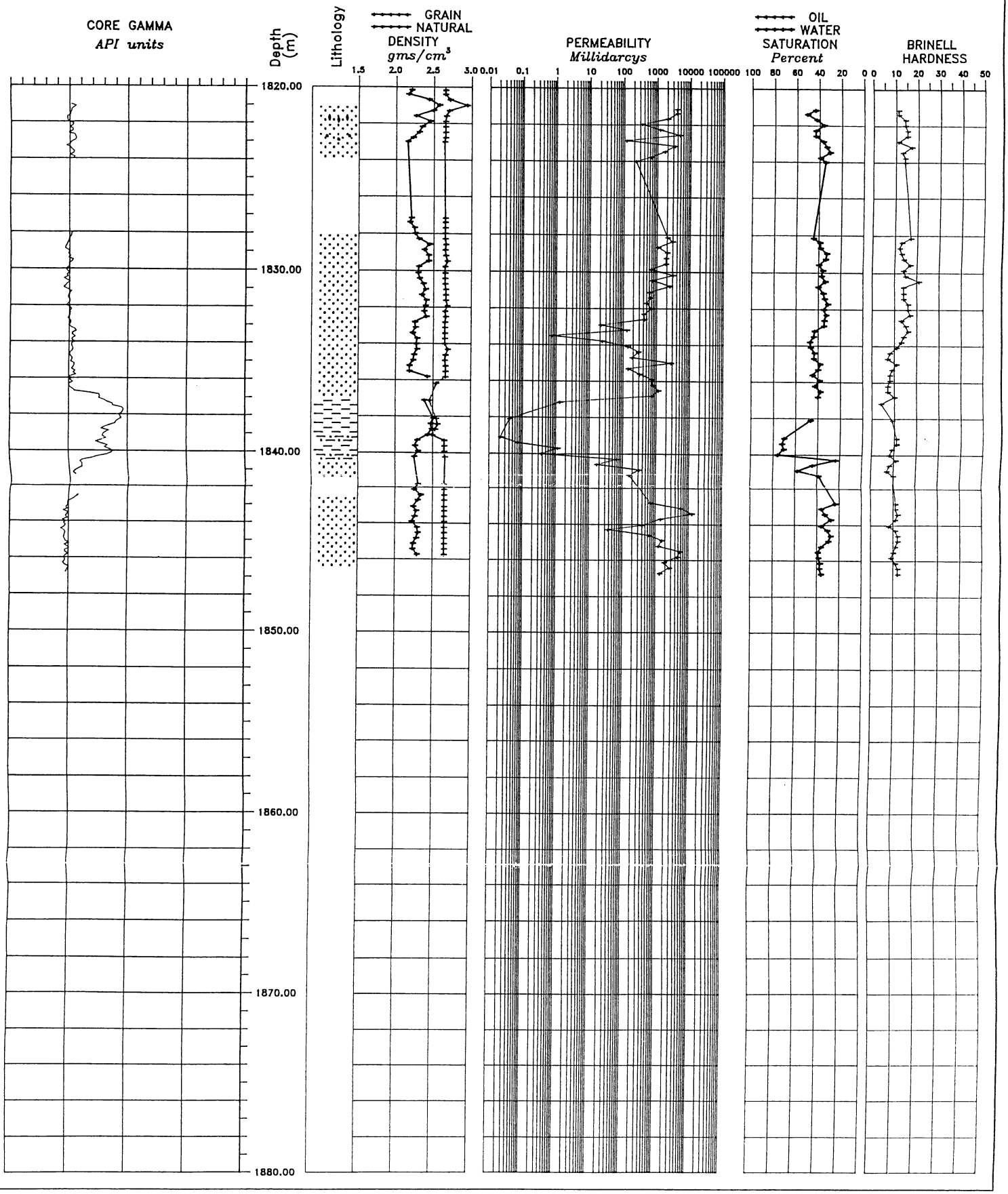
CORE PLOT

Scale 1 : 200

AMDEL CORE SERVICES

Company: BHP PETROLEUM PTY LTD
Well: Minerva No.1
Field: Wildcat
Permit: Vic-P-31

File No.: RG205
Core Int: Core 1: 1821.00 - 1824.04m
Core Int: Core 2: 1828.00 - 1841.27m
Core Int: Core 3: 1842.50 - 1846.87m



PE800195

This is an enclosure indicator page.
The enclosure PE800195 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800195 has the following characteristics:

ITEM_BARCODE	= PE800195
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-1 Core Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= WELL_LOG
DESCRIPTION	= Minerva-1 Core 1, 2, 3 Gamma Ray Plot Scale 1:200
REMARKS	=
DATE_WRITTEN	=
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-1
CONTRACTOR	= PE800195
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	= 1820
BOTTOM_DEPTH	= 1880
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

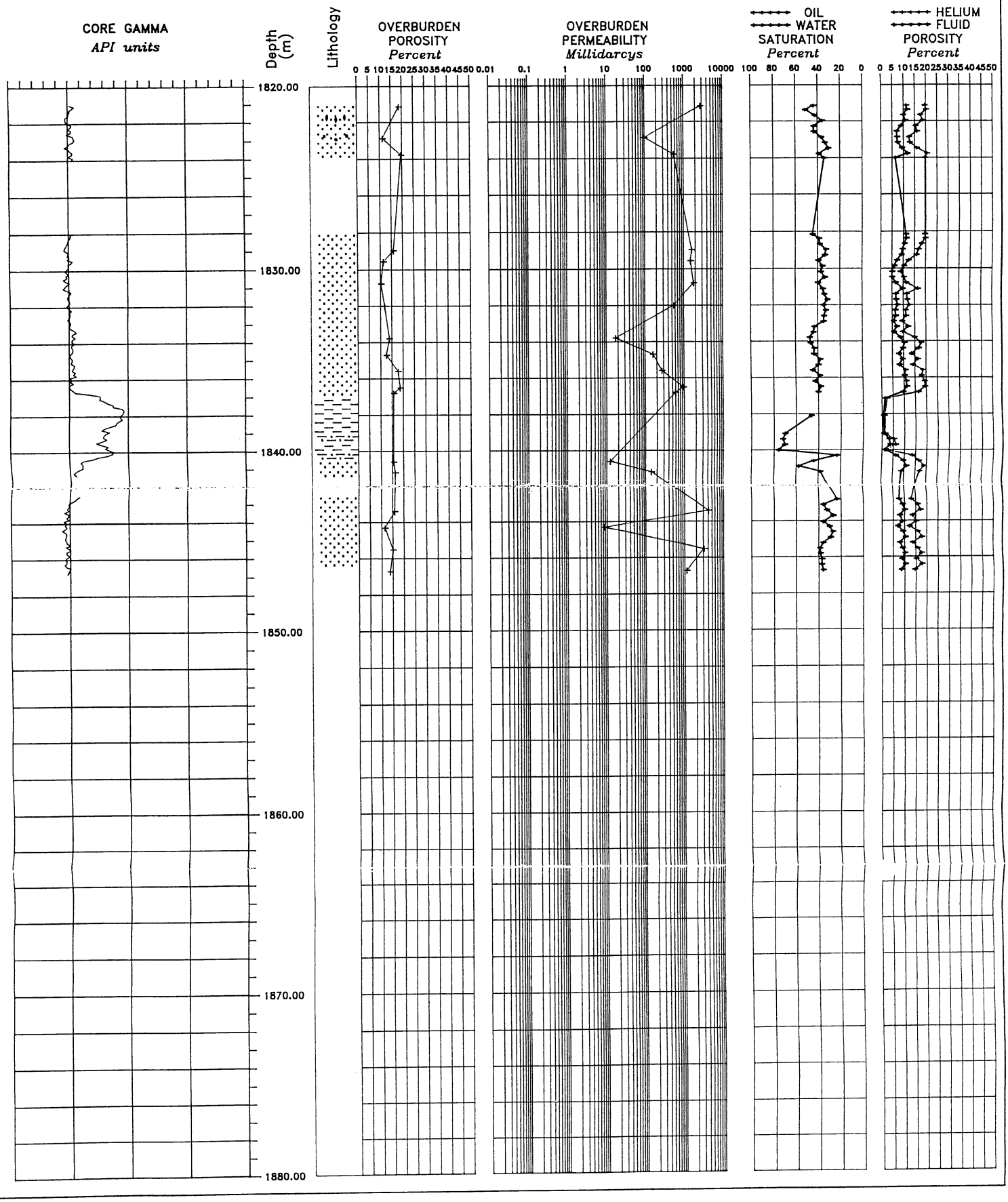
CORE PLOT

Scale 1 : 200

AMDEL CORE SERVICES

Company: BHP PETROLEUM PTY LTD
Well: Minerva No.1
Field: Wildcat
Permit: Vic–P–31

File No.: RG205
Core Int: Core 1: 1821.00 – 1824.04m
Core Int: Core 2: 1828.00 – 1841.27m
Core Int: Core 3: 1842.50 – 1846.87m



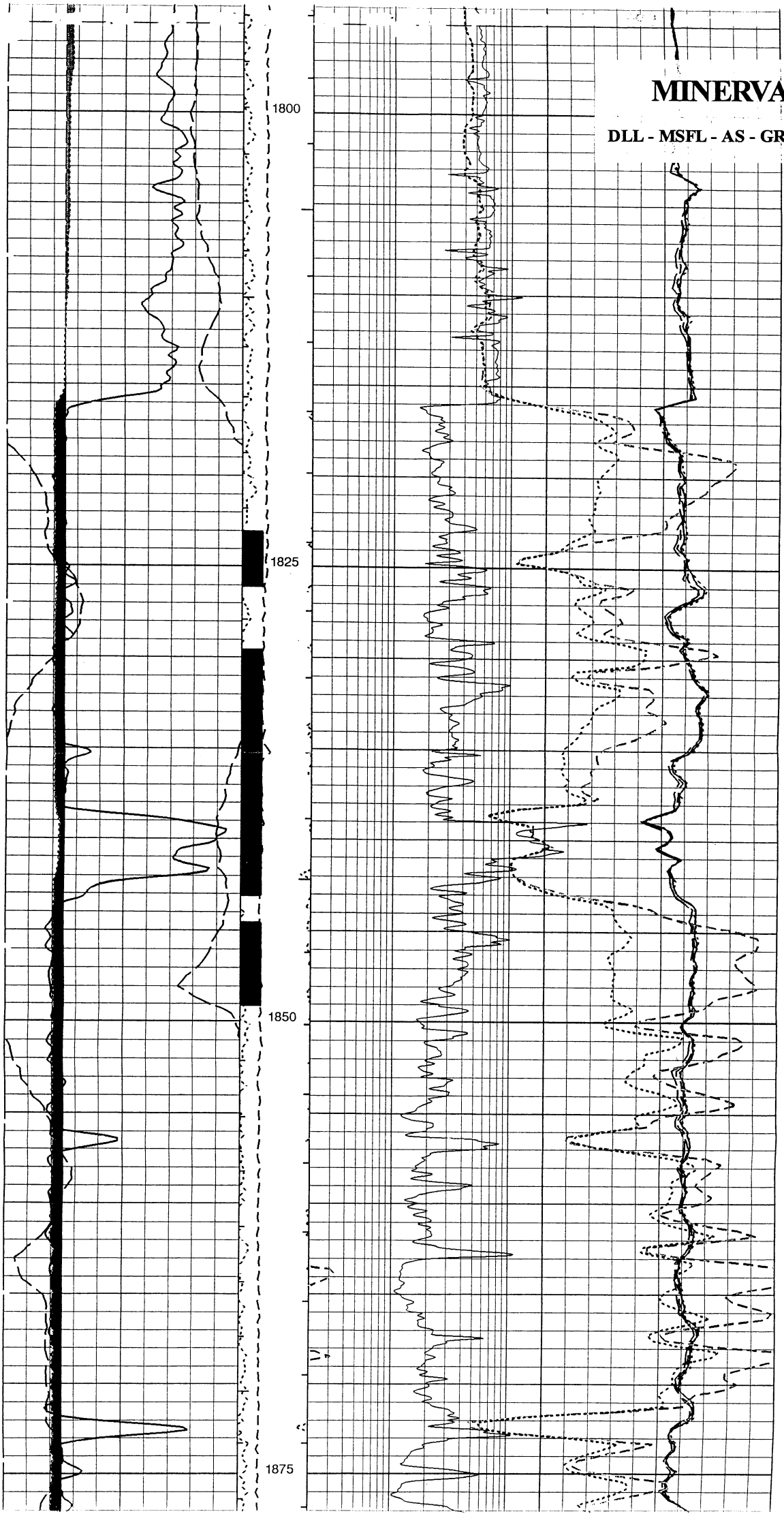
PE800196

This is an enclosure indicator page.
The enclosure PE800196 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800196 has the following characteristics:

ITEM_BARCODE	= PE800196
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-1 Log Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= WELL_LOG
DESCRIPTION	= Minerva-1 DLL-MSFL-AS-GR-AMS-SP Log Plot Scale 1:200
REMARKS	=
DATE_WRITTEN	=
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-1
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)



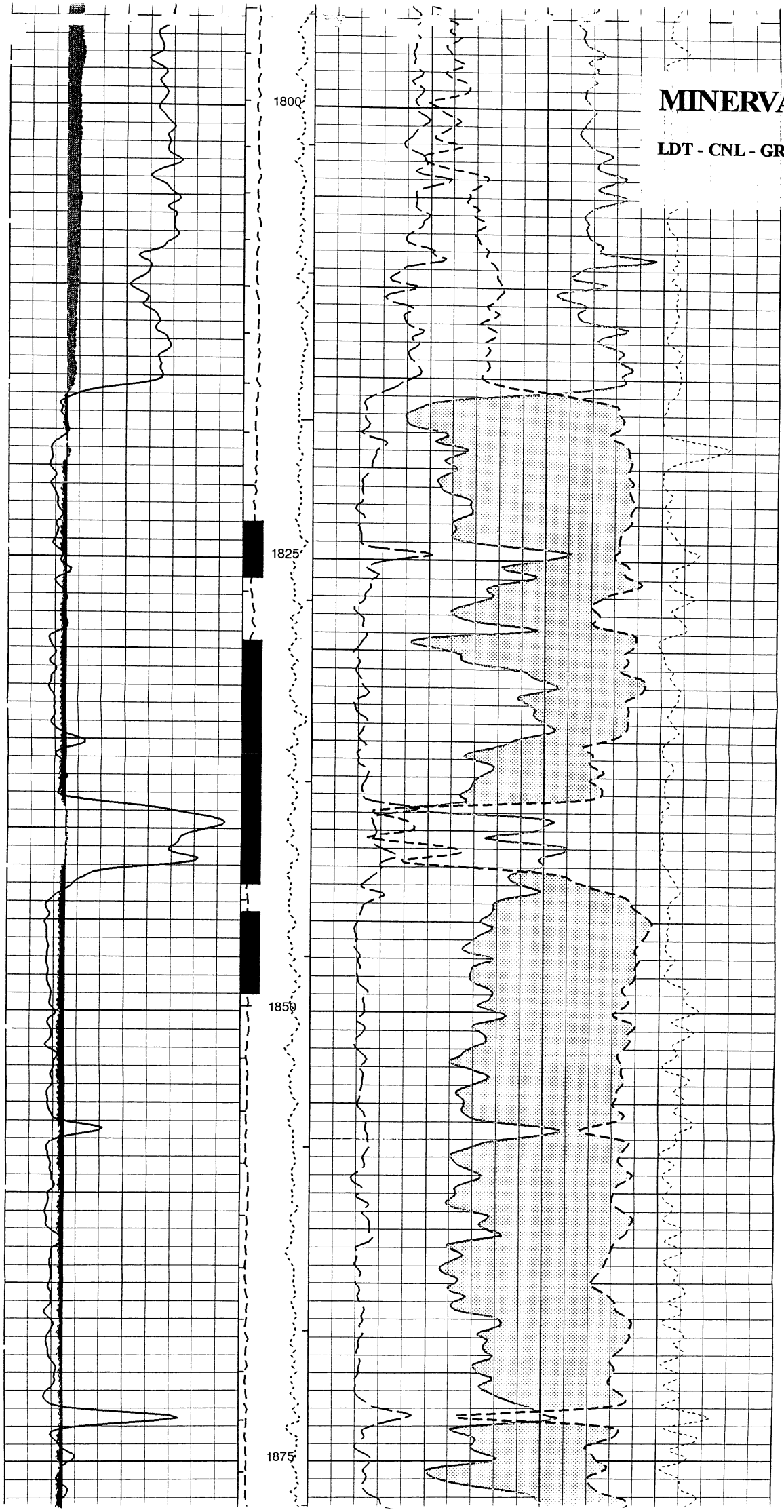
PE800198

This is an enclosure indicator page.
The enclosure PE800198 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800198 has the following characteristics:

ITEM_BARCODE	PE800198
CONTAINER_BARCODE	PE800188
NAME	Minerva-1 Log Plot
BASIN	OTWAY
OFFSHORE?	N
DATA_TYPE	WELL
DATA_SUB_TYPE	WELL_LOG
DESCRIPTION	Minerva-1 LDT-CNL-GR-AMS Log Plot Scale 1:200
REMARKS	
DATE_WRITTEN	
DATE_PROCESSED	
DATE_RECEIVED	11-DEC-1997
RECEIVED_FROM	BHP Petroleum Pty Ltd
WELL_NAME	Minerva-1
CONTRACTOR	
AUTHOR	
ORIGINATOR	BHP Petroleum Pty Ltd
TOP_DEPTH	
BOTTOM_DEPTH	
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)



MINERVA - 1

LDT - CNL - GR - AMS

PE800197

This is an enclosure indicator page.
The enclosure PE800197 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800197 has the following characteristics:

ITEM_BARCODE	= PE800197
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 1 Graphic Log Description Scale 1:200
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 1	Page:
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT W.D.:	CORE BARREL & MUD TYPE:		

DEPTH (m)	LITHOLOGY	SHOWS T U	SHOWS F	SHOWS G	GRAIN SIZE SILT	GRAIN SIZE V.FINE	GRAIN SIZE FINE	GRAIN SIZE MEDIUM	GRAIN SIZE COARSE	GRAIN SIZE V.COARSE	SEDIMENTARY STRUCTURE	LITHOLOGICAL DESCRIPTION
												TOP OF CORE 1
1729												Sandstone, very fine grained, silty, grading upwards to very fine to fine grained, muddy and very poorly sorted through extensive bioturbation. Faint subhorizontal disturbated laminations throughout although primary sedimentary structured largely destroyed through bioturbation. Sparse sand filled dwelling burrows near top of interval. Sporadic sideritic nodular mudstone intervals evident replacing burrow features.
1730												
1731												
1732												
1733												
												BOTTOM OF CORE 1

November 1993

Base drawing No.F988
F1033

PE800199

This is an enclosure indicator page.
The enclosure PE800199 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800199 has the following characteristics:

ITEM_BARCODE	PE800199
CONTAINER_BARCODE	PE800188
NAME	Minerva-2A Core Plot
BASIN	OTWAY
OFFSHORE?	N
DATA_TYPE	WELL
DATA_SUB_TYPE	WELL_LOG
DESCRIPTION	Minerva-2A Core 1, 2, 3, 4, 5 Gamma Ray Plot Scale 1:200
REMARKS	
DATE_WRITTEN	
DATE_PROCESSED	
DATE_RECEIVED	11-DEC-1997
RECEIVED_FROM	BHP Petroleum Pty Ltd
WELL_NAME	Minerva-2A
CONTRACTOR	PE800199
AUTHOR	
ORIGINATOR	BHP Petroleum Pty Ltd
TOP_DEPTH	1720
BOTTOM_DEPTH	1780
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

ACS LABORATORIES PTY. LTD.
ACN 008 273 005

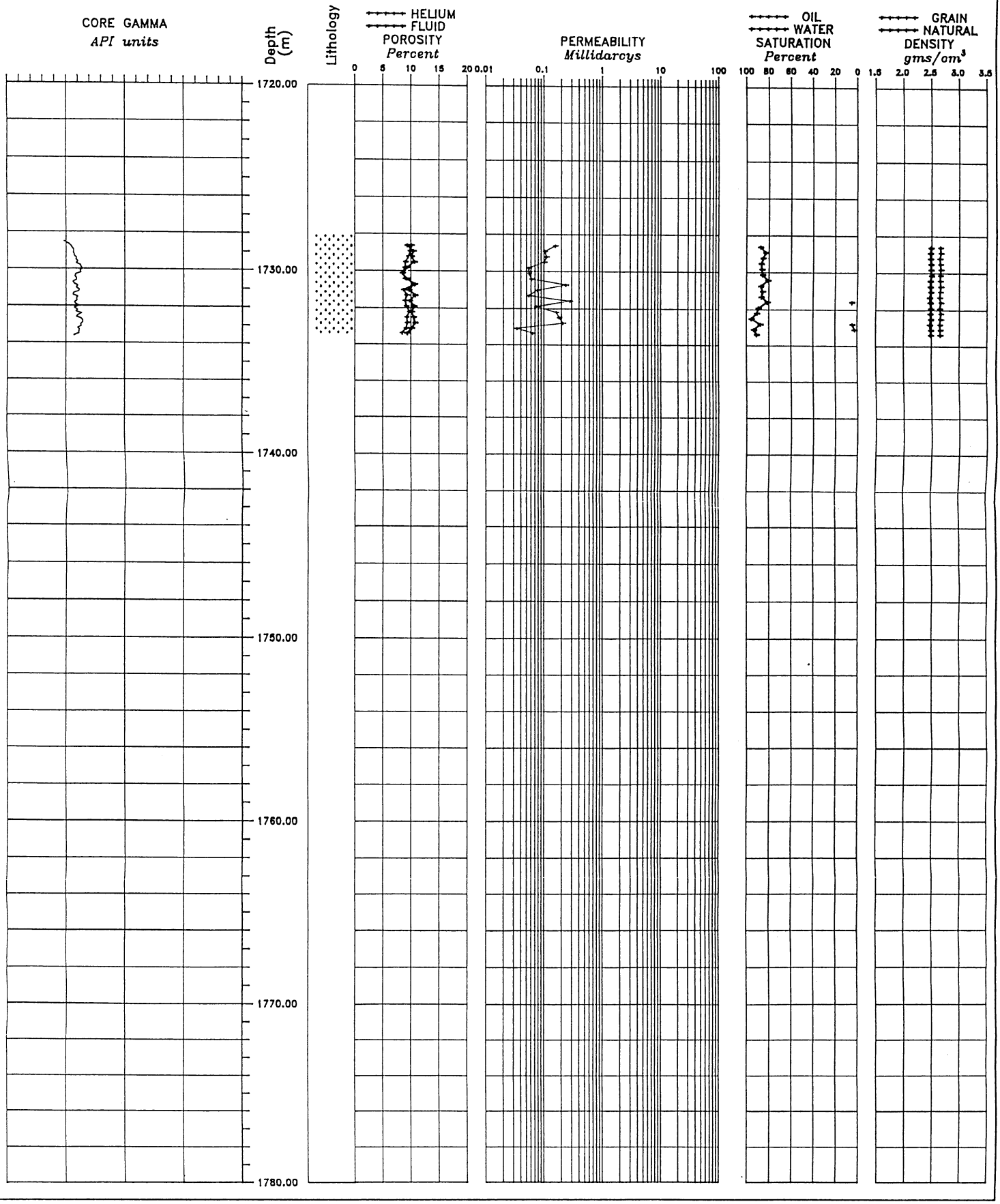
CORE PLOT

Scale 1 : 200

ACS LABORATORIES AUSTRALIA

Company: BHP PETROLEUM PTY.LTD.
Well: MINERVA-2A
Field: MINERVA
Permit: OTWAY

File No.: 5-207
Core Int: CORE NO.1 1728.50-1733.60 M
Core Int: CORE NO.2&3 1838.80-1882.50 M
Core Int: CORE NO.4&5 1915.00-1969.00 M



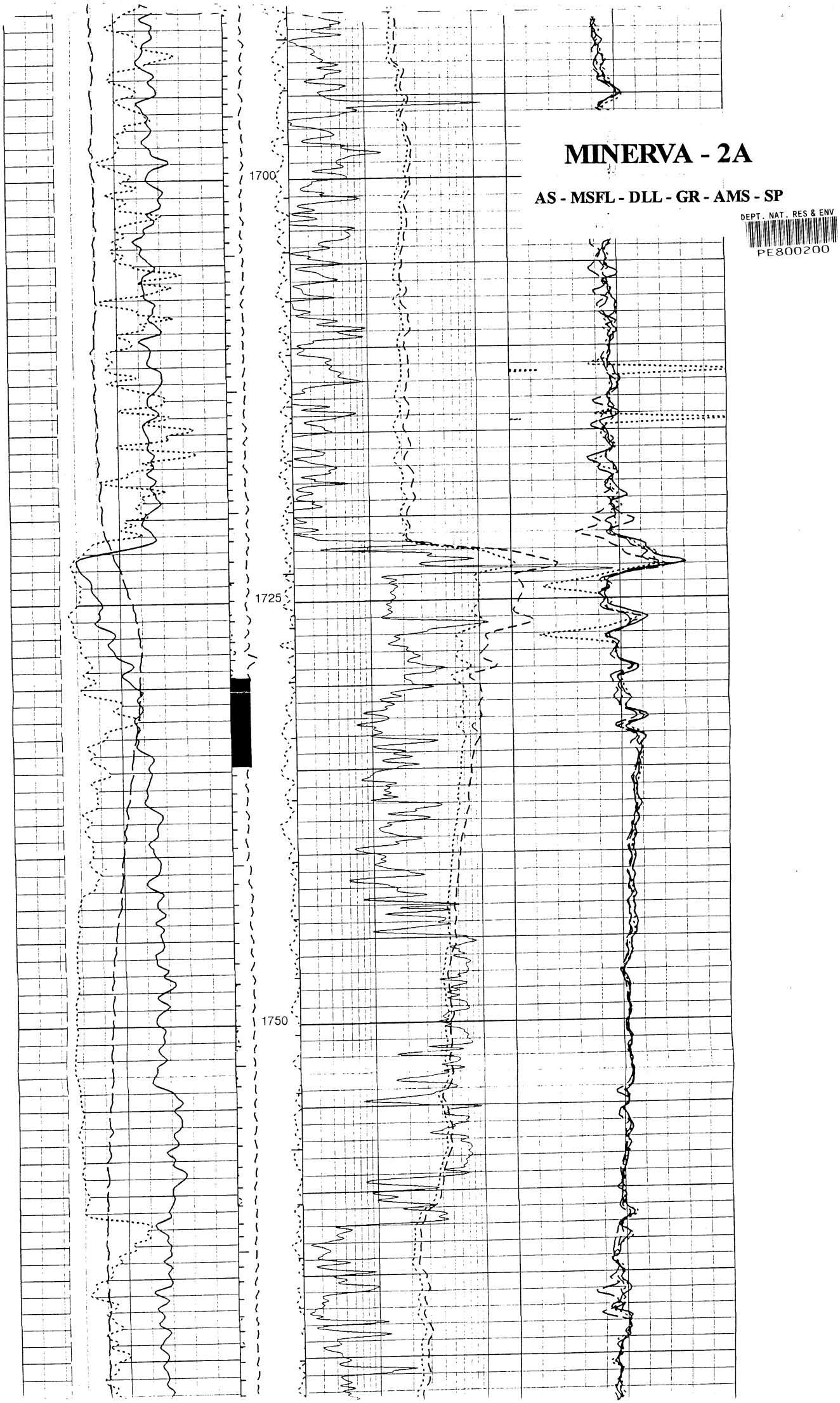
PE800200

This is an enclosure indicator page.
The enclosure PE800200 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800200 has the following characteristics:

ITEM_BARCODE	= PE800200
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Log Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= WELL_LOG
DESCRIPTION	= Minerva-2A AS-MSFL-DLL-GR-AMS-SP Log Plot Scale 1:200
REMARKS	=
DATE_WRITTEN	=
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)



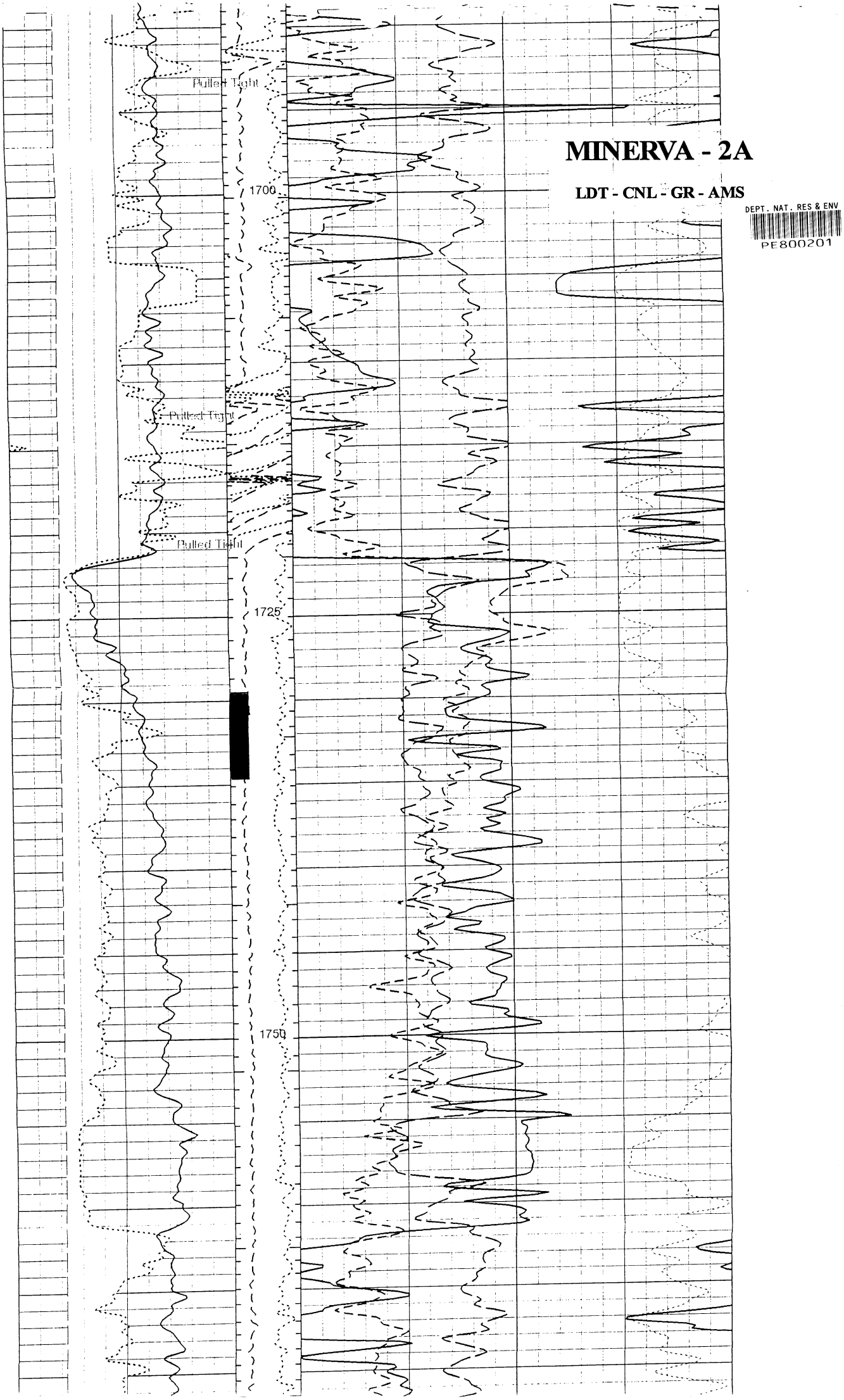
PE800201

This is an enclosure indicator page.
The enclosure PE800201 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800201 has the following characteristics:

ITEM_BARCODE	= PE800201
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Log Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= WELL_LOG
DESCRIPTION	= Minerva-2A LDT-CNL-GR-AMS Log Plot Scale 1:200
REMARKS	=
DATE_WRITTEN	=
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)



MINERVA - 2A

LDT - CNL - GR - AMS

PE800202

This is an enclosure indicator page.
The enclosure PE800202 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800202 has the following characteristics:

ITEM_BARCODE	= PE800202
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 2 Grahic Log Description Scale 1:200 Page 3a
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31		DATE:	CORE NO.: 2 Page: 3a
AUTHOR: P.Arditto / S.Horan		INTERVAL:	
RIG: Byford Dolphin		CUT:	
K.B.: 25mRT	W.D.:	CORE BARREL & MUD TYPE:	

DEPTH (m)	LITHOLOGY	SHOWS T U	SHOWS F	SHOWS G	GRAIN SIZE SILT	V.FINE	FINE	MEDIUM	COARSE	V.COARSE	SEDIMENTARY STRUCTURE	LITHOLOGICAL DESCRIPTION
1838												TOP CORE 2
1839												SANDSTONE

November 1993

Base drawing No.F988
F989

PE800203

This is an enclosure indicator page.
The enclosure PE800203 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800203 has the following characteristics:

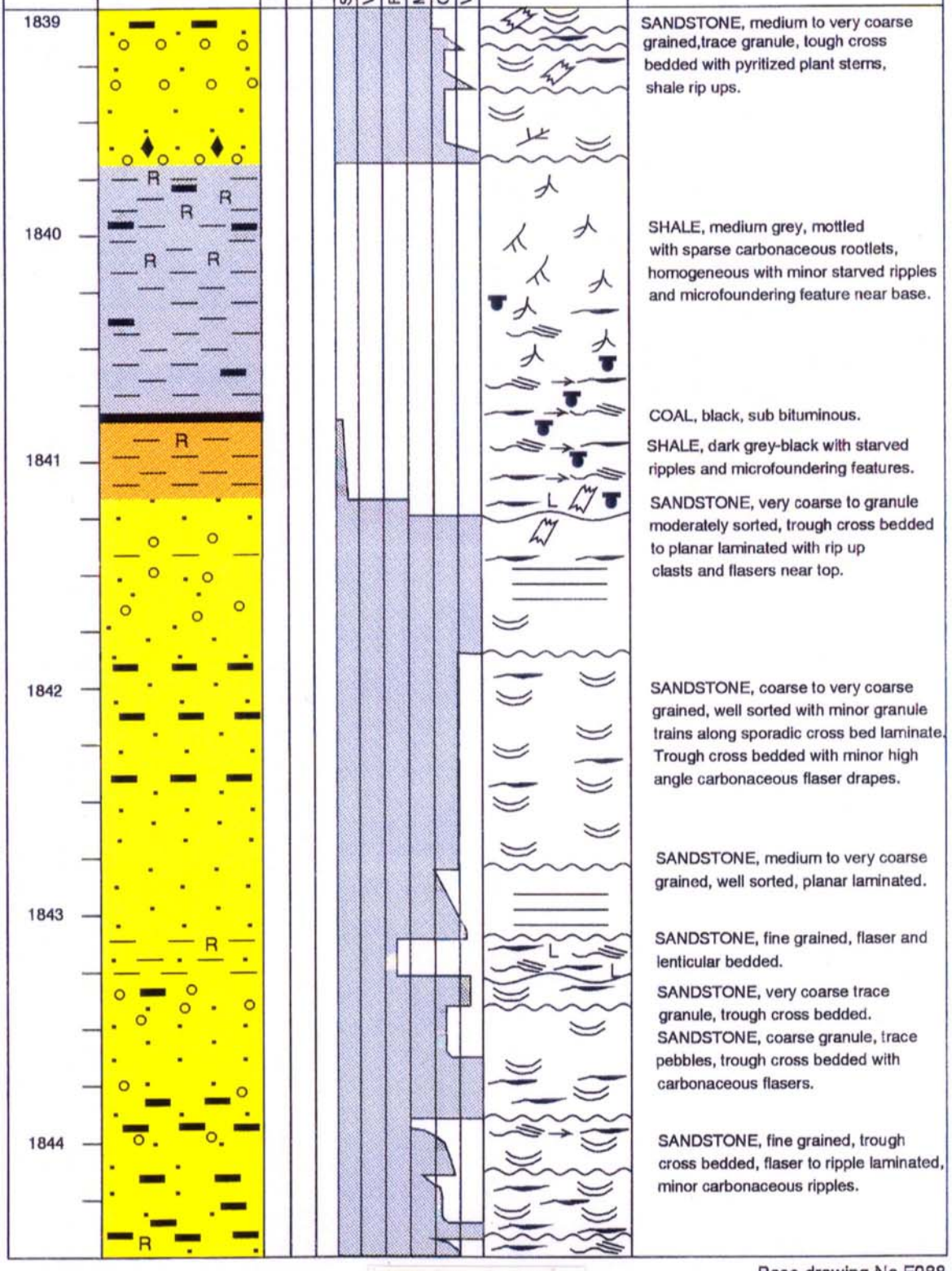
ITEM_BARCODE	= PE800203
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 2 Grahic Log Description Scale 1:200 Page 3
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 2	Page: 3
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT W.D.:	CORE BARREL & MUD TYPE:		



November 1993

Base drawing No.F988
F990

PE800204

This is an enclosure indicator page.
The enclosure PE800204 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800204 has the following characteristics:

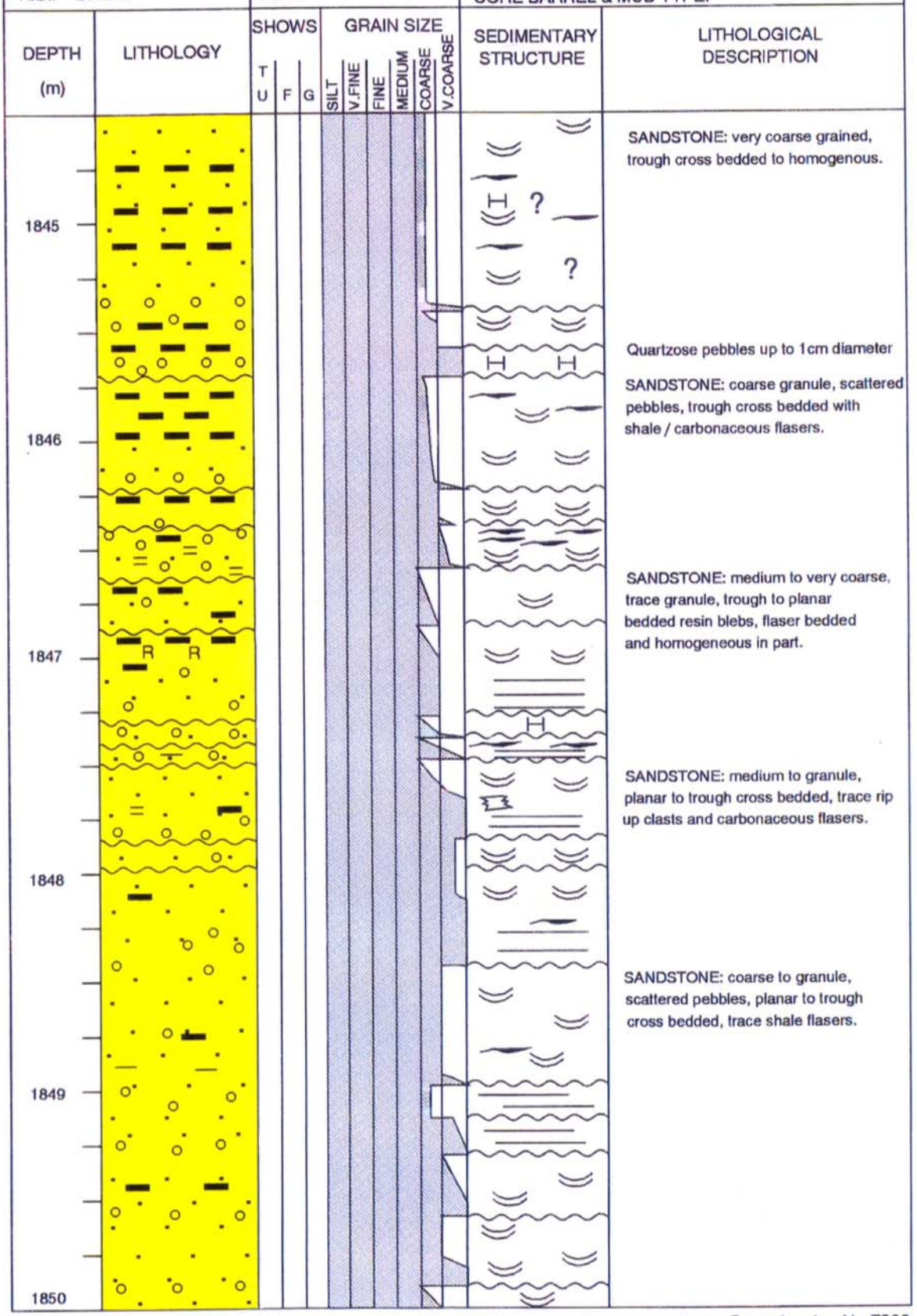
ITEM_BARCODE	= PE800204
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 2 Grahic Log Description Scale 1:200 Page 4
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 2	Page: 4
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT W.D.:	CORE BARREL & MUD TYPE:		



November 1993

Base drawing No.F988
F991

PE800205

This is an enclosure indicator page.
The enclosure PE800205 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800205 has the following characteristics:

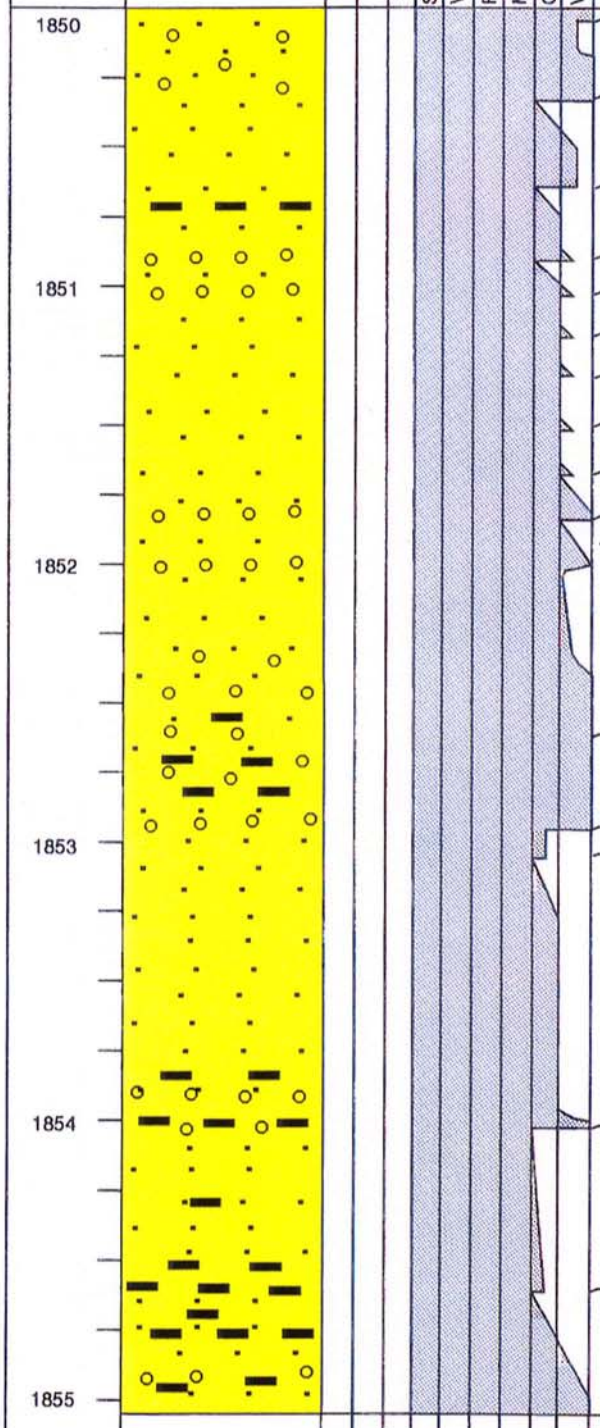
ITEM_BARCODE	= PE800205
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 2 Grahic Log Description Scale 1:200 Page 5
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 2	Page: 5
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT	W.D.:	CORE BARREL & MUD TYPE:	



SEDIMENTARY STRUCTURE	LITHOLOGICAL DESCRIPTION
	SANDSTONE: mediun granule, trough cross bedded homogenous in part.
	SANDSTONE: coarse to very coarse, trace granule and scattered pebbles, trough cross bedded, trace planar bedded.
	SANDSTONE: coarse granule, trace scattered pebbles, planar bedded.
	SANDSTONE: very coarse granule, trace pebbles, trough cross bedded with trace plant sterns.
	SANDSTONE: medium to very coarse trace granule - pebble, trough cross bedded.
	SANDSTONE: medium granule, trough cross bedded with plant stems and carbonaceous rip ups.
	BOTTOM CORE 2

November 1993

Base drawing No.F988
F992

PE800206

This is an enclosure indicator page.
The enclosure PE800206 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800206 has the following characteristics:

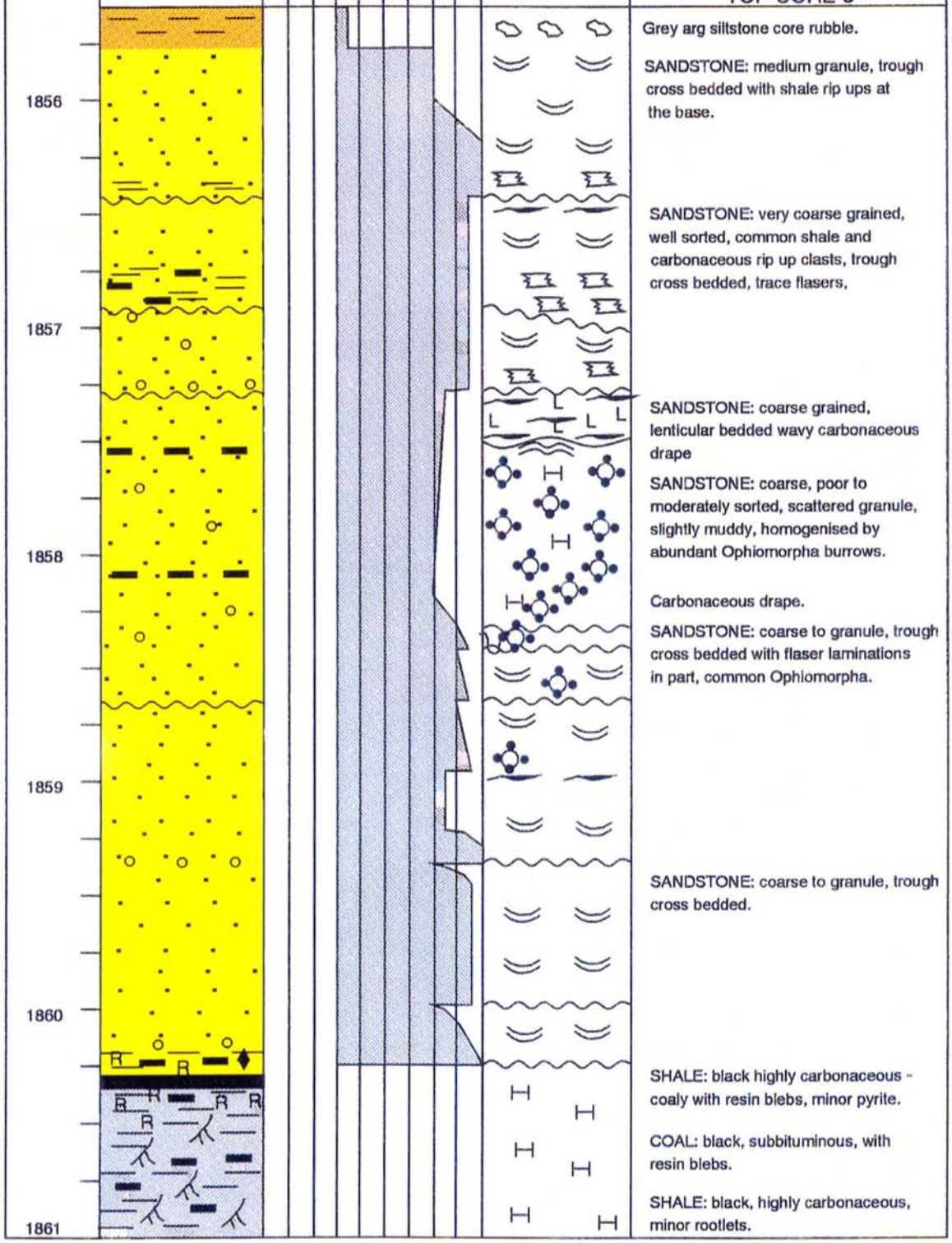
ITEM_BARCODE	PE800206
CONTAINER_BARCODE	PE800188
NAME	Minerva-2A Core Graphic Log
BASIN	OTWAY
OFFSHORE?	N
DATA_TYPE	WELL
DATA_SUB_TYPE	LITHOLOGY_RPT
DESCRIPTION	Minerva-2A Core 3 Grahic Log Description Scale 1:200 Page 6
REMARKS	
DATE_WRITTEN	30-NOV-1993
DATE_PROCESSED	
DATE_RECEIVED	11-DEC-1997
RECEIVED_FROM	BHP Petroleum Pty Ltd
WELL_NAME	Minerva-2A
CONTRACTOR	
AUTHOR	
ORIGINATOR	BHP Petroleum Pty Ltd
TOP_DEPTH	
BOTTOM_DEPTH	
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 3	Page: 6
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT W.D.:	CORE BARREL & MUD TYPE:		



November 1993

Base drawing No.F988
F993

PE800207

This is an enclosure indicator page.
The enclosure PE800207 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800207 has the following characteristics:

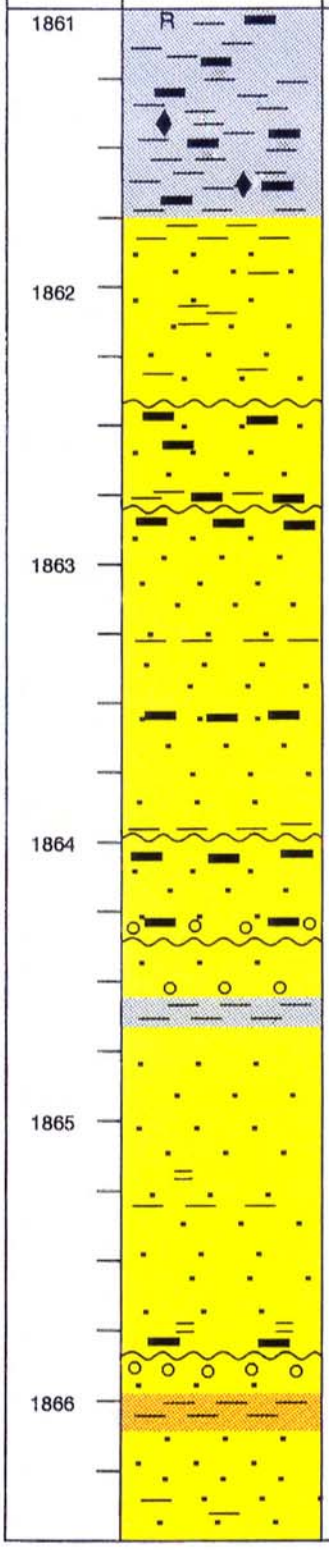
ITEM_BARCODE	PE800207
CONTAINER_BARCODE	PE800188
NAME	Minerva-2A Core Graphic Log
BASIN	OTWAY
OFFSHORE?	N
DATA_TYPE	WELL
DATA_SUB_TYPE	LITHOLOGY_RPT
DESCRIPTION	Minerva-2A Core 3 Grahic Log Description Scale 1:200 Page 7
REMARKS	
DATE_WRITTEN	30-NOV-1993
DATE_PROCESSED	
DATE_RECEIVED	11-DEC-1997
RECEIVED_FROM	BHP Petroleum Pty Ltd
WELL_NAME	Minerva-2A
CONTRACTOR	
AUTHOR	
ORIGINATOR	BHP Petroleum Pty Ltd
TOP_DEPTH	
BOTTOM_DEPTH	
ROW_CREATED_BY	DN07_SW

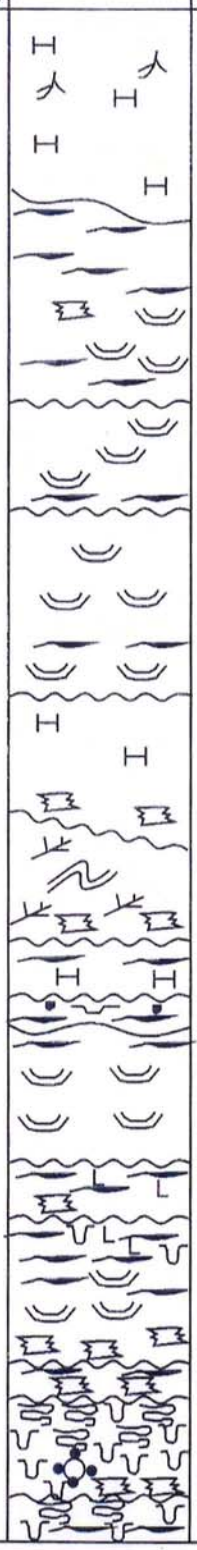
(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 3	Page: 7
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT W.D.:	CORE BARREL & MUD TYPE:		





LITHOLOGICAL DESCRIPTION

COAL: black, bituminous

SHALE: black - dark grey, highly carbonaceous

1861.13 - 1861.33 slicken sided shale core rubble.

SANDSTONE: mediun to coarse trough cross bedded with flaser beds and shale rip up clasts.

SANDSTONE: medium grained, homogenous with minor shale / carbonaceous rip ups, plant stems and dewatering structures.

SHALE: dark grey, common flasers, microfoundering structures and load casts.

SANDSTONE: fine to medium grained, trough cross bedded with flasers, lenticular beds, burrows and carbonaceous / shale rip ups.

SANDSTONE: heavily burrowed to bioturbated, trace Ophiomorpha burrows.

November 1993

Base drawing No.F988
F994

PE800208

This is an enclosure indicator page.
The enclosure PE800208 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800208 has the following characteristics:

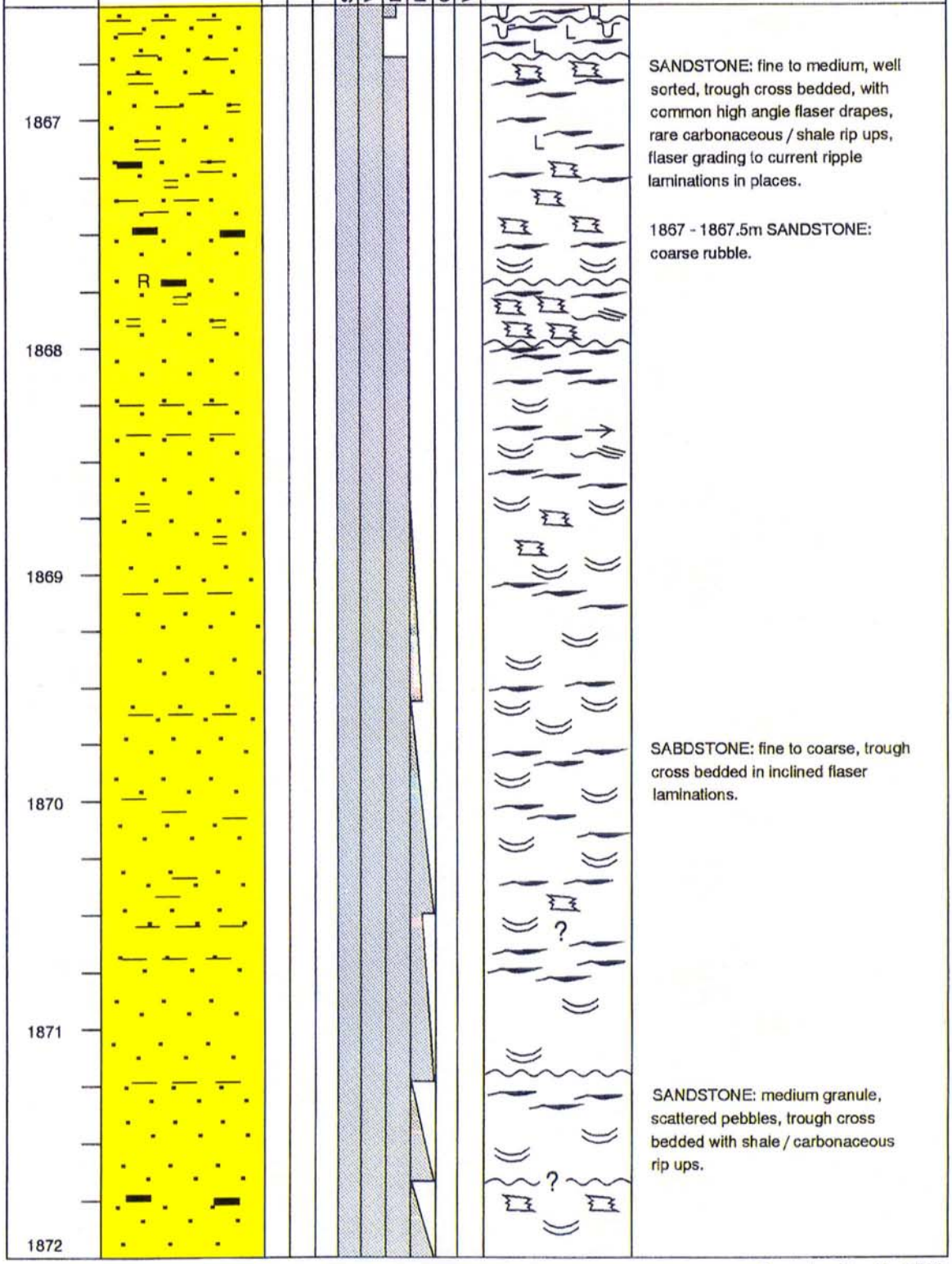
ITEM_BARCODE	= PE800208
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 3 Grahic Log Description Scale 1:200 Page 8
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 3	Page: 8
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT W.D.:	CORE BARREL & MUD TYPE:		



November 1993

Base drawing No.F988
F995

PE800209

This is an enclosure indicator page.
The enclosure PE800209 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800209 has the following characteristics:

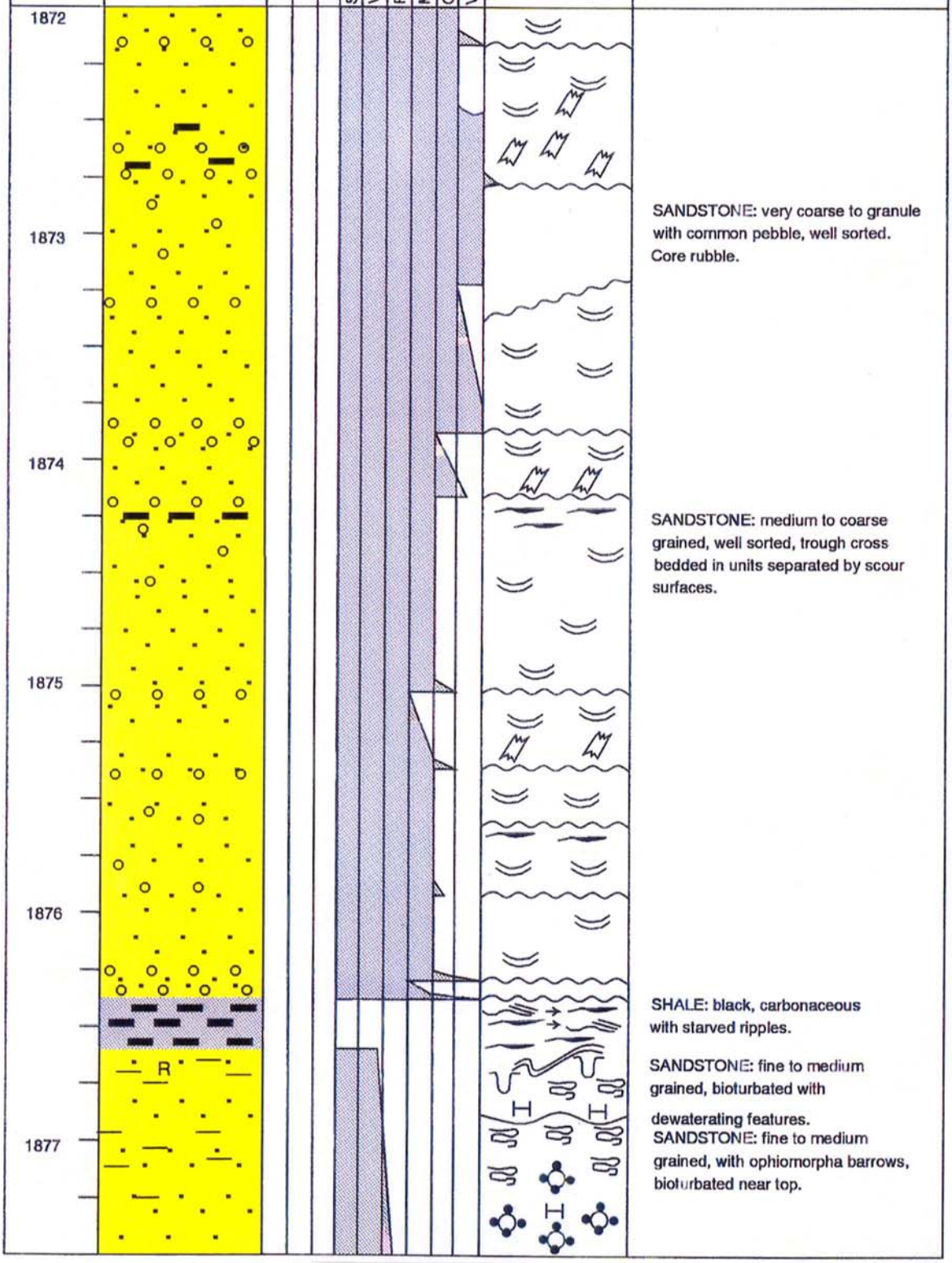
ITEM_BARCODE	= PE800209
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 3 Grahic Log Description Scale 1:200 Page 9
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 3	Page: 9
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT W.D.:	CORE BARREL & MUD TYPE:		



November 1993

Base drawing No.F988
F996

PE800210

This is an enclosure indicator page.
The enclosure PE800210 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800210 has the following characteristics:

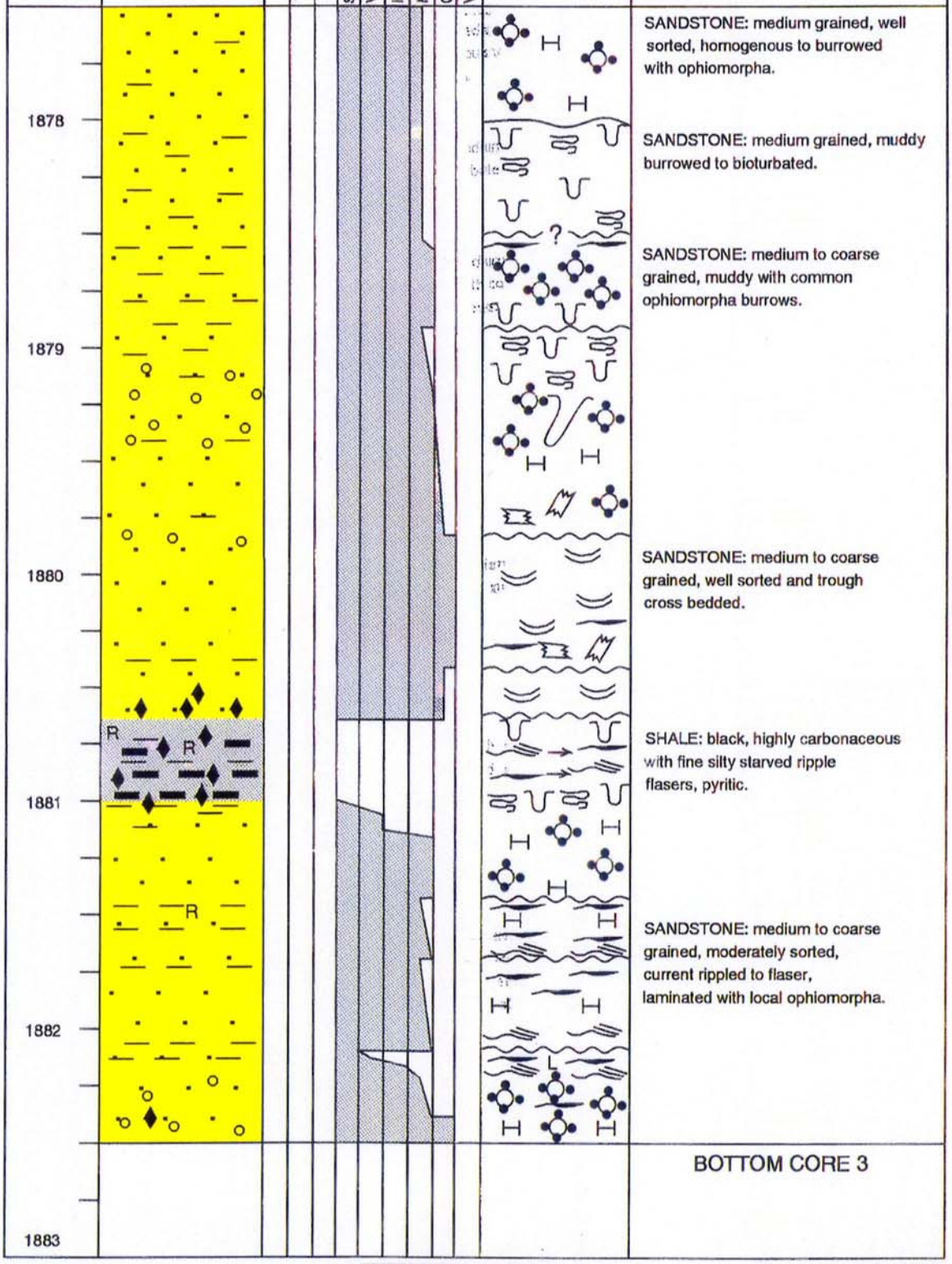
ITEM_BARCODE	= PE800210
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Log
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 3 Grahic Log Description Scale 1:200 Page 10
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 3	Page: 10
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT	W.D.:	CORE BARREL & MUD TYPE:	



November 1993

Base drawing No.F988
F997

PE800211

This is an enclosure indicator page.
The enclosure PE800211 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800211 has the following characteristics:

ITEM_BARCODE	PE800211
CONTAINER_BARCODE	PE800188
NAME	Minerva-2A Core Plot
BASIN	OTWAY
OFFSHORE?	N
DATA_TYPE	WELL
DATA_SUB_TYPE	WELL_LOG
DESCRIPTION	Minerva-2A Core 1, 2, 3, 4, 5 Gamma Ray Plot Scale 1:200
REMARKS	
DATE_WRITTEN	
DATE_PROCESSED	
DATE_RECEIVED	11-DEC-1997
RECEIVED_FROM	BHP Petroleum Pty Ltd
WELL_NAME	Minerva-2A
CONTRACTOR	PE800211
AUTHOR	
ORIGINATOR	BHP Petroleum Pty Ltd
TOP_DEPTH	1830
BOTTOM_DEPTH	1890
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

ACS LABORATORIES PTY. LTD.
ACN 008 273 005

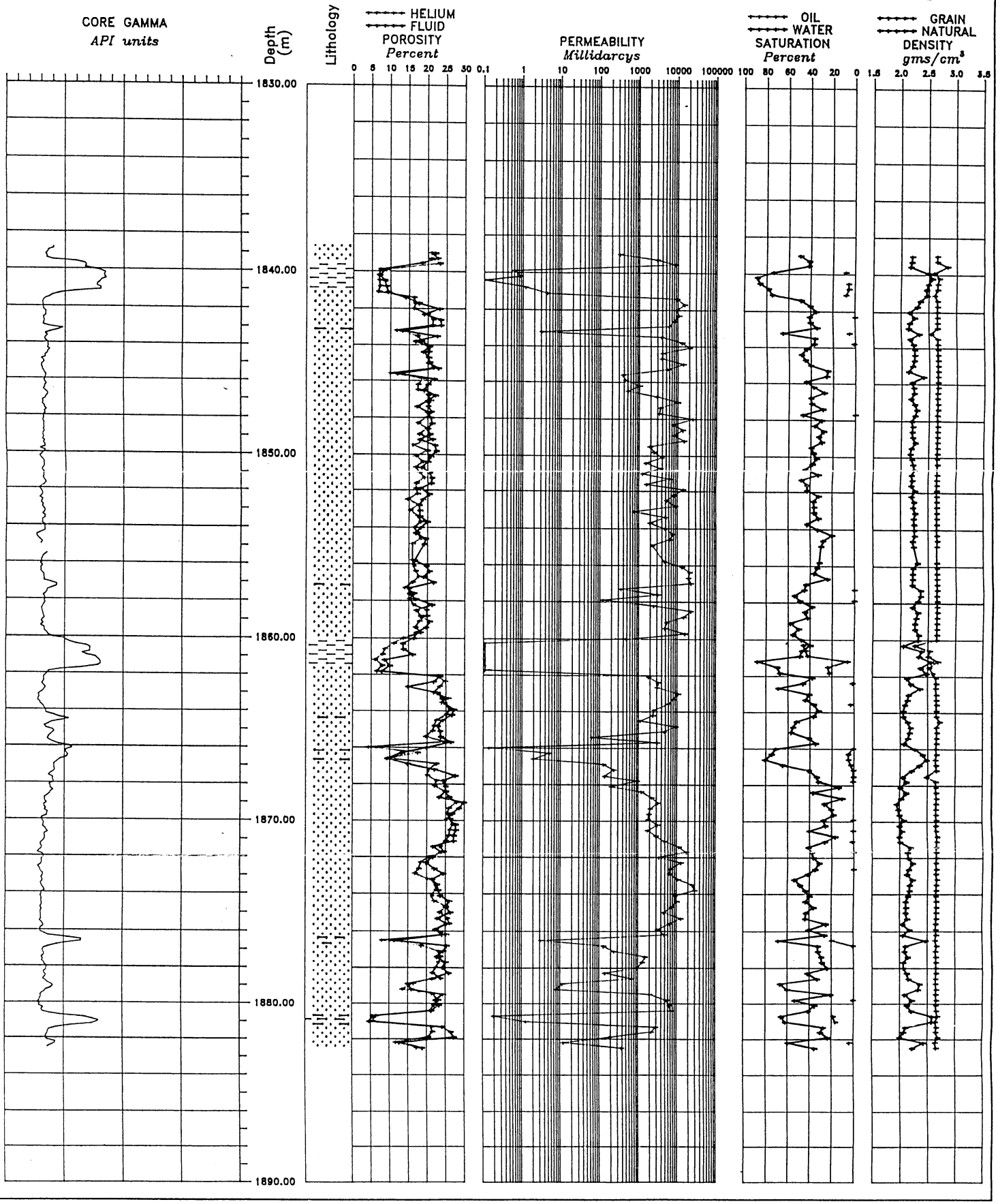
CORE PLOT

Scale 1 : 200

ACS LABORATORIES AUSTRALIA

Company: BHP PETROLEUM PTY.LTD.
Well: MINERVA-2A
Field: MINERVA
Permit: OTWAY

File No.: 5-207
Core Int: CORE NO.1 1728.50-1733.60 M
Core Int: CORE NO.2&3 1838.80-1882.50 M
Core Int: CORE NO.4&5 1915.00-1969.00 M



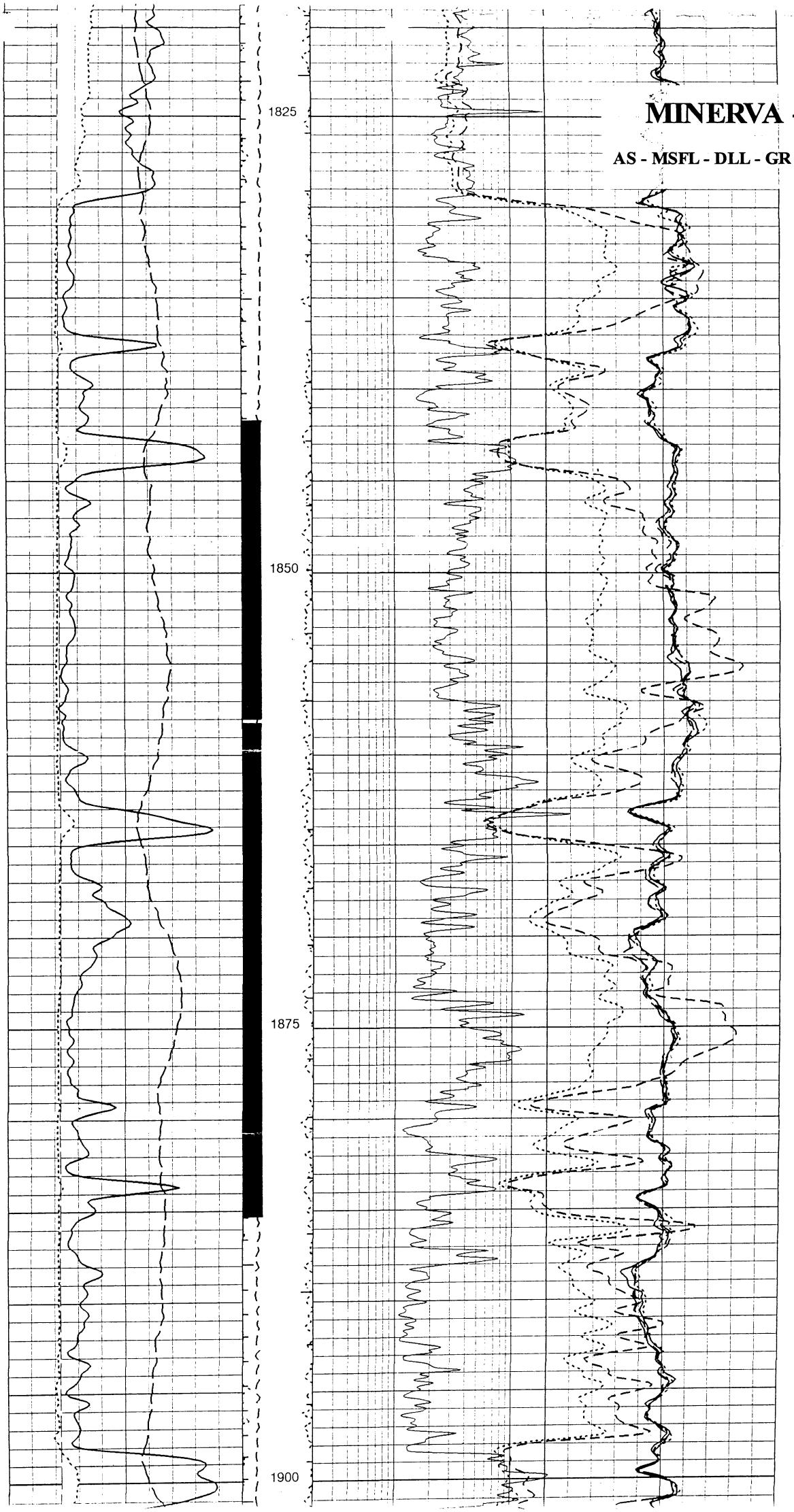
PE800212

This is an enclosure indicator page.
The enclosure PE800212 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800212 has the following characteristics:

ITEM_BARCODE	= PE800212
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Log Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= WELL_LOG
DESCRIPTION	= Minerva-2A AS-MSFL-DLL-GR-AMS-SP Log Plot Scale 1:200
REMARKS	=
DATE_WRITTEN	=
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)



MINERVA - 2A

AS - MSFL - DLL - GR - AMS - SP

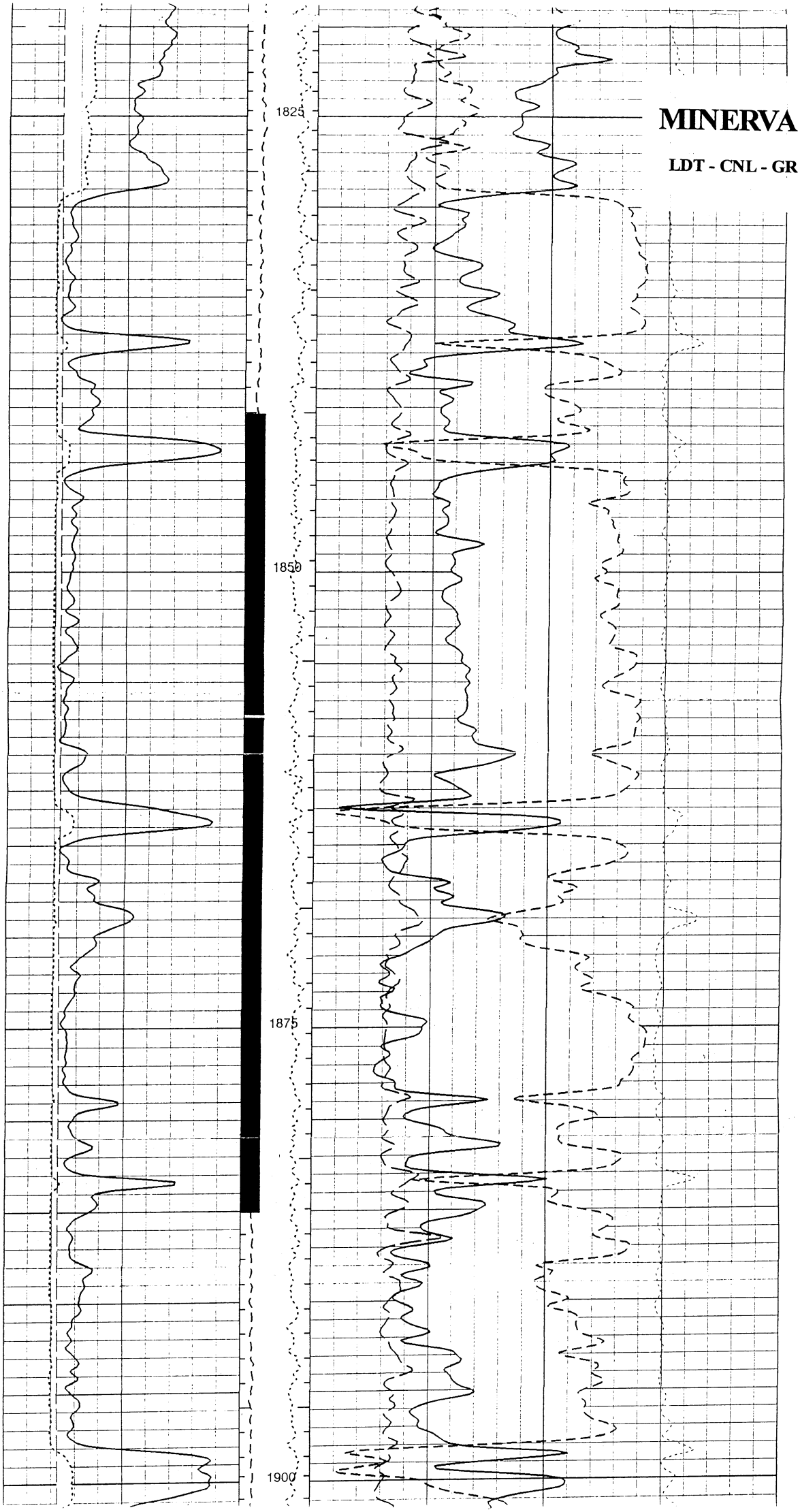
PE800213

This is an enclosure indicator page.
The enclosure PE800213 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800213 has the following characteristics:

ITEM_BARCODE	= PE800213
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Log Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= WELL_LOG
DESCRIPTION	= Minerva-2A LDT-CNL-GR-AMS Log Plot Scale 1:200
REMARKS	=
DATE_WRITTEN	=
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)



MINERVA - 2A

LDT - CNL - GR - AMS

PE800214

This is an enclosure indicator page.
The enclosure PE800214 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800214 has the following characteristics:

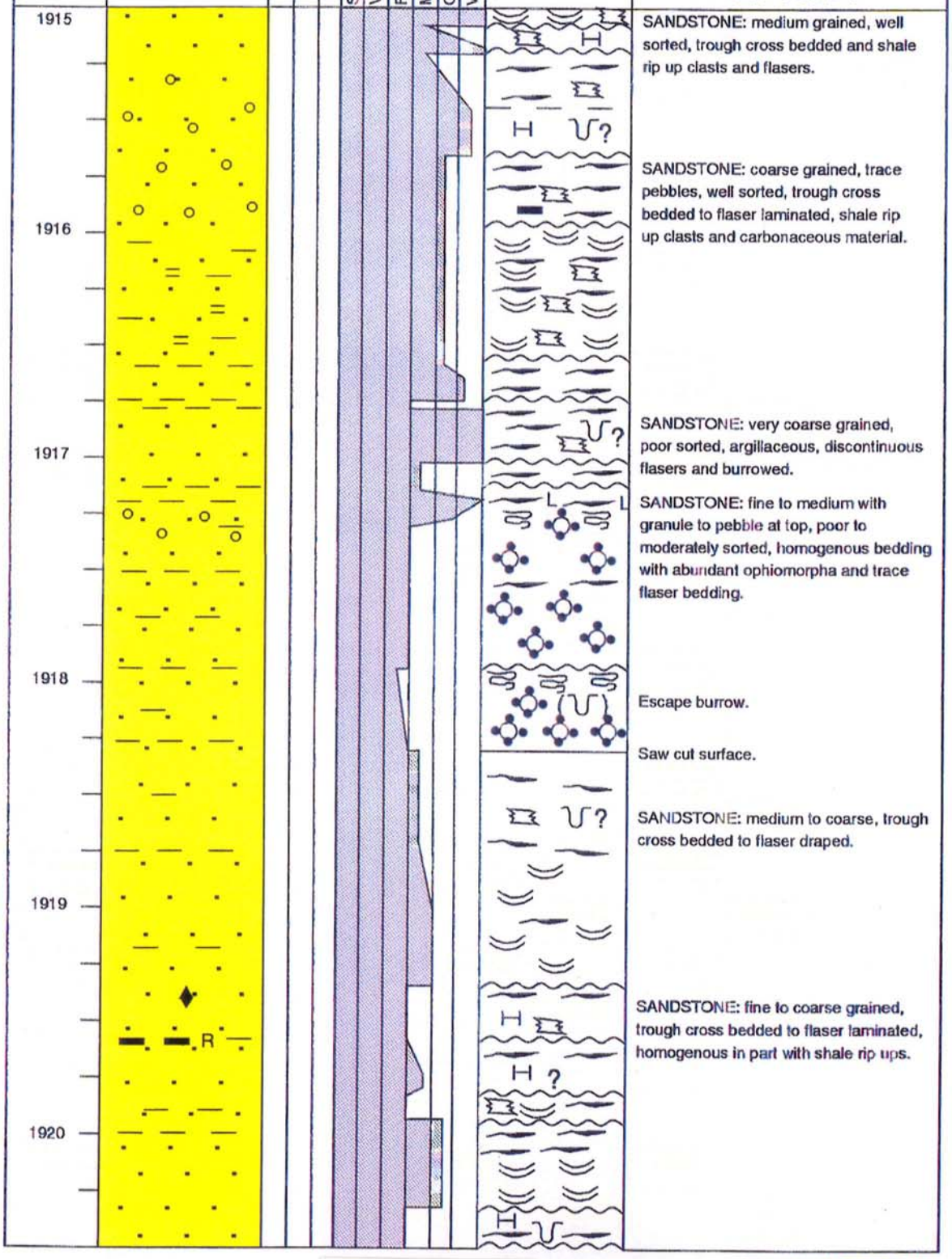
ITEM_BARCODE	= PE800214
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 4 Graphic Log Description Scale 1:200 Page 11
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 4	Page: 11
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT	W.D.:	CORE BARREL & MUD TYPE:	



November 1993

Base drawing No.F988
F998

PE800215

This is an enclosure indicator page.
The enclosure PE800215 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800215 has the following characteristics:

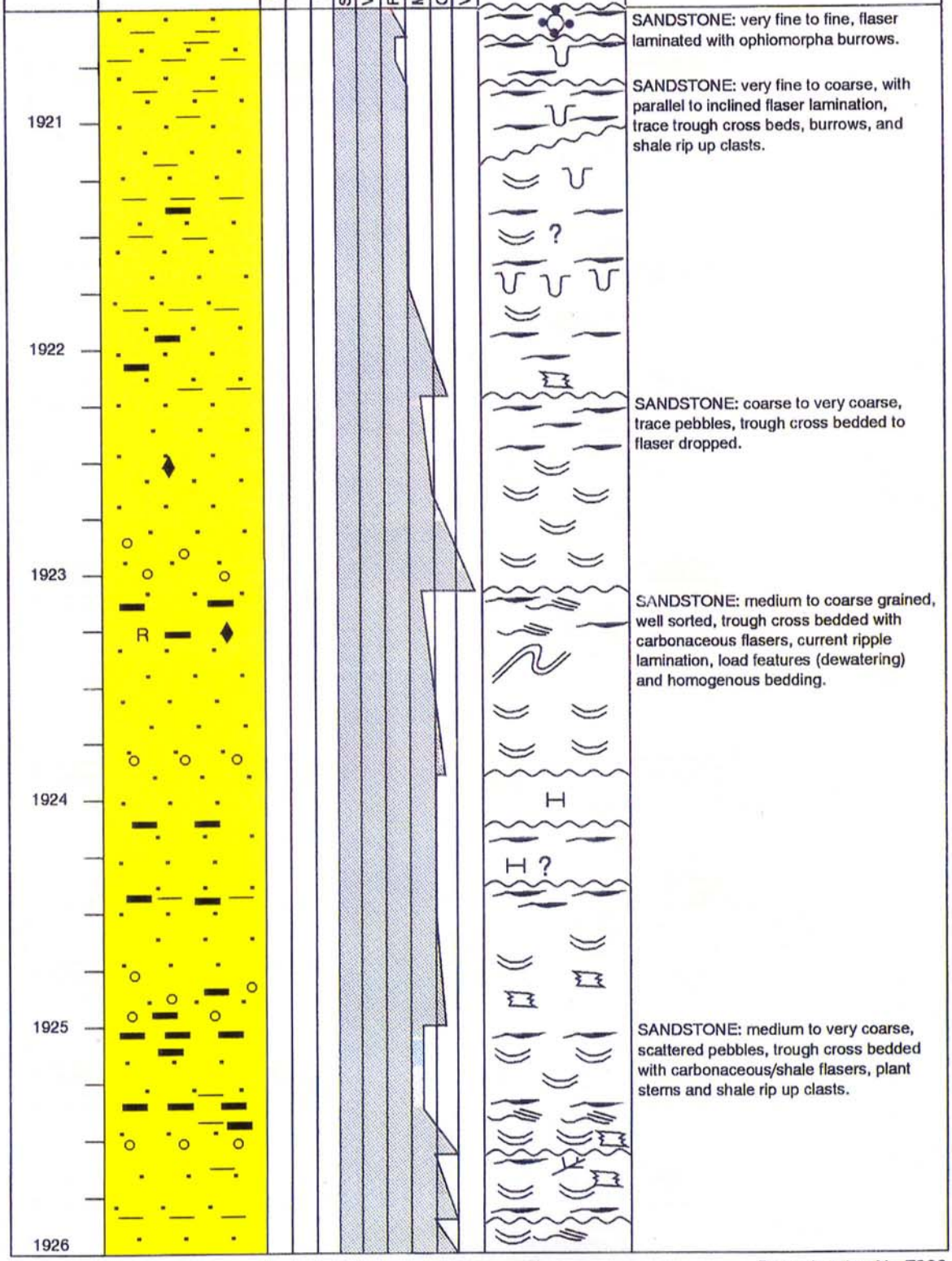
ITEM_BARCODE	= PE800215
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 4 Graphic Log Description Scale 1:200 Page 12
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 4	Page: 12
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT W.D.:	CORE BARREL & MUD TYPE:		



November 1993

Base drawing No.F988
F999

PE800216

This is an enclosure indicator page.
The enclosure PE800216 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800216 has the following characteristics:

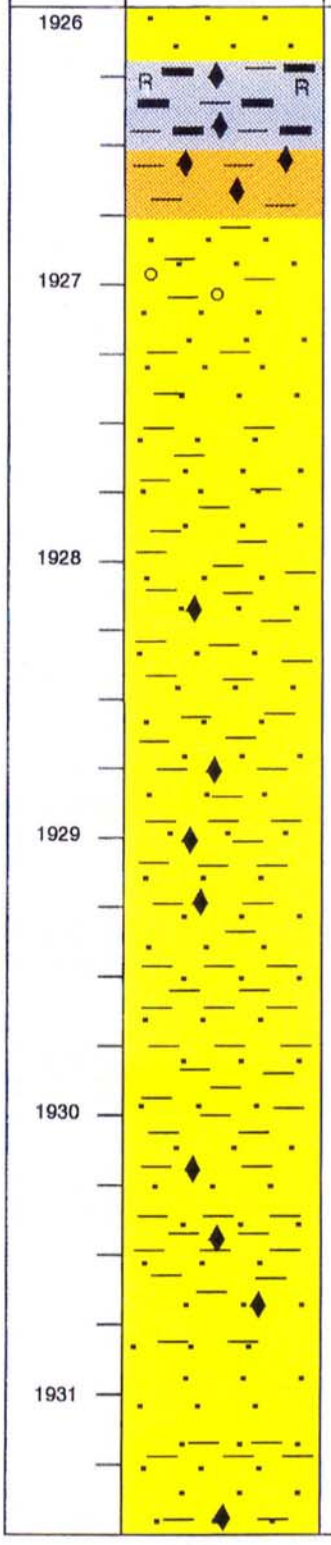
ITEM_BARCODE	= PE800216
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 4 Graphic Log Description Scale 1:200 Page 13
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 4	Page: 13
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT W.D.:	CORE BARREL & MUD TYPE:		



SEDIMENTARY STRUCTURE	LITHOLOGICAL DESCRIPTION
	SHALE: dark grey to black, homogenous with abundant coaly plant stems, sparse resin blebs, sparse nodular pyrite cement.
	SANDSTONE: silty to very fine grained, current ripple laminated to flaser bedded, burrowed to bioturbated, scattered pebbles and trace rootlet.
	SILTY SANDSTONE: silty to very fine grained, argillaceous, abundant sandy microfoundering structures, rare current ripple to flaser laminations, trace burrows.
	SANDSTONE: very fine to medium grained, current ripple laminated to flaser bedded, mud crack and microfoundering features at top.
	SANDSTONE: very fine to medium grained, flaser to current ripple laminated, trace trough cross beds, burrowed to bioturbated in part.

November 1993

Base drawing No.F988
F1000

PE800217

This is an enclosure indicator page.
The enclosure PE800217 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800217 has the following characteristics:

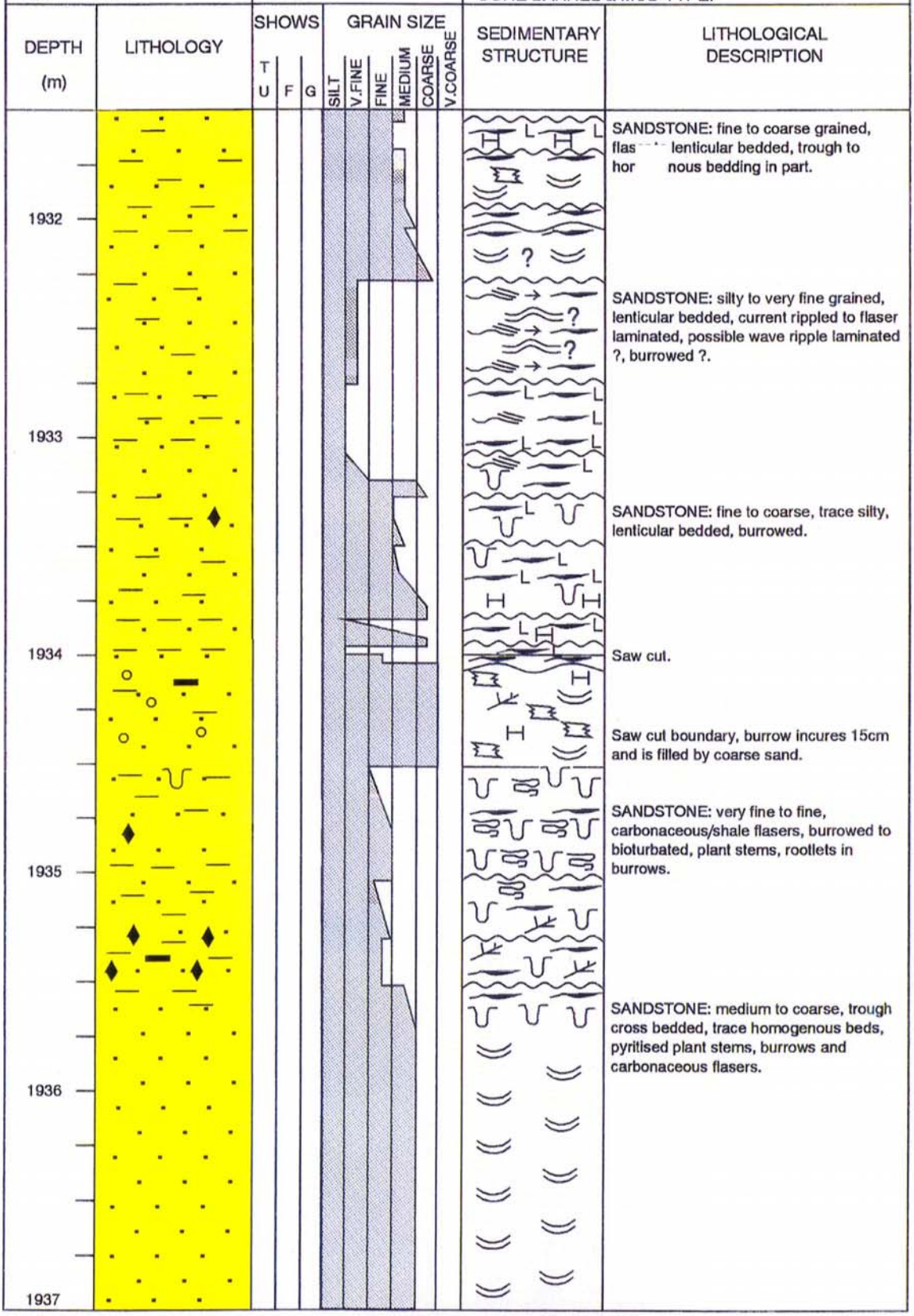
ITEM_BARCODE	= PE800217
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 4 Graphic Log Description Scale 1:200 Page 14
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 4	Page: 14
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT W.D.:	CORE BARREL & MUD TYPE:		



November 1993

Base drawing No.F988
F1001

PE800218

This is an enclosure indicator page.
The enclosure PE800218 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800218 has the following characteristics:

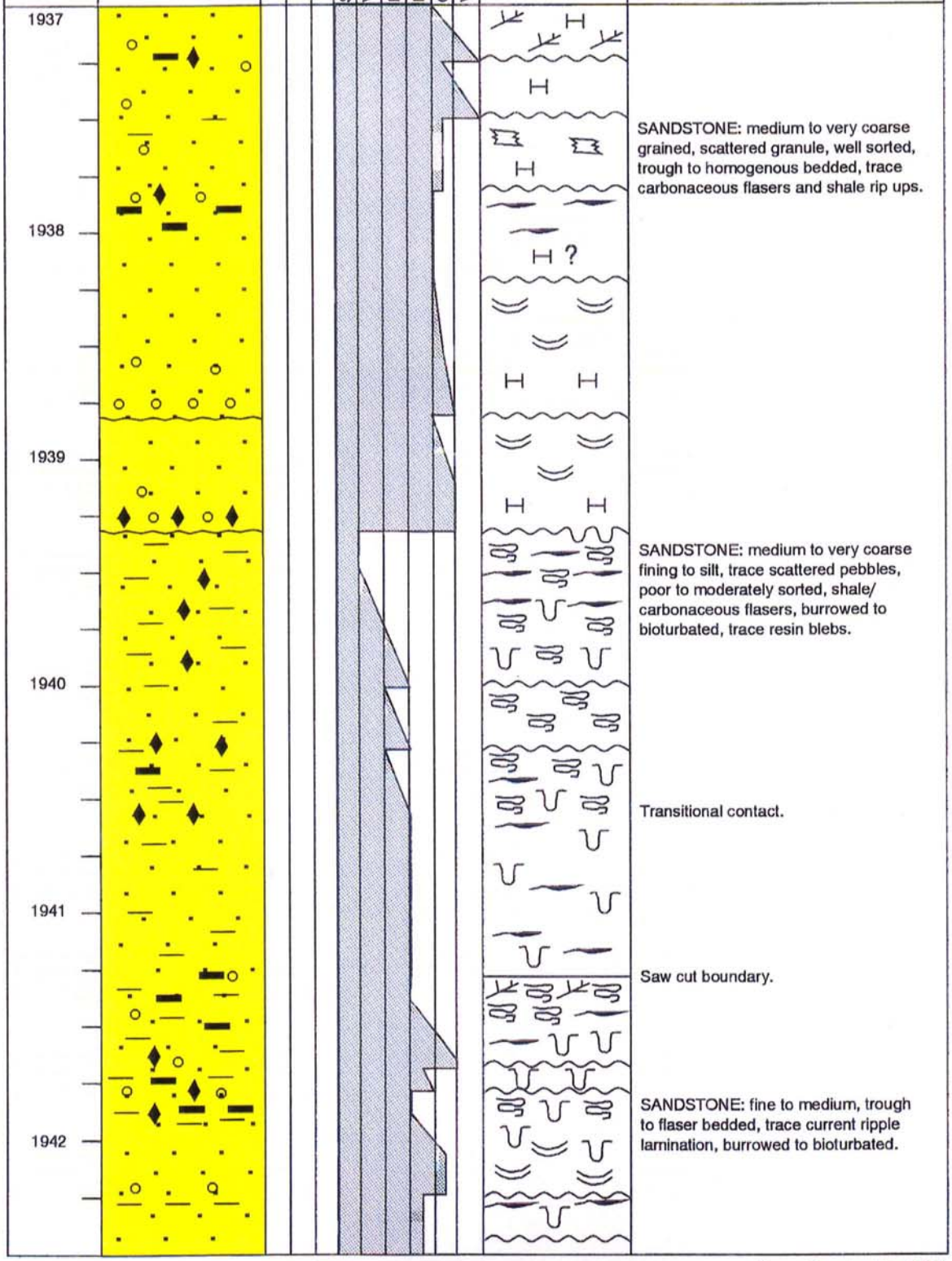
ITEM_BARCODE	= PE800218
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 4 Graphic Log Description Scale 1:200 Page 15
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 4	Page: 15
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT	W.D.:	CORE BARREL & MUD TYPE:	



November 1993

Base drawing No.F988
F1002

PE800219

This is an enclosure indicator page.
The enclosure PE800219 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800219 has the following characteristics:

ITEM_BARCODE	= PE800219
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 4 Graphic Log Description Scale 1:200 Page 16
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31		DATE:	CORE NO.: 4 / Page: 16
AUTHOR: P.Arditto / S.Horan		INTERVAL:	
RIG: Byford Dolphin		CUT:	
K.B.: 25mRT	W.D.:	CORE BARREL & MUD TYPE:	

DEPTH (m)	LITHOLOGY	SHOWS T U	SHOWS F	SHOWS G	GRAIN SIZE SILT	V.FINE	FINE	MEDIUM	COARSE	V.COARSE	SEDIMENTARY STRUCTURE	LITHOLOGICAL DESCRIPTION
												BOTTOM CORE 4
1943												

November 1993

Base drawing No.F988
F1003

PE800220

This is an enclosure indicator page.
The enclosure PE800220 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800220 has the following characteristics:

ITEM_BARCODE	= PE800220
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 5 Graphic Log Description Scale 1:200 Page 16
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31		DATE:	CORE NO.: 5 Page: 16
AUTHOR: P.Arditto / S.Horan		INTERVAL:	
RIG: Byford Dolphin		CUT:	
K.B.: 25mRT	W.D.:	CORE BARREL & MUD TYPE:	

DEPTH (m)	LITHOLOGY	SHOWS T U	SHOWS F	SHOWS G	GRAIN SIZE SILT	GRAIN SIZE V.FINE	GRAIN SIZE FINE	GRAIN SIZE MEDIUM	GRAIN SIZE COARSE	GRAIN SIZE V.COARSE	SEDIMENTARY STRUCTURE	LITHOLOGICAL DESCRIPTION
1943												TOP OF CORE 5
1944												? SHALE: silty, with abundant microfoundering features. SANDSTONE: very coarse to fine grained, flaser to current ripple laminated, commonly lenticular bedded, trace micro foundering structures.

November 1993

Base drawing No.F988
F1004

PE800221

This is an enclosure indicator page.
The enclosure PE800221 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800221 has the following characteristics:

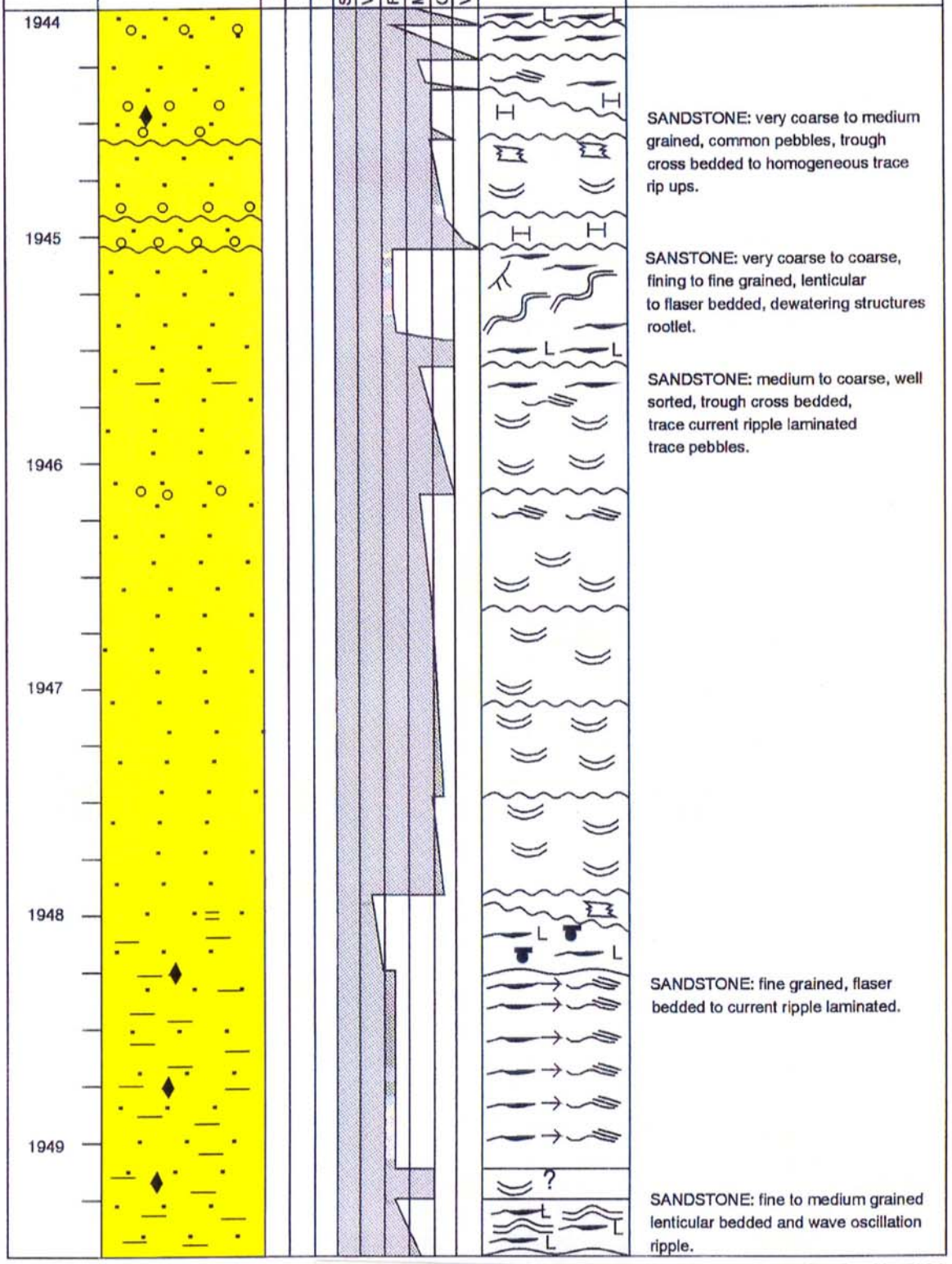
ITEM_BARCODE	= PE800221
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 5 Graphic Log Description Scale 1:200 Page 17
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 5	Page: 17
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT	W.D.:	CORE BARREL & MUD TYPE:	



November 1993

Base drawing No.F988
F1005

PE800222

This is an enclosure indicator page.
The enclosure PE800222 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800222 has the following characteristics:

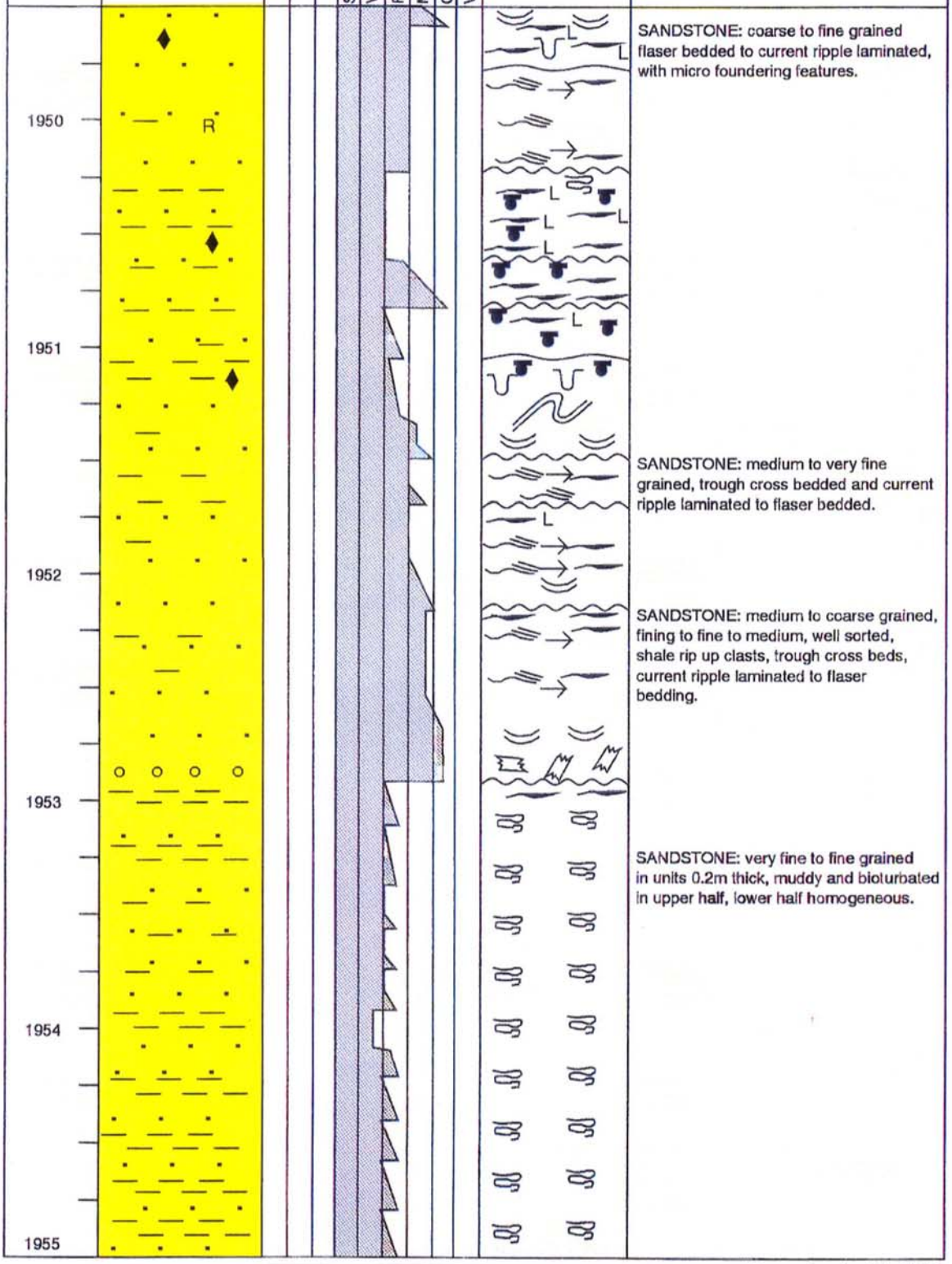
ITEM_BARCODE	= PE800222
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 5 Graphic Log Description Scale 1:200 Page 18
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 5	Page: 18
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT W.D.:	CORE BARREL & MUD TYPE:		



November 1993

Base drawing No.F988
F1006

PE800223

This is an enclosure indicator page.
The enclosure PE800223 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800223 has the following characteristics:

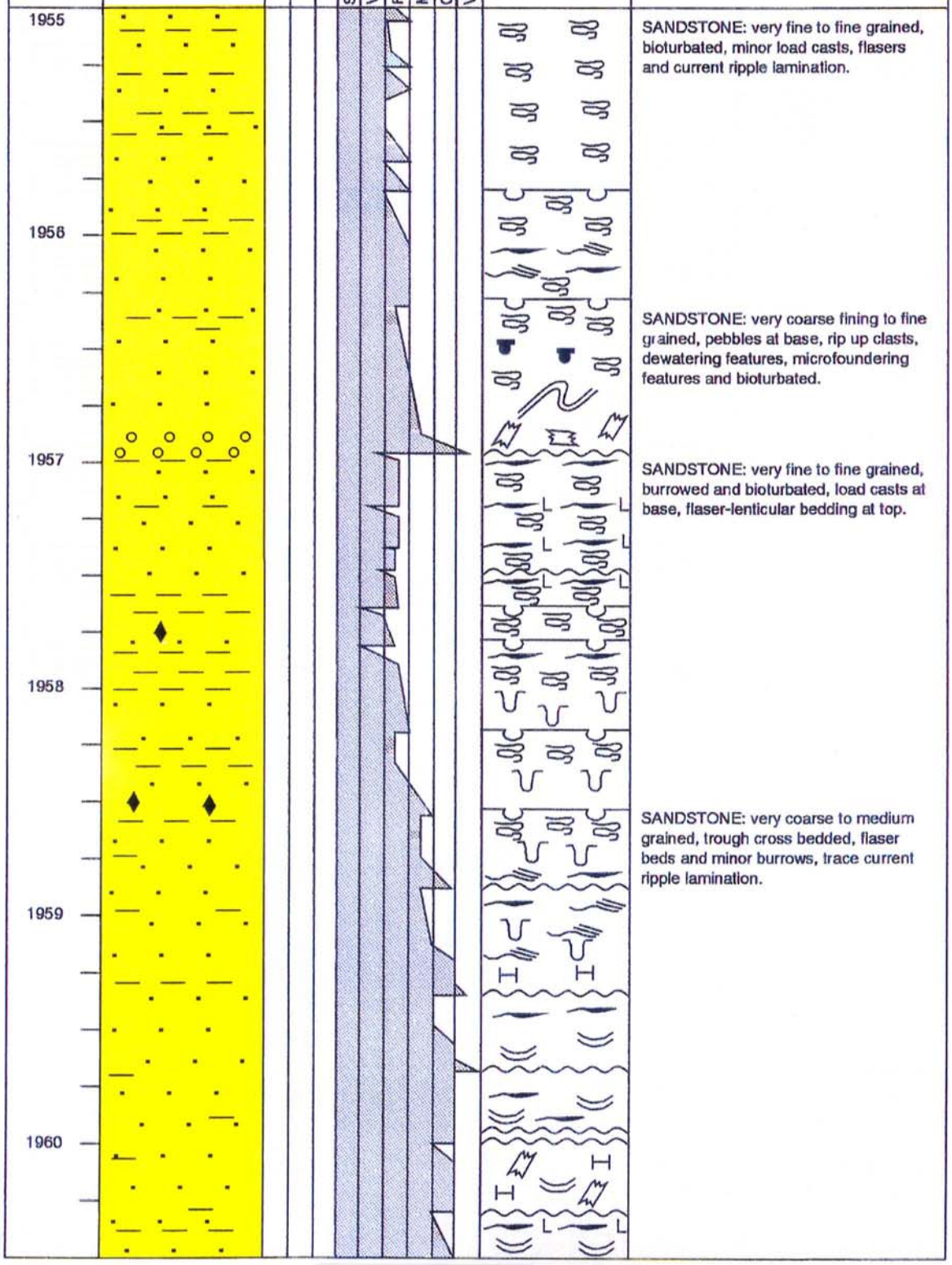
ITEM_BARCODE	= PE800223
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 5 Graphic Log Description Scale 1:200 Page 19
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 5	Page: 19
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT W.D.:	CORE BARREL & MUD TYPE:		



November 1993

Base drawing No.F988
F1007

PE800224

This is an enclosure indicator page.
The enclosure PE800224 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800224 has the following characteristics:

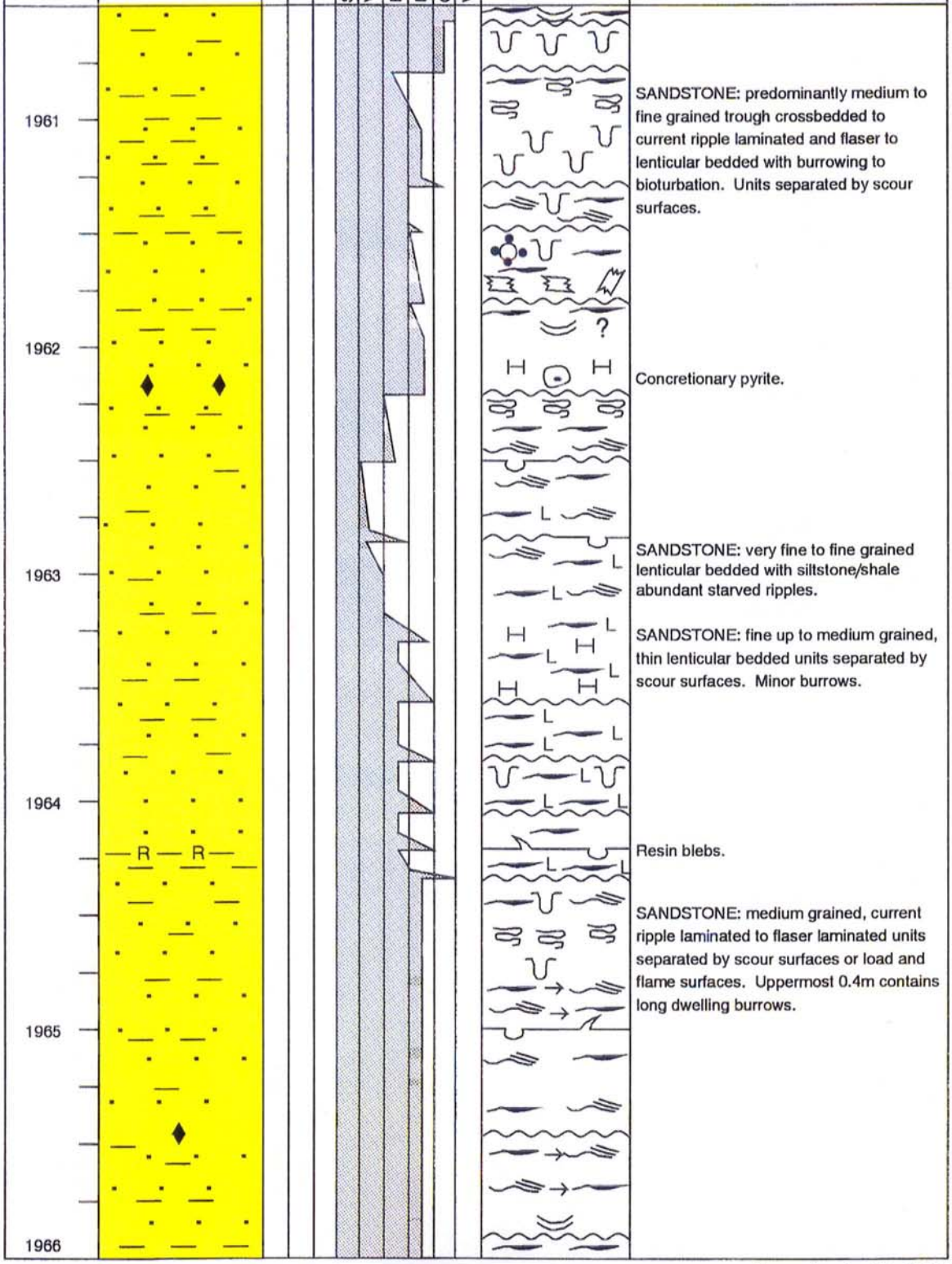
ITEM_BARCODE	= PE800224
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 5 Graphic Log Description Scale 1:200 Page 20
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31		DATE:	CORE NO.: 5 / Page: 20
AUTHOR: P.Arditto / S.Horan		INTERVAL:	
RIG: Byford Dolphin		CUT:	
K.B.: 25mRT	W.D.:	CORE BARREL & MUD TYPE:	



November 1993

Base drawing No.F988
F1008

PE800225

This is an enclosure indicator page.
The enclosure PE800225 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800225 has the following characteristics:

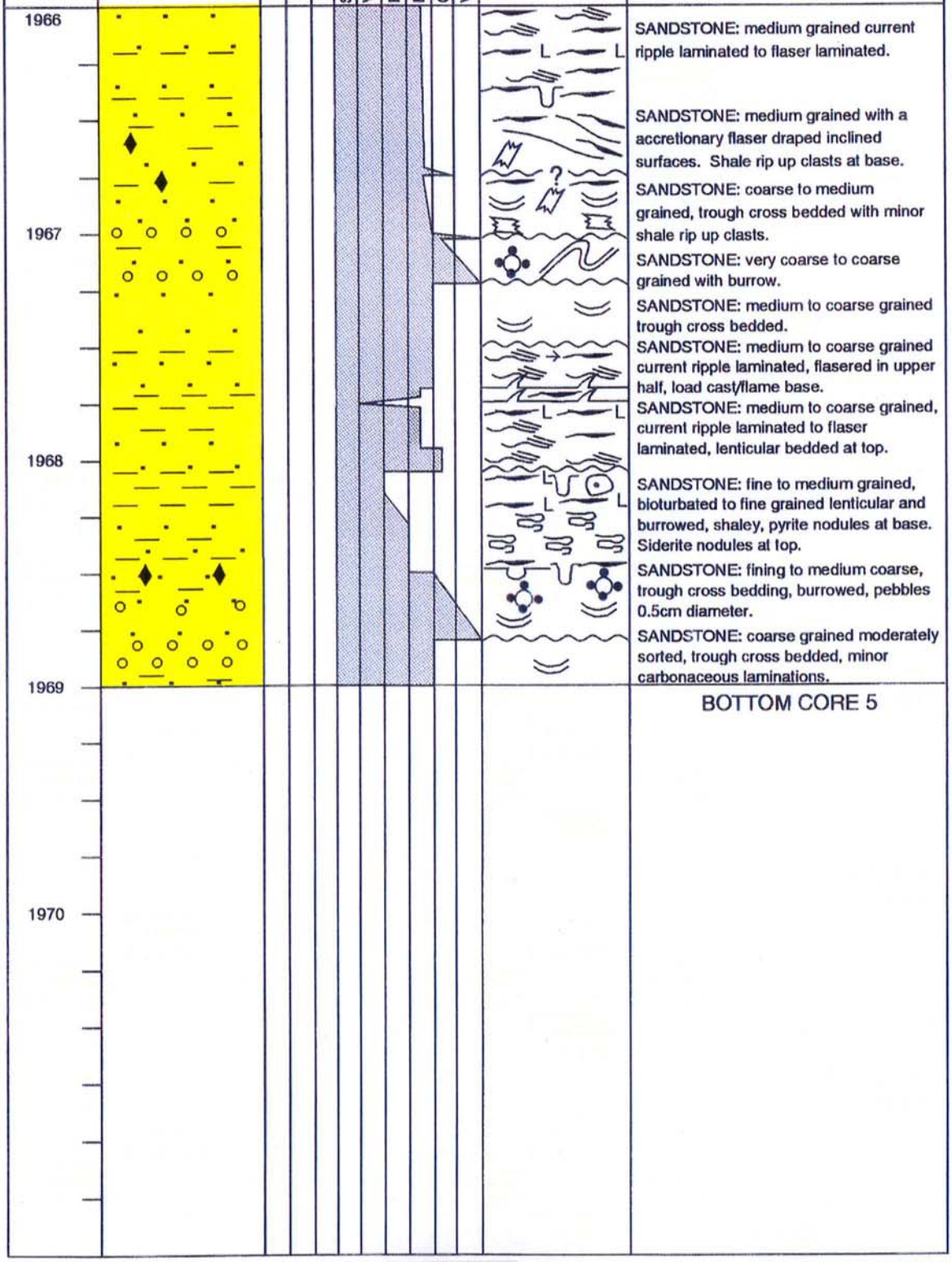
ITEM_BARCODE	= PE800225
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Graphic Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= LITHOLOGY_RPT
DESCRIPTION	= Minerva-2A Core 5 Graphic Log Description Scale 1:200 Page 21
REMARKS	=
DATE_WRITTEN	= 30-NOV-1993
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

BHP Petroleum

CORE DESCRIPTION
MINERVA- 2A

PERMIT: VIC / P31	DATE:	CORE NO.: 5	Page: 21
AUTHOR: P.Arditto / S.Horan	INTERVAL:		
RIG: Byford Dolphin	CUT:		
K.B.: 25mRT	W.D.:	CORE BARREL & MUD TYPE:	



November 1993

Base drawing No.F988
F1009

PE800226

This is an enclosure indicator page.
The enclosure PE800226 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800226 has the following characteristics:

ITEM_BARCODE	= PE800226
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Core Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= WELL_LOG
DESCRIPTION	= Minerva-2A Core 1, 2, 3, 4, 5 Gamma Ray Plot Scale 1:200
REMARKS	=
DATE_WRITTEN	=
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	= PE800226
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	= 1910
BOTTOM_DEPTH	= 1970
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

ACS LABORATORIES PTY. LTD.
ACN 008 273 005

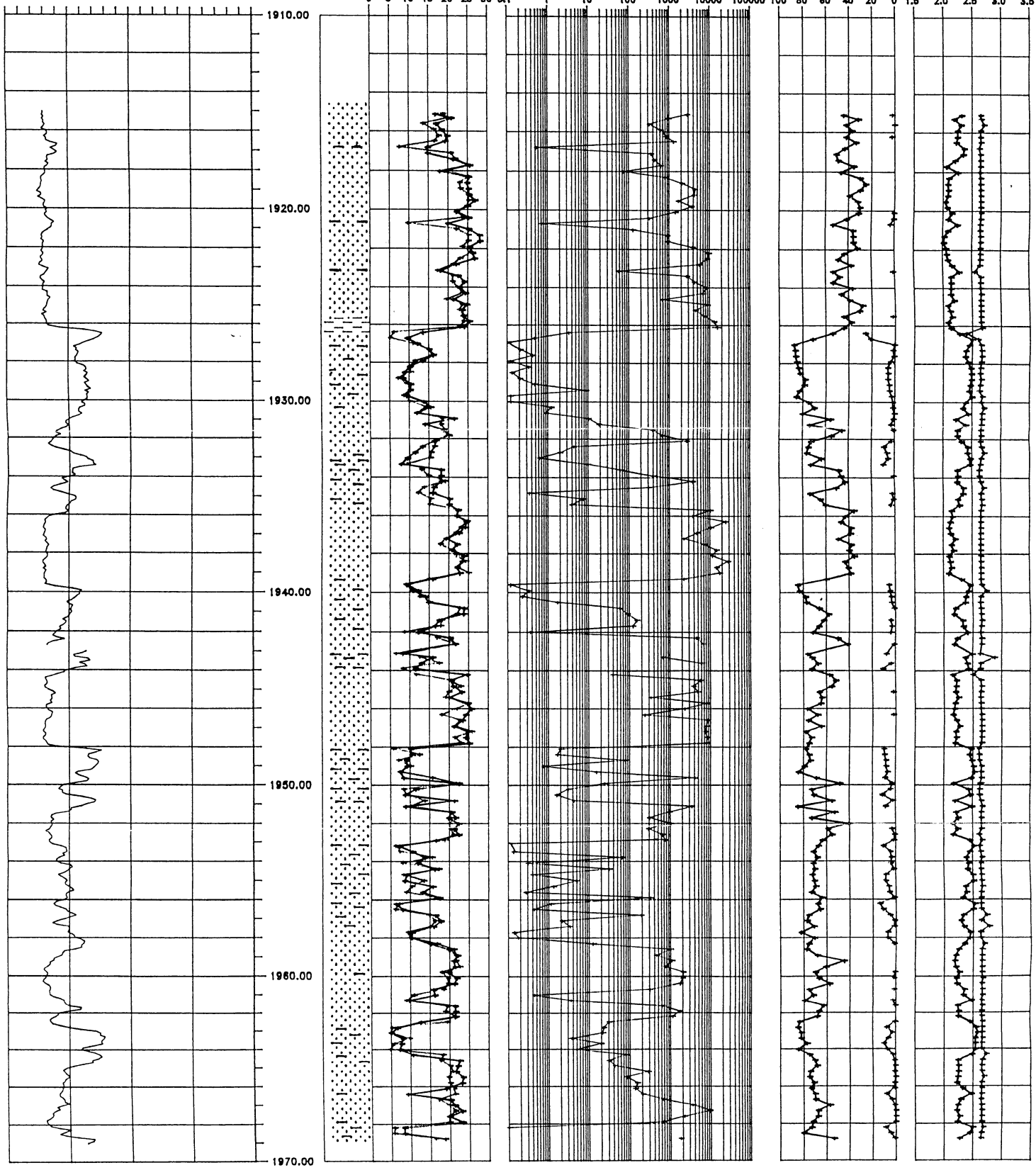
CORE PLOT

Scale 1 : 200

ACS LABORATORIES AUSTRALIA

Company: BHP PETROLEUM PTY.LTD.
Well: MINERVA-2A
Field: MINERVA
Permit: OTWAY

File No.: 5-207
Core Int: CORE NO.1 1728.50-1733.60 M
Core Int: CORE NO.2&3 1838.80-1882.50 M
Core Int: CORE NO.4&5 1915.00-1969.00 M



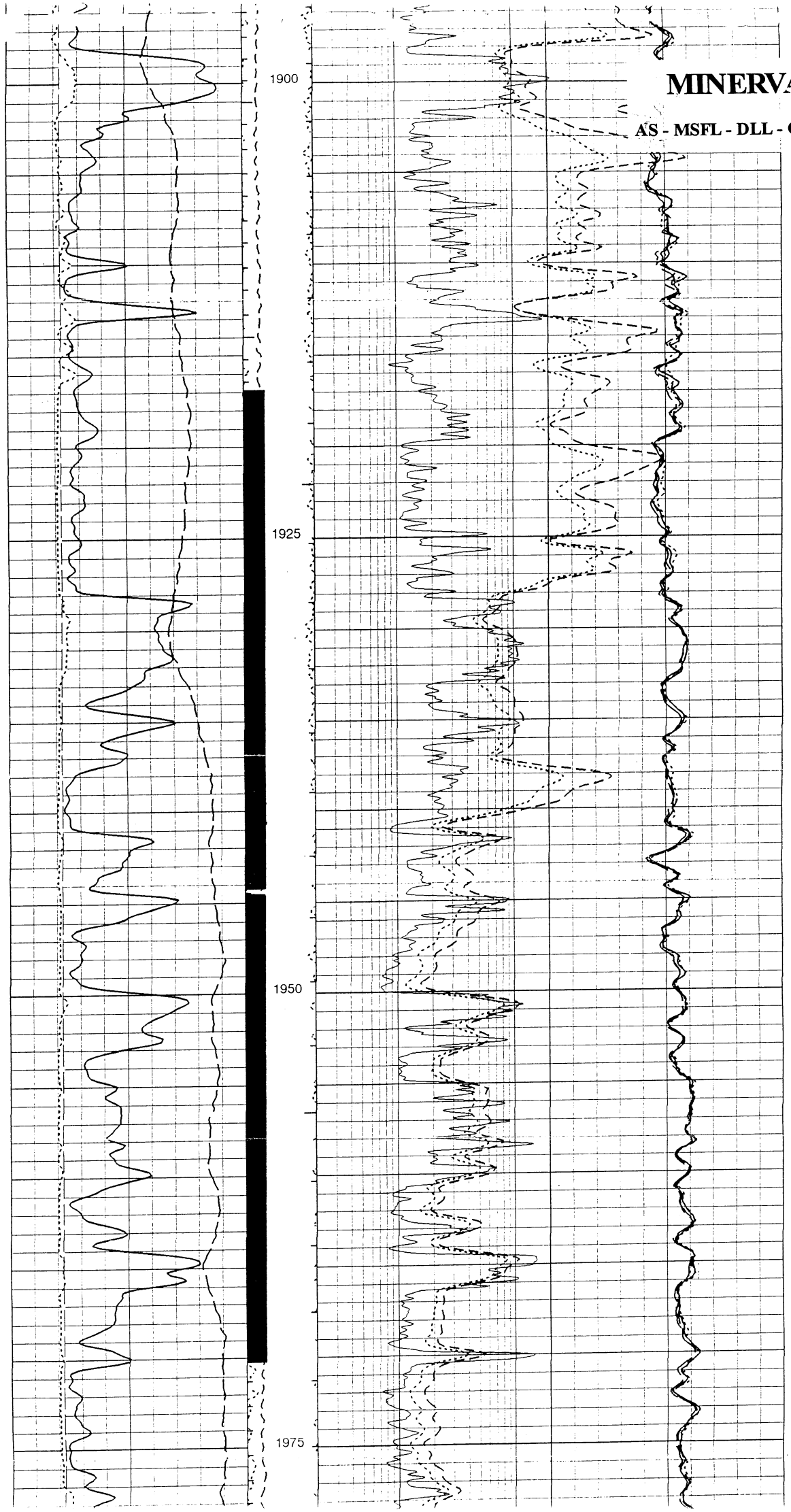
PE800227

This is an enclosure indicator page.
The enclosure PE800227 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800227 has the following characteristics:

ITEM_BARCODE	= PE800227
CONTAINER_BARCODE	= PE800188
NAME	= Minerva-2A Log Plot
BASIN	= OTWAY
OFFSHORE?	= N
DATA_TYPE	= WELL
DATA_SUB_TYPE	= WELL_LOG
DESCRIPTION	= Minerva-2A AS-MSFL-DLL-GR-AMS-SP Plot Scale 1:200
REMARKS	=
DATE_WRITTEN	=
DATE_PROCESSED	=
DATE_RECEIVED	= 11-DEC-1997
RECEIVED_FROM	= BHP Petroleum Pty Ltd
WELL_NAME	= Minerva-2A
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= BHP Petroleum Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)



MINERVA - 2A

AS - MSFL - DLL - GR - AMS - SP

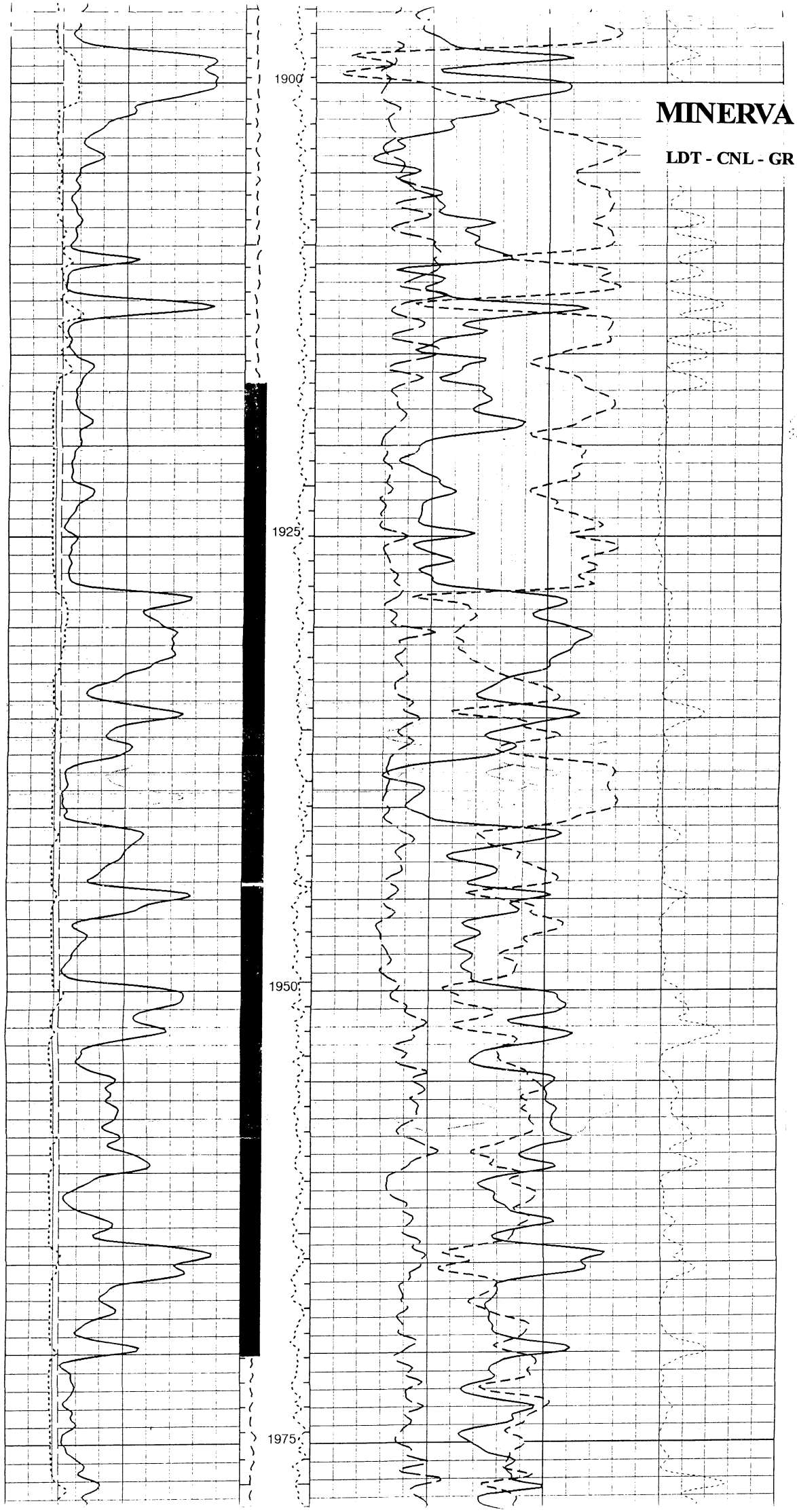
PE800228

This is an enclosure indicator page.
The enclosure PE800228 is enclosed within the container PE800188 at this location in this document.

The enclosure PE800228 has the following characteristics:

ITEM_BARCODE	PE800228
CONTAINER_BARCODE	PE800188
NAME	Minerva-2A Log Plot
BASIN	OTWAY
OFFSHORE?	N
DATA_TYPE	WELL
DATA_SUB_TYPE	WELL_LOG
DESCRIPTION	Minerva-2A LDT-CNL-GR-AMS Plot Scale 1:200
REMARKS	
DATE_WRITTEN	
DATE_PROCESSED	
DATE_RECEIVED	11-DEC-1997
RECEIVED_FROM	BHP Petroleum Pty Ltd
WELL_NAME	Minerva-2A
CONTRACTOR	
AUTHOR	
ORIGINATOR	BHP Petroleum Pty Ltd
TOP_DEPTH	
BOTTOM_DEPTH	
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)



MINERVA - 2A

LDT - CNL - GR - AMS