Petrel
Assessment Unit 39100201

Timor

125

130

10

**Timor
Sea**

*Joseph
Bonaparte
Gulf*

15

Australia

0   100   200   300   KILOMETERS
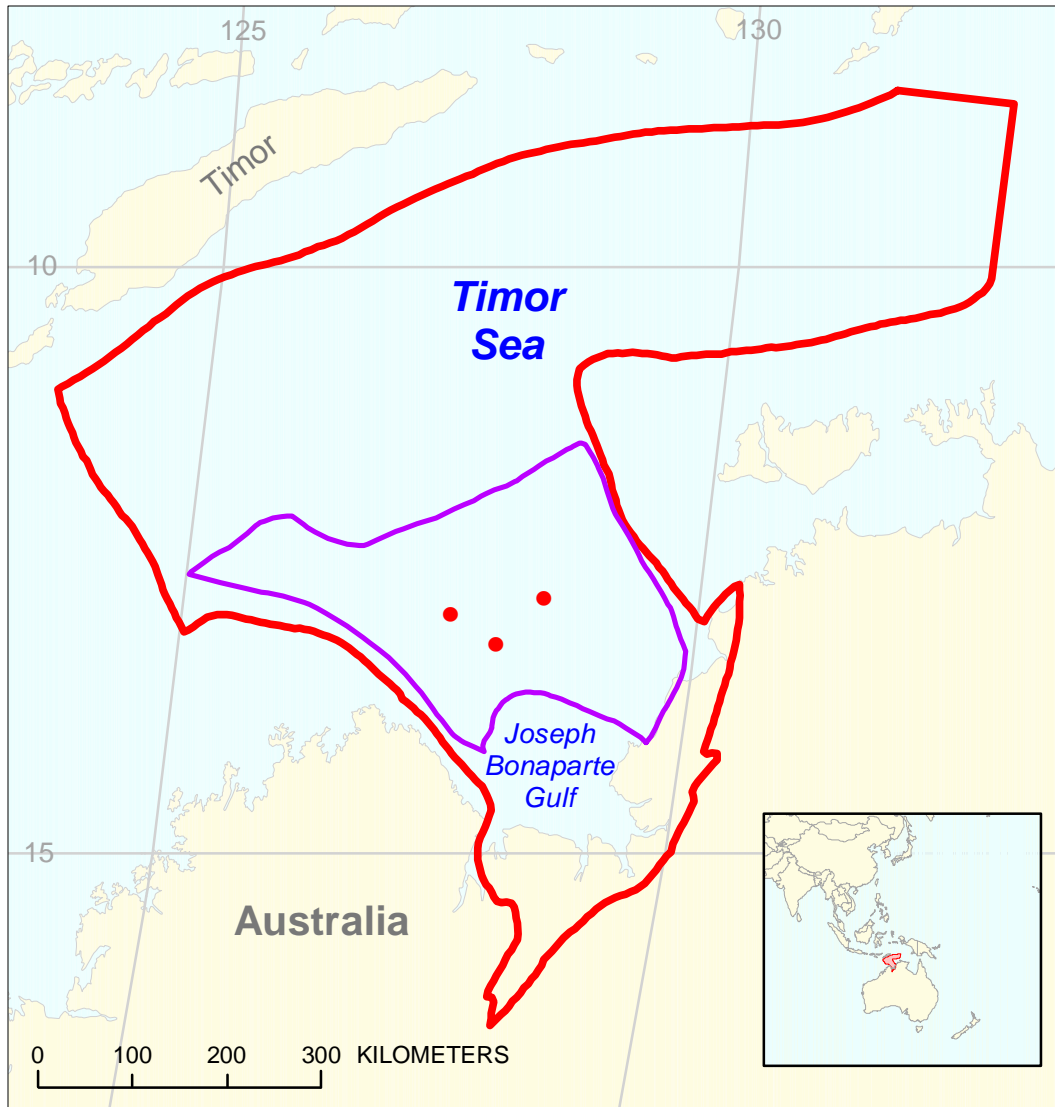
☐ Petrel Assessment Unit 39100201
☐ Bonaparte Gulf Basin Geologic Province 3910

USGS PROVINCE: Bonaparte Gulf Basin (3910)   **GEOLOGIST:** M.G. Bishop

TOTAL PETROLEUM SYSTEM: Keyling/Hyland Bay-Permian (391002)

ASSESSMENT UNIT: Petrel (39100201)

DESCRIPTION: Offshore discoveries in Joseph Bonaparte Gulf, Australia. Gas and condensate at Petrel and Tern fields sourced by Early Permian coals and marine shales and Late Permian deltaic shales deposited in a late-rift/post-rift sag basin.

SOURCE ROCKS: The Keyling Formation delta-plain coals; TOC 35 wt. % and HI 230, and marginal marine shales; TOC 2.8 wt. % and HI 95. The Hyland Bay Formation pro-delta shales are also high in gas-prone organic carbon; TOC 1.6 to 2 wt. % and HI 55 to 240.

MATURATION: Peak hydrocarbon generation for the Keyling Formation was Late Permian through Early Triassic; Late Cretaceous through Tertiary for the Hyland Bay Formation.
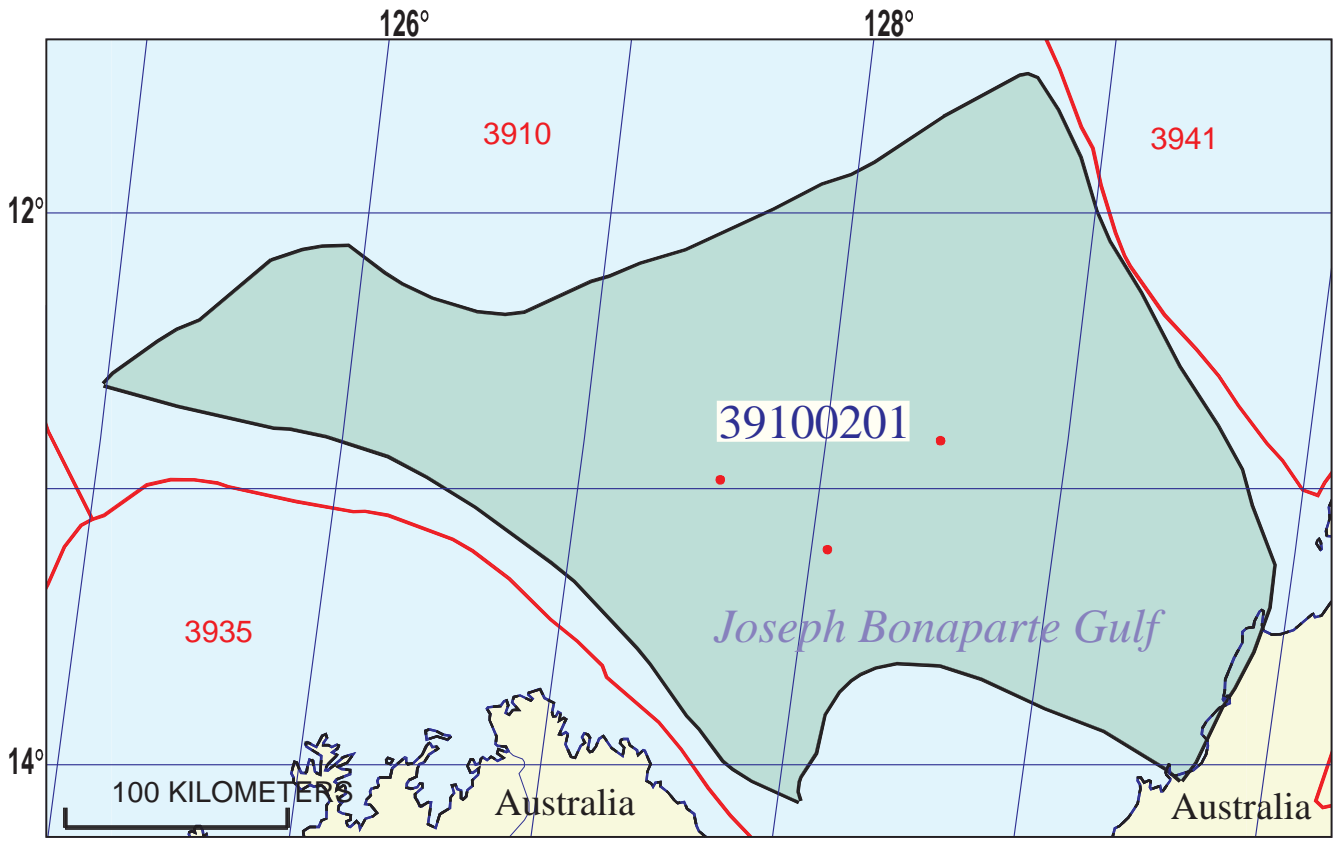
MIGRATION: Lateral migration toward the flanks of the basin and to the Petrel structure and continued vertical migration with movement of Ordovician salt.

RESERVOIR ROCKS: Reservoir rocks include Permian sandstones from barrier bar, fluvial, deltaic and shallow marine environments.

TRAPS AND SEALS: Anticline traps and salt-related doming dominate. Seals are primarily intraformational. The seal at Tern field is the shallow marine Mount Goodwin Formation.

REFERENCES:
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Gunn, P.J., 1988, Bonaparte Basin: evolution and structural framework, *in* Purcell, P.G., and Purcell, R.R., eds., The North West Shelf Australia: Proceedings of Petroleum Exploration Society Australia Symposium, Perth, 1988, p. 276-285.
Gunn, P.J., 1988, Hydrocarbon discoveries in the Bonaparte Basin, *in* Purcell, P.G., and Purcell, R.R., eds., The North West Shelf Australia: Proceedings of Petroleum Exploration Society Australia Symposium, Perth, 1988, p. 419-424.
McConachie, B.A., Bradshaw, M.T., and Bradshaw, J., 1996, Petroleum systems of the Petrel sub-basin–an integrated approach to basin analysis and identification of hydrocarbon exploration opportunities: APPEA Journal, v. 36, pt. 1, p. 248-268.
Mory, A.J., 1988, Regional geology of the offshore Bonaparte Basin, *in* Purcell, P.G., and Purcell, R.R., eds., The North West Shelf Australia: Proceedings of Petroleum Exploration Society Australia Symposium, Perth, 1988, p. 287-309.

126°   128°

3910   3941

12°

39100201

3935

Joseph Bonaparte Gulf

14°

100 KILOMETERS

Australia   Australia

Petrel
Assessment Unit - 39100201

EXPLANATION

—— Hydrography

—— Shoreline

3910 —— Geologic province code and boundary

- - - Country boundary

•   Gas field centerpoint

•   Oil field centerpoint   39100201 —— Assessment unit
                                             code and boundary

Projection: Robinson. Central meridian: 0

Date:…………………….. 3/25/99
Assessment Geologist:…….. T.S. Ahlbrandt
Region:……………………. Asia Pacific   Number: 3
Province:…………………… Bonaparte Gulf Basin   Number: 3910
Priority or Boutique………… Priority
Total Petroleum System:…… Keyling/Hyland Bay-Permian   Number: 391002
Assessment Unit:………….. Petrel   Number: 39100201
* Notes from Assessor   MMS growth factor. Gas pipeline planned.

CHARACTERISTICS OF ASSESSMENT UNIT

Oil (<20,000 cfg/bo overall) **or** Gas (≥20,000 cfg/bo overall):…   Gas

What is the minimum field size?……….   10   mmboe grown (≥1mmboe)
(the smallest field that has potential to be added to reserves in the next 30 years)

Number of discovered fields exceeding minimum size:…………   Oil: 0   Gas: 3
        Established (>13 fields)   Frontier (1-13 fields)   X   Hypothetical (no fields)

Median size (grown) of discovered oil fields (mmboe):
                                1st 3rd   2nd 3rd   3rd 3rd
Median size (grown) of discovered gas fields (bcfg):
                                1st 3rd   3263   2nd 3rd   256   3rd 3rd

Assessment-Unit Probabilities:
  Attribute   Probability of occurrence (0-1.0)
1. **CHARGE:** Adequate petroleum charge for an undiscovered field ≥ minimum size………………   1.0
2. **ROCKS:** Adequate reservoirs, traps, and seals for an undiscovered field ≥ minimum size……   1.0
3. **TIMING OF GEOLOGIC EVENTS:** Favorable timing for an undiscovered field ≥ minimum size   1.0

Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):……...……......….   1.0

4. **ACCESSIBILITY:** Adequate location to allow exploration for an undiscovered field
   ≥ minimum size…………………………………………….……………………..…….…………   1.0

UNDISCOVERED FIELDS
Number of Undiscovered Fields: How many undiscovered fields exist that are ≥ minimum size?:
                        (uncertainty of fixed but unknown values)

Oil fields:…………………………………min. no. (>0)   median no.   max no.
Gas fields:………………………………min. no. (>0)   2   median no.   20   max no.   50

Size of Undiscovered Fields: What are the anticipated sizes (**grown**) of the above fields?:
                        (variations in the sizes of undiscovered fields)

Oil in oil fields (mmbo)…………………..…… min. size   median size   max. size
Gas in gas fields (bcfg):…………………... min. size   60   median size   250   max. size   5000

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS
(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……………………..………			
NGL/gas ratio (bngl/mmcfg)………………....…			

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)…………….……..	22	44	66
Oil/gas ratio (bo/mmcfg)……………………….…			

SELECTED ANCILLARY DATA FOR UNDISCOVERED FIELDS
(variations in the properties of undiscovered fields)

Oil Fields:	minimum	median	maximum
API gravity (degrees)……………………….…….			
Sulfur content of oil (%)…………………….....…			
Drilling Depth (m) ………………...……………...			
Depth (m) of water (if applicable)…………....….			

Gas Fields:	minimum	median	maximum
Inert gas content (%)………………………....……			
CO_2 content (%)…………………………….....…			
Hydrogen-sulfide content (%)………………..……..			
Drilling Depth (m)……………………………………	2300	3000	4000
Depth (m) of water (if applicable)………………….	40	85	130

Assessment Unit (name, no.)
Petrel, 39100201

ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT
TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

1. Australia   represents ____100____ areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):…………..…			
Volume % in parcel (areal % x richness factor):…			
Portion of volume % that is offshore (0-100%)……			

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):………..….			
Volume % in parcel (areal % x richness factor):…		100	
Portion of volume % that is offshore (0-100%)……		100	

Petrel, AU 39100201
Undiscovered Field-Size Distribution

Minimum field size: 60 BCFG

Mean number of
undiscovered fields: 21.5

UNDISCOVERED GAS FIELDS (No.)

GAS-FIELD SIZE (BCFG)