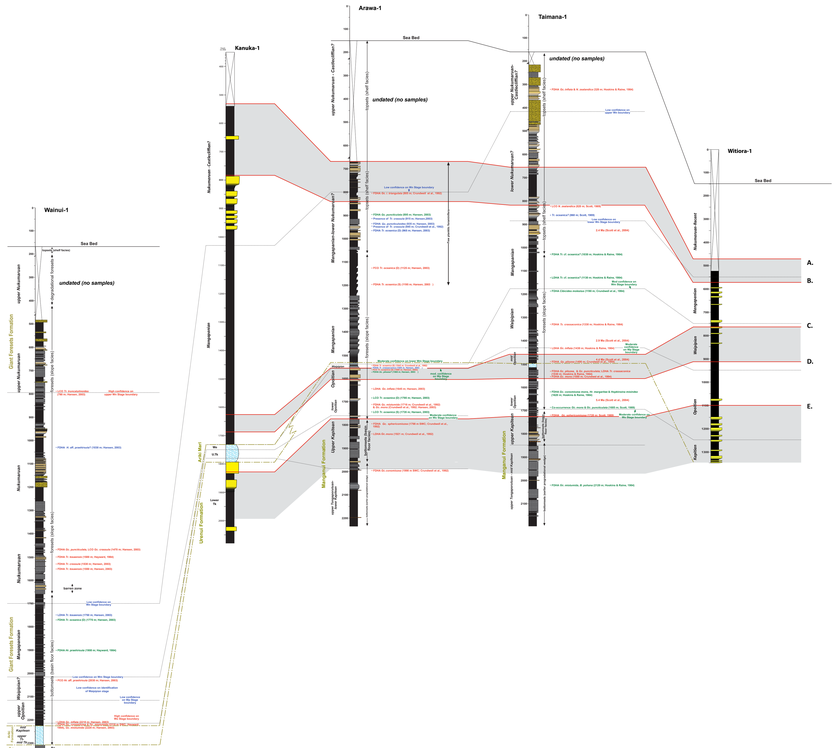
Enclosure 1: Late Miocene to Recent biostratigraphy and seismic correlation of 13 wells, northern Taranaki Basin, New Zealand



Note: This enclosure has been modified from Hansen & Kamp (Petroleum Report 2938) by updating of planktic foraminiferal bioevents , updating ages of stage boundaries, addition of stratigraphy for Kanuka-1 and Witiora-1 and inclusion of new seismic reflection horizons from mapping in this thesis (J. Richardson-Land, MSc, University of Waikato.

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Panel location map

Legend for well logs

- Mudstone/claystone
- Siltstone
- Sandy siltstone/silty sandstone
- Sandstone
- Marl
- Silty marl
- Shell beds
- Volcaniclastic mudstone/claystone
- Volcaniclastic siltstone
- Volcaniclastic sandy siltstone/silty sandstone
- Volcaniclastic sandstone
- Volcanic massifs
- Pebble bands

Well sections have been flattened at the level of the base of the topset facies. Bioevents from cuttings samples are cited by their lower limit only (e.g., 1300-1310 m becomes 1310 m). Following normal biostratigraphic procedure for wells, stage boundaries are generally located midway between the highest sample containing criteria for determining a stage 'top' (upper stage boundary) and the lowest sample of the next overlying stage. New Zealand biostratigraphic stages have been modified after Raine et al. 2015.

Stage abbreviations:
Wq: Haweran; Wc: Castlecliffian; Wn: Nukumaruan; Wm: Mangapanian; Wp: Waipipian; Wo: Opoitian; Tk: Kapitean; Tt: Tongaporutuan; Sw: Waiauan; Sl: Lillburnian.

Reflector Letter Designations:

Seafloor (Present Day - 0 Ma)

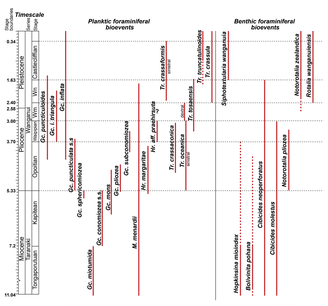
A (equivalent Top Nukumaruan Wn -1.63 Ma)

B (equivalent Top Mangapanian Wm - 2.4 Ma)

C (equivalent Top Waipipian Wp - 3.0 Ma)

D (equivalent Top Opoitian Wo - 3.6 Ma)

E (equivalent Top Kapitean Tk - 5.2 Ma)



Revised biostratigraphic datums and numerical ages from Raine et al. (2015).

Species name changes (after Scott 2001)
Gr. crassacarina (keeled) = *Tr. crassaformis*
Gr. crassaformis (non-keeled) = *Tr. oceanica*
Gr. conoidea synonymised with *Gr. miotumida* (after (Hornibrook et al. (1989) and Scott et al. (1990))

FDHA - First downhole appearance
LDHA - Last downhole appearance

FCO - First common occurrence (downhole)
LCO - Last common occurrence (downhole)

Confidence levels on bioevents (species identification) and stage boundaries:

* High confidence
* Moderate confidence
* Low confidence

Casing ----------

Planktic foraminifera stage criteria

Stage	Planktic foraminifera
Castlecliffian (Wc)	presence of *Tr. Truncatulinoides* (upper Wn-Recent) subsidiary benthic foraminifera - *Siphotextularia wanganuia* (Wc-Rec)
Nukumaruan (Wn)	presence of *Tr. crassaformis* (Wn-Wc) lower Wn - latest appearance of *Tr. oceanica* (D) (Wm-lower Wn) basal Wn - earliest appearance of *Tr. crassula* (Wn-Recent) subsidiary benthic foraminifera - last appearance *Cibicides neoperforatus* (Tt-Wn)
Mangapanian (Wm)	no *Tr. crassaformis*, *Tr. crassula*, *Tr. crassaconica* presence of dextral *Tr. oceanica* basal Wm - earliest appearance of *Tr. tosaensis* (upper Wp-lower Wc)
Waipipian (Wp)	presence of *H. aff. praehirsuta* (Wp) subsidiary benthic foraminifera - last appearance *Cibicides molestus* (Ab-Wp) subsidiary benthic foraminifera - *Notorotalia pliozea* (Tk-Wm)
Opoitian (Wo)	presence of *H. margaritae* (uppermost Tk-Wo), *Gc. puncticulata* (Wo-?e.Wp) sinistral *Tr. oceanica* (Wo-Wp) upper Wo - earliest appearance of *Gc. inflata* (upper Wo-Recent) lower Wo - earliest appearance of *Tr. crassaconica* (lower Wo-Wp) presence of *Gc. plizaea* (upper Tk-lower Wo) subsidiary benthic foraminifera - last appearance *Hopkinsina mioindex* (Sl-Wo)
Upper Kapitean (upper TK)	presence of *Gc. mons* (mid Tk-lower Wo), *Gc. sphericomiozea* (upper Tk) absence of *Tr. oceanica*, *Gc. miotumida* subsidiary benthic foraminifera - last appearance *Bolivinita pohana* (Tt-Tk) mid Kapitean - earliest appearance of *Gc. sphericomiozea*
Lower Kapitean (lower Tk)	presence of *G. miotumida* (upper Sl-mid Tk)
Upper Tongaporutuan (upper Tt)	absence of *Gq. dehiscens*
Lower Tongaporutuan (lower Tt)	presence of *Gq. dehiscens* (Lw-lower Tt)

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