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CENOZOIC COOL-WATER CARBONATES OF THE GREAT AUSTRALIAN BIGHT

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OCEAN DRILLING PROGRAM LEG 182:

CENOZOIC COOL-WATER CARBONATES OF THE GREAT AUSTRALIAN BIGHT

Safety Package - Pollution Prevention and Safety Panel
May 1997

David A. Feary
Australian Geological Survey Organisation
Department of Geology & Geophysics
University of Sydney
Sydney NSW 2006
Australia

DEPARTMENT OF PRIMARY INDUSTRIES AND ENERGY

Minister for Primary Industries and Energy: Hon. J. Anderson, M.P.
Minister for Resources and Energy: Senator the Hon. W.R. Parer
Secretary: Paul Barratt

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Executive Director: Neil Williams

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ISSN: 1039-0073
ISBN: 0 642 25037 5

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ABSTRACT

Leg 182 will drill a transect of 10 sites from the shelf-edge (200 m) to the middle continental rise (4465 m) in the western Great Australian Bight. The primary drilling objective is a more detailed understanding of global environmental change in high- to mid-latitude settings. Cores from different facies deposited in various water depths during a range of geologic periods will yield the detailed anatomy of a Cenozoic cool-water carbonate margin. The response of this depositional system to sealevel fluctuations will be compared to records from warm-water, rimmed and un-rimmed carbonate platforms in order to test and refine the global sealevel curve, and most importantly to describe the reaction of cool-water carbonate depositional systems to different phases of the sealevel cycle. Biological and chemical paleoenvironmental proxies will be used to decipher a detailed paleoceanographic record, in order to more precisely describe the timing and paleoceanographic effects of the opening of the Tasman Gateway, and the influence of the Leeuwin Current on paleoproductivity over time. The shelf-to-basin transect will also provide high resolution data on the tempo and pattern of biotic evolution in oceanic and neritic environments.

Secondary objectives are directed towards understanding the hydrology of a carbonate platform adjacent to a vast inland karst with sluggish water circulation; and the nature of early burial diagenesis (lithification and dolomitization) in a cold, seawater-dominated system.

Although several of the Leg 182 sites are located close to or overlying the Eyre Sub-basin, an extensional rift basin containing a thick Mesozoic non-marine to shallow marine section, the existence of a dry exploration well (Jerboa-1) with direct seismic ties to these sites indicates negligible safety risk. Vitrinite reflectance data and thermal modelling show that the entire section intersected at Jerboa-1 is thermally immature, and that thermal maturity would occur at a depth of approximately 2900 m adjacent to this well. No potential migration pathways have been identified in the vicinity of the Leg 182 sites, and horizon mapping in two-way-time shows that no significant areas of closure will be intersected.

Weather conditions may provide some operational constraints, as the shallow water (<350 m) sites are subject to heave and wind restrictions; however flexibility in the drilling schedule should minimize any weather-induced disruptions.

1. INTRODUCTION

Leg 182 will drill a transect of 10 sites from the shelf-edge (200 m) to the middle continental rise (4465 m) in the western Great Australian Bight (Fig. 1). Leg 182 is scheduled to depart from Wellington, NZ on 4th October 1998 and return to Fremantle on 29th November 1998. Co-Chief Scientists will be David A. Feary (Australian Geological Survey Organisation) and Al C. Hine (University of South Florida); the Leg Manager / Staff Scientist will be Mitch Malone.

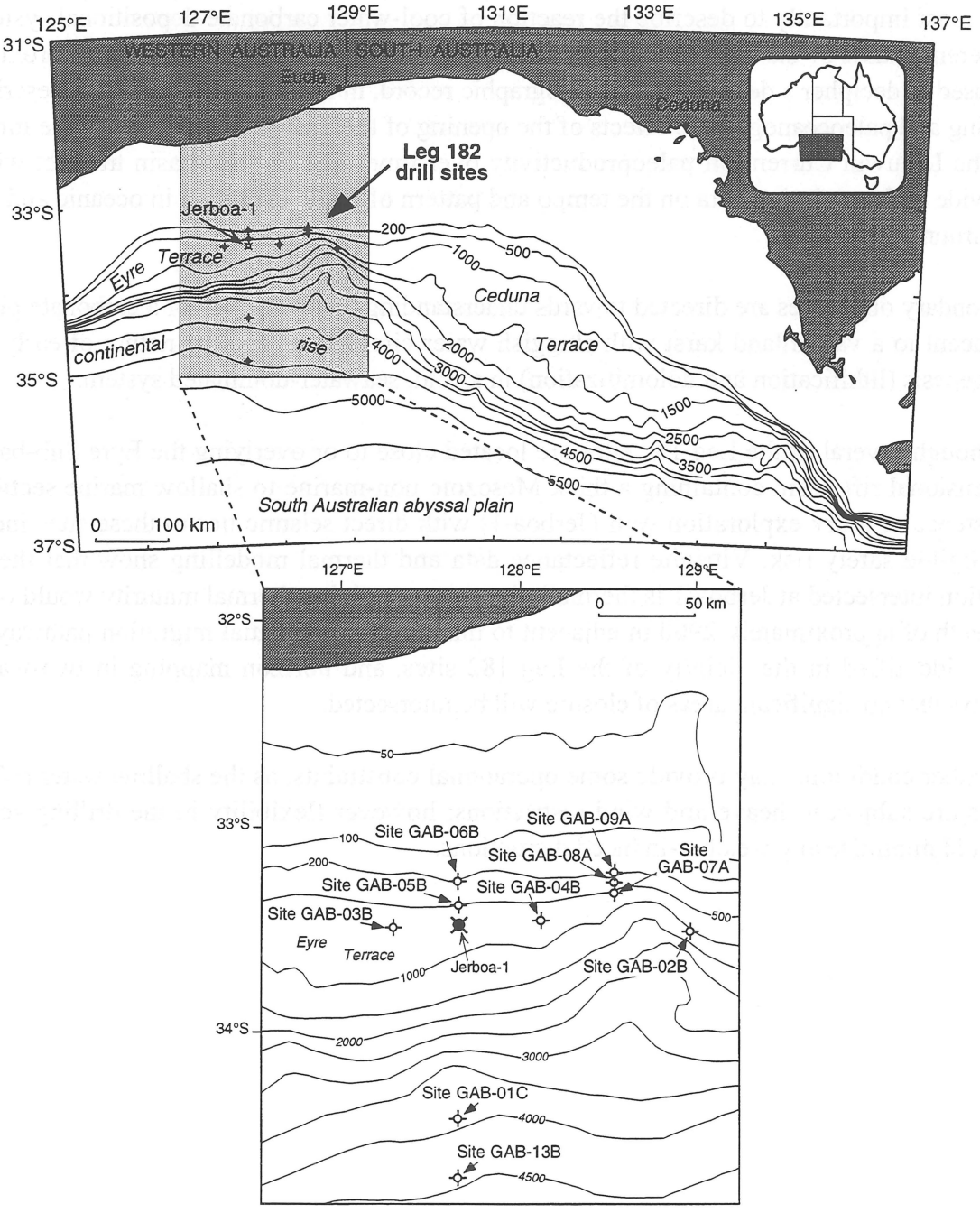


Figure 1. Maps showing the location of Leg 182 drill sites in the western Great Australian Bight.

2. LEG 182 SCIENTIFIC OBJECTIVES

The following summary of Leg 182 scientific objectives is derived from more extensive discussions presented in Feary et al., (1994) and Feary et al., (1995).

2.1 Southern Ocean Paleoceanography: the paleoceanographic history of a carbonate-dominated, mid-latitude continental margin and adjacent basin during evolution of the Southern Ocean.

As the Southern Ocean is one of the major controlling influences on global circulation and climate, it is imperative that the oceanic history of this region be refined as much as possible. However, at present the paleoceanographic development of this area is considerably less well known compared to the high latitude North Atlantic (Kennett and Barron, 1992). Although there are numerous paleoceanographic problems that can be answered by the Leg 182 drilling transect, four stand out as critical;

(i) The relationship between circulation patterns in the deep ocean and on the shelf during times of warm versus cold ocean conditions. The stratigraphic record in the Southern Ocean is punctuated by numerous hiatuses that are attributed to erosive periods, related to increased circulation during initiation of the Circum-Antarctic Current (Miller et al., 1987; Kennett and Barker, 1990). Although such hiatuses are thought to develop on deep margins during times of lower sealevel, and to correlate with unconformities on the continental shelf, there are apparently continuous onshore sequences of Oligocene shelf carbonates deposited while there was erosion or non-deposition of the entire Oligocene on the adjacent ocean floor.

(ii) The precise timing and nature of the opening of the Tasman Gateway. Subsidence of the Tasman Rise, which permitted initiation of the cold circum-Antarctic circulation and thermal isolation of Antarctica, is one of the most important developments in Cenozoic paleoceanography (Kennett, 1982). The history of this event is poorly constrained because so much of the oceanic record is missing due to seafloor erosion. The proximity of the Leg 182 shelf-to-basin transect to the Tasman Rise suggests that it should contain an excellent record of the paleoceanographic development of this seaway.

(iii) The evolution and effect of the Leeuwin Current. The first evidence for the existence of the Leeuwin Current occurs in middle Eocene time, when currents from the Indian Ocean were deflected into the elongate proto-Great Australian Bight embayment. In support of this, the record of warm-water intervals is more common in the west than it is in the east, implying that the source of the water is from the west. Studies of Quaternary cores from the Great Australian Bight suggest a complex interplay between the Leeuwin Current and the West Wind drift. This interplay appears to have had dramatic effects on primary productivity, as the Leeuwin Current is a source of warm oligotrophic waters, while the West Wind Drift causes upwelling of cooler eutrophic waters.

(iv) The relationship between primary productivity and cool-water carbonate development. The Leg 182 shelf-to-basin transect should contain an important record of paleoproductivity linked to upwelling. Such periods should be recorded in the biota by low species diversity, high numbers of individuals, increased sedimentation rate, and distinctive changes in stable isotope and trace element compositions.

2.2 Cool-water Carbonate Deposition Models: the formulation of models for carbonate sedimentation on continental margins bathed predominantly by cool oceanic waters.

The deposition and accumulation of platform (neritic) carbonate sediments under cool-water (ca. <20°C) conditions is poorly understood compared to warm-water carbonates, primarily because the database is so small (Nelson, 1988; James and Kendall, 1992). Yet, because of their dominantly skeletal composition, nutrient-dependant biology, and low diagenetic potential, cool-water carbonates record the history of oceanic change in ways that are profoundly different from tropical carbonates. In hydrodynamic terms, cool-water carbonate shelves are hybrids, possessing some of the characteristics of both terrigenous clastic shelves and warm-water carbonate shelves. Sediments are produced on the shelf, in contrast to terrigenous clastic shelves where sediment is transported onto the shelf from the hinterland. However, without the elevated rim that typifies many warm-water carbonate shelves, the sediments are subject to the full sweep of oceanic waves and swells, as they are on terrigenous clastic shelves. Cenozoic exposures of inner shelf facies in Australia suggest that storm- and wave-dominated processes tend to control deposition. Are the models of wave-dominated shelf deposition developed onshore applicable throughout the Cenozoic? All seismic profiles across the southern margin of Australia indicate that a large proportion of the youngest part of succession is made up of prograding clinoforms (James and von der Borch, 1991; Feary and James, in press). Such clinoforms seem to be a signature of cool-water platforms and ramps, and are postulated to be a product of accumulation dynamics (Boreen and James, 1993). There is little information regarding the composition of these deposits; specifically, are they produced by in-place, enhanced bioproduction along the shelf edge, or are they made up of finer-grained material produced on the shelf and swept offshore to accumulate below wavebase?

2.3 Response of Cool-water Carbonates to Sealevel Fluctuations: determination of the Southern Ocean basin sealevel record, and the effect of sealevel fluctuations on stratigraphic packaging and early diagenesis of cool-water carbonates.

The Eucla margin is rich in biogenic carbonate sediments that respond in a sensitive way to variations in sealevel, and contain vital geochemical information needed for linking sealevel changes to paleoceanography. This information can then be utilized to address two major questions of global and temporal significance;

(i) What is the detailed sealevel history of the Southern Ocean basin, and can it be linked to paleoceanographic variations? Specifically, the southern Australian neritic shelf record, derived largely from onshore successions in which the marine record is preserved only in highstand systems tracts, appears to be at odds with the global model (Haq et al., 1987) during several critical periods. Is this because the sediments were deposited in cool-water? By using a combination of physical stratigraphy and proxy paleoenvironmental parameters, in a much more expanded section than exists onshore, the well-preserved Eocene to Oligocene and early to middle Miocene successions will permit a thorough testing of this part of the sealevel curve and resolution of specific eustatic events. The late Miocene to Pliocene sequence is unknown onshore except for the Early Pliocene highstand, and so this will be the first clear record of this component of the sealevel record in this region.

(ii) How do cool-water carbonate platforms respond to changes in sealevel? Carbonate platforms, with their chemically metastable sediments born largely in place, are particularly

responsive to changes in seawater temperature and chemistry and variations in sea state and sealevel. To date, most information on carbonate platforms comes from rimmed, warm-water platforms (Kendall and Schlager, 1981; Sarg, 1988). There is almost no information on the manner in which cool-water carbonate platforms respond to changes in these critical parameters at a variety of different time scales. Specifically, we require information describing how different segments of the shelf react during different parts of the sealevel cycle, and to determine whether cold- and warm-water carbonate platforms have basically different depositional geometries as a result of the different ways the carbonate factory responds to sealevel changes.

2.4 Fluid Circulation through a Cool-water Carbonate Platform: the circulation patterns of shallow subsurface fluids in an area of low hydraulic gradient and minimal recharge.

The Eucla margin is one of the few modern shelves where the onshore recharge zone is an areally vast, flat-lying karst (the Nullarbor Plain (Fig. 1). The high primary depositional permeability of winnowed grainstones of the Eucla Shelf, and the lack of early cementation, suggest that significant groundwater circulation may occur, at least at shallow depths. The drive for such a circulation may come from temperature contrasts between cool ocean waters and groundwaters warmed by geothermal heat flux (and possibly volcanics) within the shelf, and be concentrated on the shelf margin (Simms, 1984). Alternatively, despite inland aridity, recharge occurring over the vast continental hinterland may drive brackish to saline waters southward to discharge through the flooded shelf. Such a circulation has been recognized by James (1992), and is associated with cave development on the Nullarbor Plain (James et al., 1989). In contrast to the long-lived nature of the above systems, differences in sea-surface elevation, on and off the shelf, associated with regional wave build-up (Feary, 1995), current flow (Rockford, 1986), and atmospheric pressure system changes may cause pumping of marine waters into and out of the platform (Marshall, 1986).

2.5 Diagenesis and Dolomitization of Cool-water Carbonates: early seafloor and shallow burial diagenesis and dolomitization of calcite-dominated sediments.

Cool-water carbonates exhibit a radically different pattern of diagenesis to that of tropical aragonitic carbonates. Slow sedimentation permits seafloor lithification by intermediate-Mg calcite cements, but these appear to be volumetrically limited and localized to omission surfaces and hardgrounds which are ubiquitous in the inner platform. Indeed, both shallow marine and meteoric cements appear to be very sparse, magnesium being lost from high-Mg calcite during grain recrystallization to low-Mg calcite. Sparse calcium-rich dolomites may be present (Reeckmann, 1988; Bone et al., 1992), and at some locations replacement can be pervasive (James et al., 1993), although the fine subtidal evaporation-related dolomites typical of tropical platforms are absent. It is not known whether dolomitization is episodic, as recognized in other present-day platforms (Vahrenkamp, 1991, McKenzie et al., 1993), or occurred over extended time periods. The Eucla margin carbonates will provide opportunities to determine the present-day associations between groundwater circulation, fluid geochemistry, and diagenetic products, and by inference from the temporal and spatial distribution of ancient diagenetic components, those that have occurred under different conditions in the past. This

will have the potential to provide fundamental insights into the diagenesis of cool-water, open-shelf carbonates which are direct analogues for comparable carbonate platforms which were ubiquitous during many time intervals.

2.6 Biostratigraphic framework of Eucla Basin Cenozoic sequences: the pace and style of evolution of mid-latitude oceanic and neritic biotas.

The Leg 182 drilling transect offers the opportunity for pioneering analysis of the Cenozoic evolution of cool-water calcareous biota, with direct applicability to studies of ancient carbonate platforms presently lacking modern analogues. Linked information from the neritic and oceanic high- to mid-latitude carbonate realm should produce an excellent record of paleobiological information. Specifically, patterns and modes of speciation and diversification of coeval shallow- and deep-water benthic organisms as well as contemporaneous planktonic biota should be revealed. By comparing these results with those from Antarctica and the northeast Australian shelf, the geography of such processes and their relationship to physicochemical factors should be discernible.

3. REGIONAL GEOLOGIC SETTING

3.1 Tectonic Setting

The southern margin of the Australian continent is a divergent, passive continental margin that formed during the protracted period of extension and rifting that led to the separation of Australia and Antarctica in the Cretaceous, and evolved during the subsequent northwards drift of the Australian continent. The initial extension phase prior to breakup in the mid-Cretaceous (96 Ma), together with the following period of slow spreading (until the middle Eocene - 49 Ma), resulted in deep continental margin basins filled with up to 12 km of mainly terrigenous clastic sediments (Willcox et al., 1988; Davies et al., 1989). These basins broadly correspond to the sites of modern upper slope terraces (e.g., the Eyre Terrace at 400-1600 m depth in the western Great Australian Bight; Fig. 1). The onset of faster spreading in the middle Eocene also corresponded with establishment of fully marine conditions, and initiation of carbonate sedimentation in the widening 'gulf' between Australia and Antarctica. Carbonate sedimentation continued throughout the remainder of the Cenozoic, as the gulf evolved first into a broad, open seaway, and then into the modern Southern Ocean. Cenozoic sedimentation resulted in an extensive, relatively thin (up to 800 m thick; Feary and James, in press) Eucla Basin succession deposited in a predominantly platform-sag to platform-edge tectonic regime (Stagg et al., 1990).

Throughout the Cenozoic, the western Great Australian Bight portion of Australia's southern continental margin has been particularly stable, with geohistory analysis of the Jerboa-1 well indicating minimal Tertiary subsidence (Hegarty et al., 1988). Slight regional tilting (<1°?) in the middle Miocene resulted in uplift and exposure of the Nullarbor Plain, and restriction of Neogene sedimentation to the modern outer shelf and upper slope.

3.2 Cenozoic Stratigraphy of the Eucla Basin

The Eucla Basin extends inland up to 350 km from the present coastline, and seaward some 200 km to the modern shelf edge and upper slope. Inland, the Eucla Basin succession thins and 'feathers' out against Precambrian basement; it gradually thickens southwards to be thickest beneath the modern shelf edge (Fig. 2). Apart from the basal siliciclastic sequence both offshore (Sequence 7) and onshore (Hampton Sandstone), and a thin, transgressive, paleovalley- filling and strandline succession of terrigenous clastics on the inland margins of the basin, the Eucla Basin succession is entirely carbonate.

The succession is basically divisible into 2 mega-sequences; a Mesozoic (?Late Jurassic-Cenomanian; Stagg et al., 1990) siliciclastic-dominated syn- to early post-rift section and a Cenozoic (Paleocene to Recent), predominantly carbonate-dominated section, separated by a major, basin-wide unconformity. The subject of the bulk of this drilling leg is the upper succession, which makes up an overall sigmoid-shaped series of sequences reaching a maximum thickness beneath the present-day outer shelf (Fig. 2). The stratigraphy of the lower, Mesozoic succession can be derived from the sequence intersected in the Jerboa-1 exploration well (Fig. 1); however little information on the upper, Cenozoic section can be obtained from this hole.

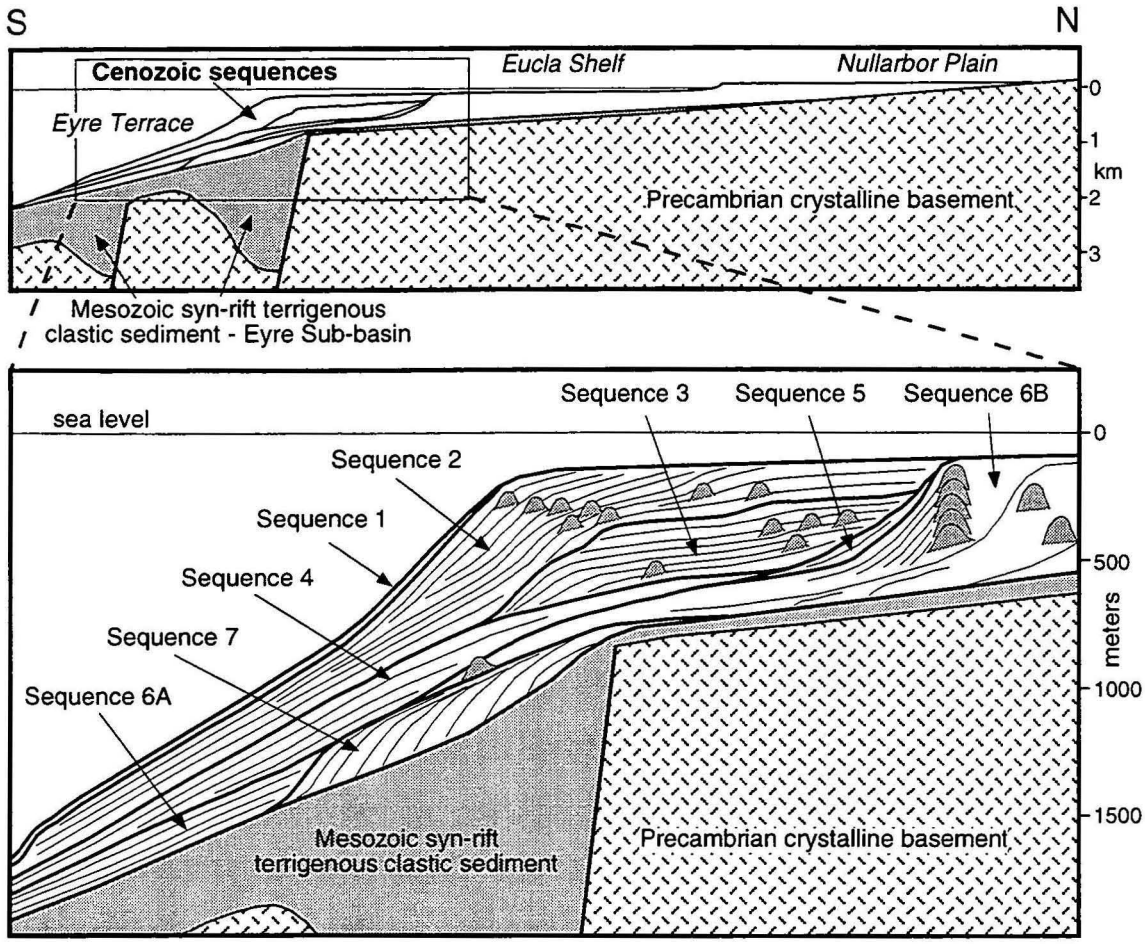


Figure 2. Schematic N-S cross-section from the Nullarbor Plain to the upper continental slope, showing thickness trends of the Mesozoic (shaded) and Cenozoic (unshaded) sequences. Note that the Mesozoic succession is primarily concentrated in the Eyre Sub-basin (underlying the Eyre Terrace bathymetric feature shown on Fig. 1). Vertical scales are approximate; based on Feary and James (in press).

The extensive erosional unconformity at the top of the syn-rift section forms an easily recognizable and mappable surface. Seven unconformity-bounded seismic sequences have been recognized overlying this unconformity (Fig. 2). One of the most striking elements of this seismic stratigraphic analysis is the identification of numerous mound-shaped structures, occurring throughout the Cenozoic succession, which have been interpreted as biogenic mounds (Feary and James, 1995). These structures are likely to preserve a detailed record of cool-water faunal community relationships, and potentially provide an analogue for cool-water mounds recognized in the rock record, but for which no modern analogues have previously been identified.

The ages assigned to this succession are extremely tentative, and are based on correlation of Sequence 6B with the onshore Eucla Group (Fig. 2); on the similarity in depositional style between the Sequence 7 progradational wedge and ?Paleocene-Early Eocene progradational sequences elsewhere along Australia's southern margin; and the division of the remainder of the

sequences into a reasonable time stratigraphic framework. On this basis, the offshore sequences can be placed in a stratigraphic framework (based on Feary and James, in press):

- Sequence 7 - Paleocene-middle Eocene progradational siliciclastic wedge deposited in a depositional sag, representing initial transgressive sedimentation.
- Sequence 6A - middle-late Eocene to early-middle Miocene deep-water carbonates forming a multi-lobed sediment apron.
- Sequence 6B - cool-water ramp carbonates with biogenic mounds (middle-late Eocene to Oligocene), overlain by an upper, warm-water, flat-topped platform rimmed by the ?early-middle Miocene "Little Barrier Reef" (Feary and James, 1995).
- Sequence 5 - small late middle Miocene lowstand sediment wedge with restricted distribution, lying at the foot of the steepest part of the progradational carbonate shelf escarpment zone.
- Sequence 4 - extensive late Miocene aggradational deep-water carbonate ramp sequence.
- Sequence 3 - latest Miocene and early Pliocene highstand aggradational deep-water carbonate ramp sequence.
- Sequence 2 - thick succession of highstand Plio-Pleistocene cool-water carbonates with spectacular clinoform ramp geometry that forms most of the modern outer shelf, and contains large deep-water biogenic mounds.
- Sequence 1 - thin Quaternary deep-water drape.

4. LEG 182 SEISMIC DATABASE

Present knowledge of the western Great Australian Bight margin is based on extensive, high-quality seismic reflection data, together with a single oil exploration drillhole which provides little information about the Cenozoic succession. The original Leg 182 drilling proposals (James and Feary, 1993; Feary et al., 1994; Feary et al., 1995) were based on detailed seismic stratigraphic interpretation (Feary and James, in press) of a grid of 2,350 km of high-quality, regional 2-D seismic reflection lines collected and processed by the Japan National Oil Corporation in 1990/1991, over an area of 155,000 km^2 on the continental shelf and upper slope of the western Great Australian Bight. An additional 1380 km of moderate-quality regional 2-D seismic lines, collected by Esso Australia in 1979 and reprocessed by JNOC, were also used to infill gaps in the JNOC dataset.

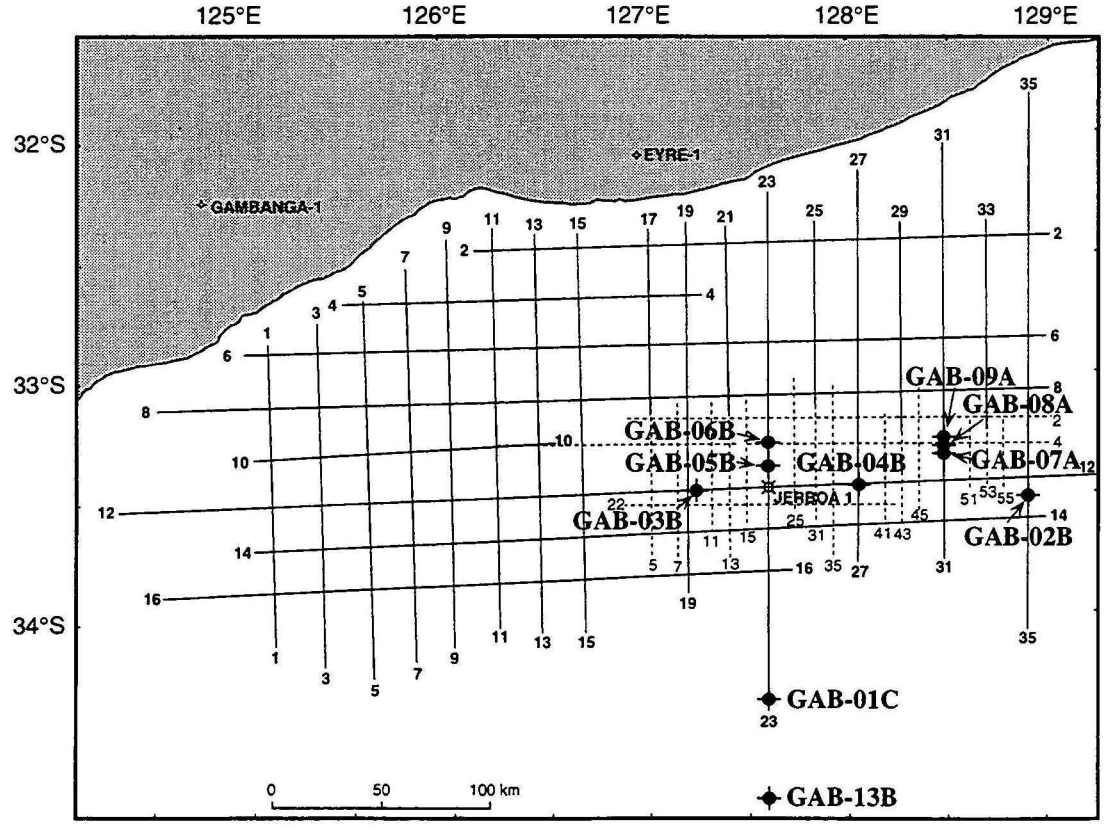


Figure 3. Map of the western Great Australian Bight showing Leg 182 drill sites relative to the JNOC (1990) seismic grid (heavy lines), together with reprocessed Esso (1979) seismic lines over the Eyre Terrace (lighter dashed lines). Exploration drillhole Jerboa-1 is also shown.

In February 1996 AGSO used the R/V *Rig Seismic* to carry out a seismic site survey cruise (Feary, 1995) in support of the Leg 182 drilling proposal, collecting 1800 line km of high-resolution, 2-D seismic data as 0.5 nm-spaced grids centered on each site, together with tie-lines between sites. Data were collected with a 1000 metre 80-channel analogue streamer, using a single 3xGI gun array in shallow water (<750 m), and twin 3xGI gun arrays in deep water (750-4500 m), running at 2000 psi at 3 m depth. Data are 3.5 sec records in shallow water, 8.5 sec records in deep water, (12.5 m shot interval in shallow water, 25 m shot interval in deep water), with a 1 ms sample rate. Primary and independent backup differential GPS navigation systems resulted in extremely high navigation accuracy. Excellent weather resulted in low streamer noise levels (normally 5-10 μB), and a superb dataset.This dataset permitted minor refinements of some site locations, to avoid potential safety concerns. The seismic data presented in the Section 9 site descriptions are postscript redisplays from this dataset.

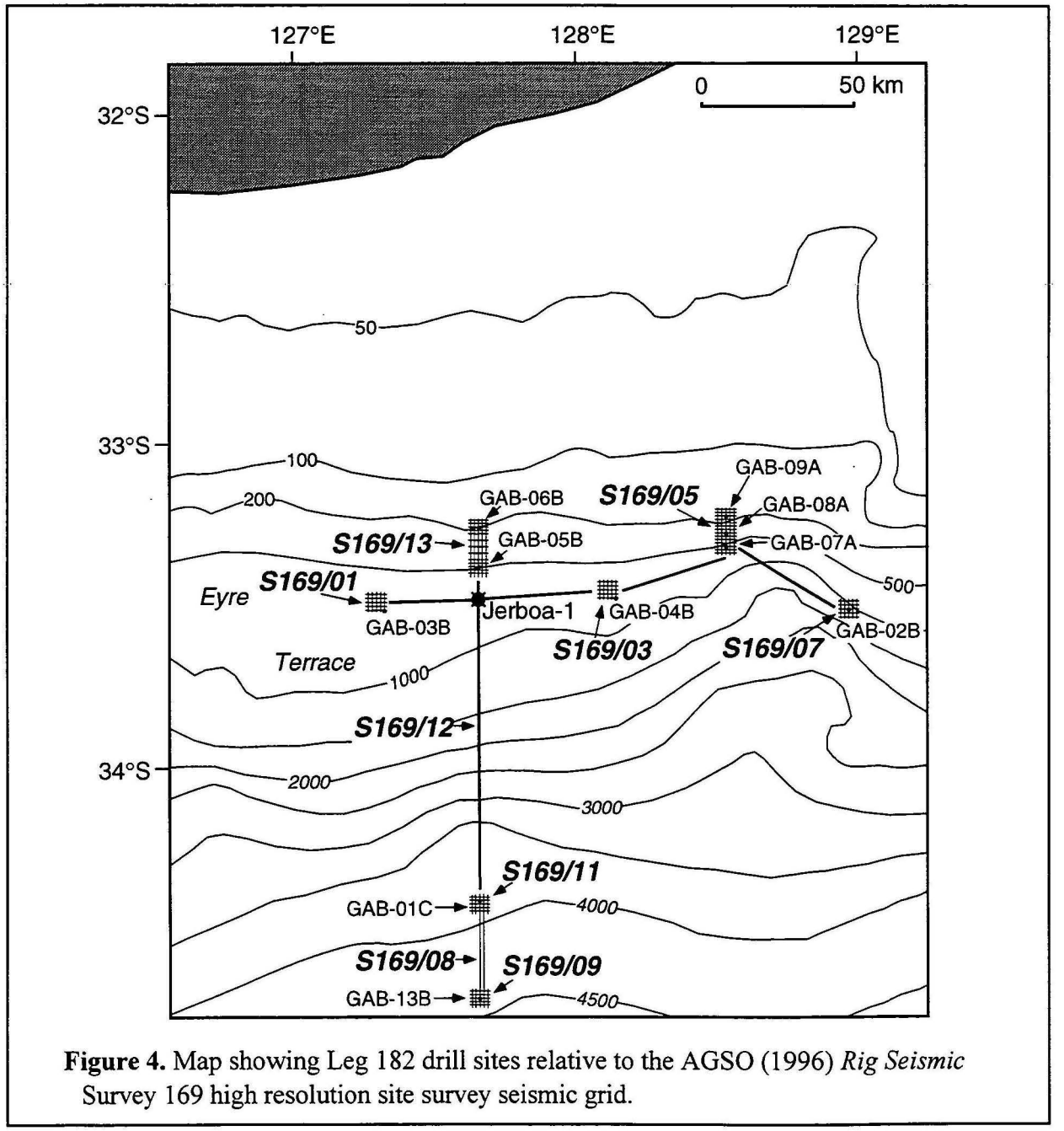


Figure 4. Map showing Leg 182 drill sites relative to the AGSO (1996) *Rig Seismic* Survey 169 high resolution site survey seismic grid.

5. COMMERCIAL DRILLING RESULTS

Three wells have been drilled for hydrocarbon exploration in the western Eucla Basin; two onshore (Eyre-1 and Gambanga-1) and one offshore (Jerboa-1) (Fig. 1). Although neither Eyre-1 nor Gambanga-1 are particularly useful as indicators of potential safety risks for Leg 182 drilling, a summary of the results from these wells are presented for completeness. Other wells in the Great Australian Bight portion of Australia's southern margin are Potoroo-1 (intersecting a similar sequence to Jerboa-1, in the Ceduna Sub-basin to the east); Apollo-1, Gemini-1, and Mercury-1 (in the Polda Trough, in the eastern Great Australian Bight). These other wells provide a general picture of the stratigraphy and depositional history of the Great Australian Bight Basin (Stagg et al., 1990), but do not contribute data additional to that derived from Jerboa-1 for the Eyre Terrace and adjacent western Great Australian Bight continental shelf area.

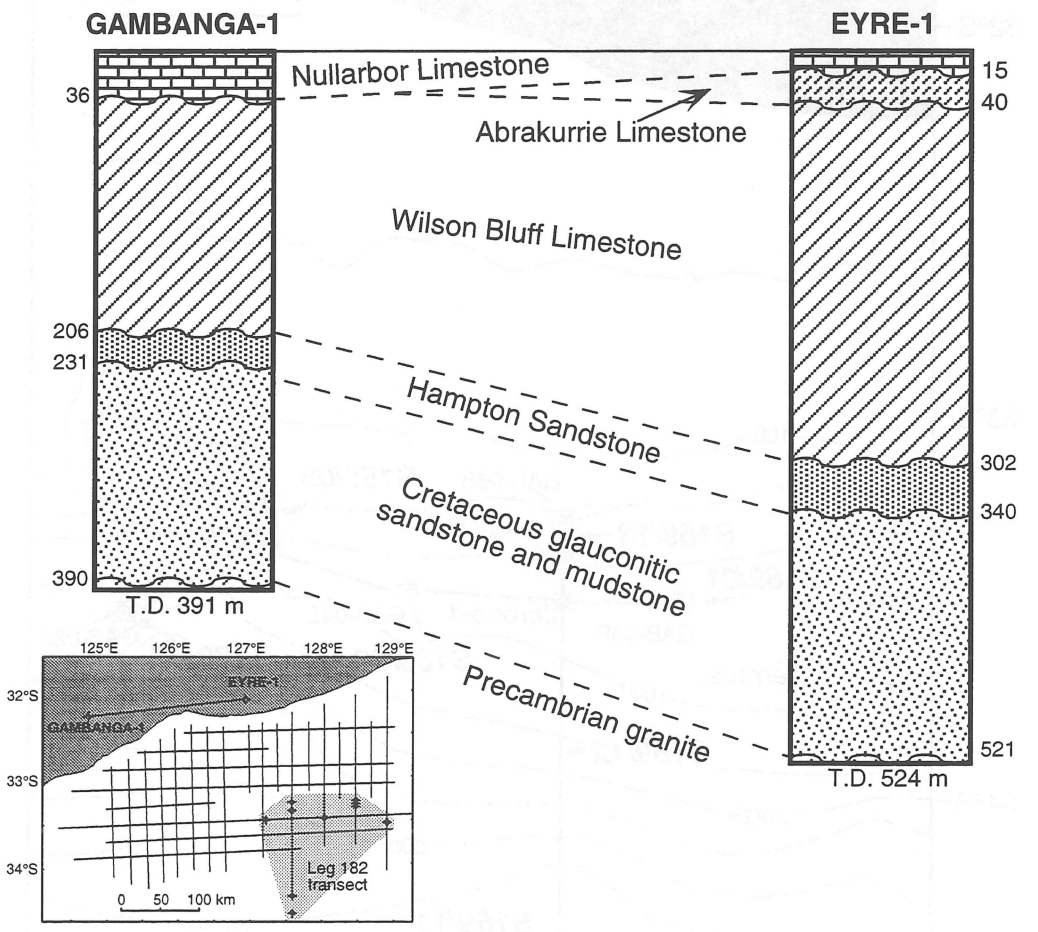


Figure 5. Stratigraphy of onshore drillholes through the Eucla Basin succession, based on well completion reports. Inset map shows the location of these drillholes relative to the Leg 182 drilling transect.

5.1 Eyre-1

Eyre-1 was drilled in December 1959 by Exoil Pty Ltd to gather stratigraphic information; to determine the thickness of the basin; and to test the petroleum potential of the area. Eyre-1

intersected 15 m of Miocene Nullarbor Limestone; 25 m of late Oligocene-early Miocene Abrakurrie Limestone; 262 m of middle-late Eocene Wilson Bluff Limestone; 38 m of Paleocene-Eocene Hampton Sandstone; 181 m of Cretaceous sandstone and siltstone; and reached TD in Precambrian granite at 521 m (Fig. 5). No hydrocarbon shows were encountered in this well.

5.2 Gambanga-1

Gambanga-1 was drilled in February 1960 by Exoil Pty Ltd as a companion well to Eyre-1, to gather stratigraphic information; to determine the thickness of the basin; and to test the petroleum potential of the area. Gambanga-1 intersected 36 m of Miocene Nullarbor Limestone; 170 m of middle-late Eocene Wilson Bluff Limestone; 25 m of Paleocene-Eocene Hampton Sandstone; 159 m of Cretaceous sandstone and siltstone; and reached TD in Precambrian granite at 390 m (Fig. 5). No hydrocarbon shows were encountered in this well.

5.3 Jerboa-1

Jerboa-1 is clearly the most useful well for understanding the hydrocarbon potential of all Leg 182 sites except the deep water sites GAB-01C and GAB-13B. Jerboa-1 is adjacent to several Leg 182 drill sites (17 nm to GAB-03B; 23 nm to GAB-04B; and only 5 nm to GAB-05B), with seismic ties to all eight shallow water sites .

Jerboa-1 was drilled by Esso/Hematite in 1980, as a wildcat oil exploration well in 761 m water depth, above a prominent tilted basement fault block (Fig. 6) located in the southern half-graben of the Eyre Sub-basin (Bein and Taylor, 1981). Flat-lying reflection segments within the Mesozoic section visible on the Esso (1979) seismic data were the primary target, with inferred sand bodies a short distance above basement as secondary targets (Bein and Taylor, 1981). These flat-lying reflections are not present in the most recent seismic data, indicating that they were an artefact of the water-bottom multiple. Jerboa-1 penetrated 1738 m of Cenozoic and Cretaceous sedimentary section before bottoming in Precambrian metabasalt basement (Fig. 7), and did not encounter any significant hydrocarbon shows. The top 232 m were washed down and cased, so that only 145 m of Tertiary section was actually drilled and logged. No cores were cut in this interval, so lithological and biostratigraphic inferences are based on cuttings and downhole logs.

The following statements describing hydrocarbon indicators are taken from the Jerboa-1 well completion report (Huebner, 1980) submitted to the Australian Government (the 'J' letters refers to the stratigraphy shown in Fig. 7):
"Hydrocarbon Indicators:

During the drilling of Jerboa-1, a continuous record of gas levels in the drilling mud was maintained from 1017 m RKB to total depth by Core Laboratories Inc., using a hotwire gas analyser and a gas chromatograph.

The first indication of gas was at 1570 m, where C_1 was detected. C_2 was first detected at 1820 m and C_3 at 2095 m. However, from 1570 m to 2220 m, gas readings on the hot wire recorder

did not exceed 1 unit. Slightly more gas was recorded below 2220 m, with several small peaks above a low background reading. The maximum hotwire reading was 6.4 units at 2480 m, with C_1 and C_4 all present. These slightly higher gas readings appear to be associated with the sandy intervals of Units JH and JJ.

No hydrocarbon fluorescence or cut was detected in any cuttings samples, sidewall cores, or in Core 1, which was cut in Unit JH at 2292.4-2303.4 m. Log analysis of sandstone intervals in Units JF, JH and JJ indicate 100% water saturation.

Relevance to Occurrence of Hydrocarbons:

Reservoirs - Jerboa-1 proved that reservoirs with moderate to good porosity are present in Units JF, JH and JJ, in the Neocomian to Late Jurassic section.

Source - Overall the section penetrated in Jerboa-1 has moderate source rock characteristics. However, although total organic content was quite low throughout the section, a significant proportion of the organic material in the Neocomian to Late Jurassic horizons consisted of amorphous material which could be suitable for generation of hydrocarbons.

Vitrinite reflectance measurements indicate that most of the section penetrated is immature to marginally mature, with the zone of initial maturity close to the well TD. These observations were confirmed by exinite fluorescence colours.

Seals - Thick clay-prone units are present above all the sandstone horizons in the Neocomian to Late Jurassic section. These could be expected to act as seals.

The absence of hydrocarbons in the sandstones of Units JF, JH and JJ can be attributed to the lack of maturity of potential source rocks in the section penetrated, and either immaturity of source rocks deeper and off-structure or lack of any effective migration pathway for hydrocarbons generated at deeper levels to move up to the section drilled. However, it is possible that deeper parts of the sub-basin may still be mature for oil generation."

The Jerboa-1 well completion submission also included a geochemical report (Burns, 1981), presenting the analysis of C_{1-4} hydrocarbon gases and C_{4-7} gasoline range hydrocarbons, together with C_{15+} liquid and gas chromatography and TOC analyses of selected samples. Burns concluded that:

"• The complete section penetrated by the well is immature and is unlikely to have generated any appreciable hydrocarbons.
- *Top of maturity in off-structure synclines would be expected at a depth of about 2900 m in the vicinity of the Jerboa-1 well.*
- *The shales of the late-middle Jurassic have a good oil source rating if they can be found in a more mature part of the basin. The late Jurassic and Neocomian shales also have potential oil generating capability but would require considerable additional burial before being considered as a viable source.*
- *There is evidence of possible migrated hydrocarbons in samples from 1480-1535 m and 1700-1730 m."*

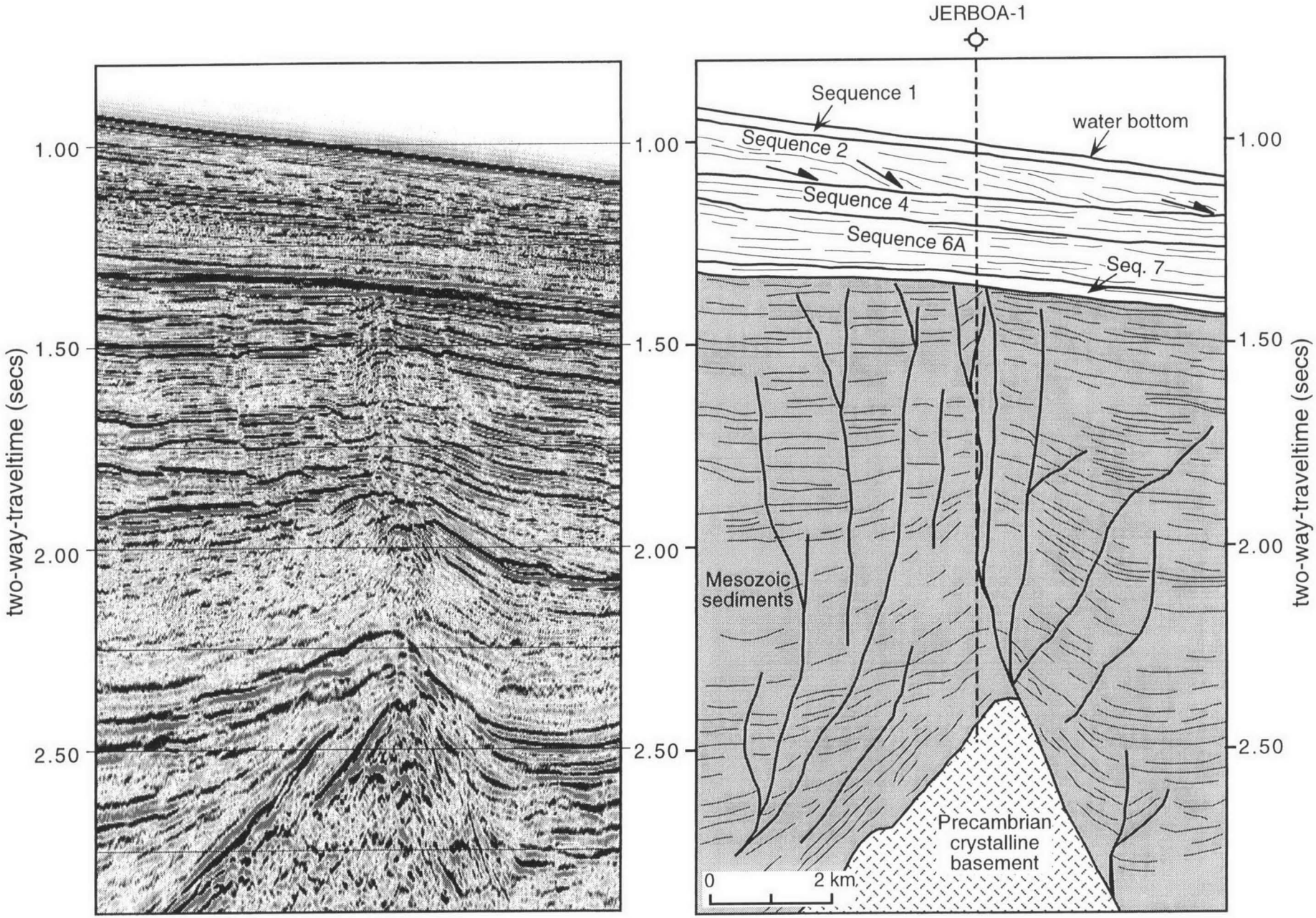


Figure 6. Part of seismic line JA90-23, together with line drawing interpretation, showing the thin Cenozoic sequences and thick Mesozoic section (shaded) intersected by exploration well Jerboa-1.

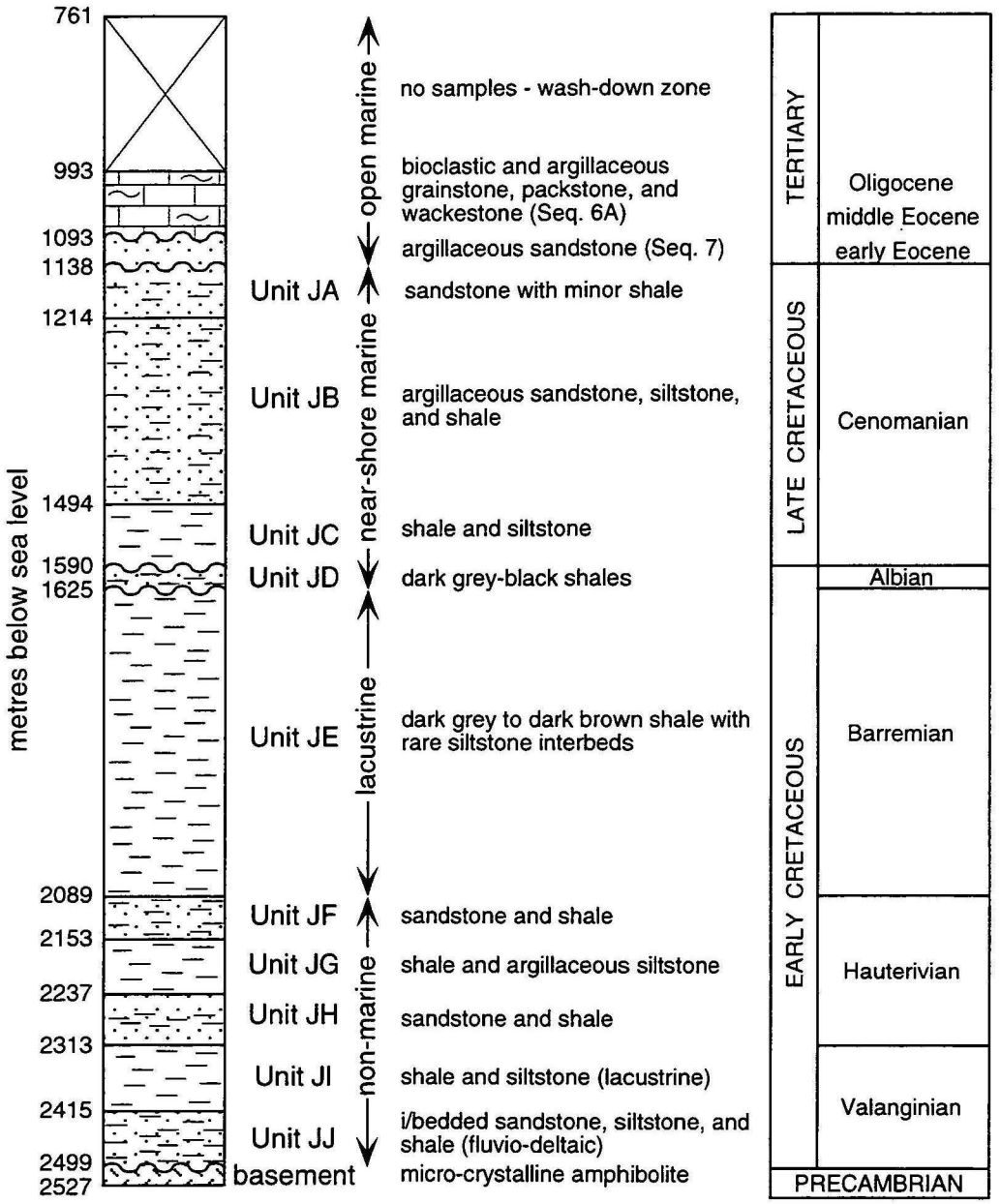


Figure 7. Stratigraphy and paleoenvironmental interpretation of the sequence intersected at Jerboa-1, based on Huebner (1980) and Bein and Taylor (1981), as revised by Stagg et al. (1990).

Stagg et al. (1990) also discussed the thermal history of the Eyre Sub-basin based on data from Jerboa-1:

"*The tectonic subsidence plot for Jerboa-1 indicates that subsidence was principally thermally-driven (at least to approximately 32 Ma), with a relatively small tectonic component. Subsidence was fairly regular from approximately 127 to 119 Ma. A period of non-deposition with slight uplift followed to approximately 95 Ma. Gradual thermal subsidence then continued to about 32 Ma, when subsidence rates increased dramatically. An increase in (non-thermal) subsidence rates at about 32 Ma is seen in all of the other Great Australian Bight wells modelled in this*

rates at about 32 Ma is seen in all of the other Great Australian Bight wells modelled in this study, and may be related to the mechanical clearing of the Australian and Antarctic plates at that time.

The geothermal gradient is currently relatively low (at least in the vicinity of Jerboa-1) and it appears to have been low throughout the Cainozoic. Not unexpectedly, the thermal modelling and vitrinite data show that the entire sedimentary section at Jerboa-1 is thermally immature (R_v < 0.65%). Only the basal unit in the well (Loongana Formation) has reached R_v = 0.5%, and this has occurred only within the last 35 Ma. The theoretical vitrinite reflectance at the base of Jerboa-1 is about 0.53%, which agrees well with measured data. Extrapolating the theoretical vitrinite reflectance profile indicates that the onset of hydrocarbon generation (R_v = 0.65%) can be expected at a depth of approximately 3050 m, with peak maturity (R_v = 0.8-1.35%) at depths of about 3550- 5700 m. Consequently, charging of structural traps similar to those at Jerboa-1 requires substantial vertical and lateral migration from (as yet undrilled) more deeply buried source rocks."

5.3.1 Summary and Implications for Leg 182 Sites

The deep water sites GAB-13B (4465 m), GAB-01C (3884 m), and GAB-02B (1043 m) are in sufficiently deep water to pose negligible safety risk. In addition, seismic data provide no basis for anticipating any occurrence of hydrocarbons, and sites are located off any closures within the sequences to be intersected.

The data and analysis from Jerboa-1 demonstrate that nearby sites GAB-03B and GAB-04B have negligible risk of encountering hydrocarbons. These sites overlie much shallower basement than Jerboa-1, but are otherwise in similar structural situations with much shallower TD's. In addition, there are no indications of possible migration pathways, and both sites have been moved slightly to avoid closure (GAB-04B) or directly overlying deeper faults (GAB-03B).

Sites GAB-07A, GAB-08A, and GAB-09A will penetrate a predominantly Plio-Pleistocene succession, reaching the late Miocene at TD. Numerous factors indicate negligible safety risk at these sites; lithologies intersected are expected to be nanno-foram oozes, with negligible reservoir capacity; TD's are far above the maturity window, and there are no indications of migration pathways; and all sites intersect dipping sequences with the only indications of closure within the uppermost 70 m.

Sites GAB-05B and GAB-06B are the only sites intersecting potential reservoir facies (the interbedded sandstones and mudstones of Sequence 7), but a number of factors indicate that there is negligible risk: these sites are close to Jerboa-1 (5 nm and 11.2 nm), with much shallower TD's, and therefore will bottom far above the maturity window; there are no indications of migration pathways, and no closure. Although farther away from Jerboa-1, GAB-06B overlies shallow basement, and accordingly has even less risk potential than GAB-05B. Nevertheless, it would be prudent to increase hydrocarbon monitoring close to the Sequence 7 upper boundary at both sites, and site GAB-06B should be drilled first so that Sequence 7 lithologies can be assessed, and more accurate velocity data can be used to more precisely predict the Sequence 7 upper sequence boundary at GAB-05B.

6. WEATHER CONDITIONS AND WATER CURRENTS

6.1 Weather Conditions in the western Great Australian Bight

Weather patterns in the Great Australian Bight are controlled by the position of the band of mid-latitude high pressure systems that pass over Australia from west to east. During the summer months (November to February), these high pressure cells pass directly over southern Australia and the Great Australian Bight, and often a high pressure cell lingers directly over the Bight area. As a result, there are lengthy periods of calm weather in the Great Australian Bight, with wind flow dominantly from the southeast in the mornings and from the continent during the afternoon and evening. Farther south, weak cold fronts between the high pressure cells bring moderate southwesterly winds. During the winter months (May to August), the band of high pressure systems is displaced to the north, and the Great Australian Bight is more influenced by the strong mid-high latitude westerly wind flow, containing embedded strong cold fronts. A wind 'surge' effect ahead of approaching high pressure systems frequently produces higher winds during the early summer, and it is likely that this effect will occur several times during Leg 182 drilling. However, weather forecasts should provide adequate warning of approaching high pressure systems, and accordingly it should be possible to schedule the shallower water sites requiring calmer seas to avoid these times.

Temperature patterns show that Eucla experiences coolest temperatures in July-August, and warmest temperatures in January-February. Rainfall is generally higher in April-September (although only 20-30 mm), and very low between October-March.

6.2 Water Currents in the western Great Australian Bight

Water conditions in the Great Australian Bight are dependant on both local and distant effects. Local winds in the Great Australian Bight and southern Australia area, as described above, produce wave activity that shows a marked fluctuation between the calmer late summer months and the rough winter months. In addition, wave activity generated from far to the south, by storms in the mid-high latitude westerly wind belt (the 'roaring 40's' and 'furious 50's'), impact on the Great Australian Bight. This is particularly the case in winter, when the westerly wind belt is displaced to the north, but is less important in summer.

Data from the TOPEX/POSEIDON satellite provide global images of wave height and wind speed every 3.3 days; typical images from October/November illustrate the range of wave activity to be expected during Leg 182 operations (Fig. 8).

Current flow in the Great Australian Bight is limited to activity of the Leeuwin Current, a year-round flow of warm, low salinity water southwards along the coast of Western Australia. This flow is strongest in winter, when it is able to flow around Cape Leeuwin and extend eastwards into the Great Australian Bight. However, although Leeuwin Current flow can be quite strong off the western margin of Australia (up to 1.5 m/sec at Cape Leeuwin), by the time it reaches the central Great Australian Bight it has weakened considerably. It has negligible effect in the central Great Australian Bight during summer, and even in winter has only minor effect.

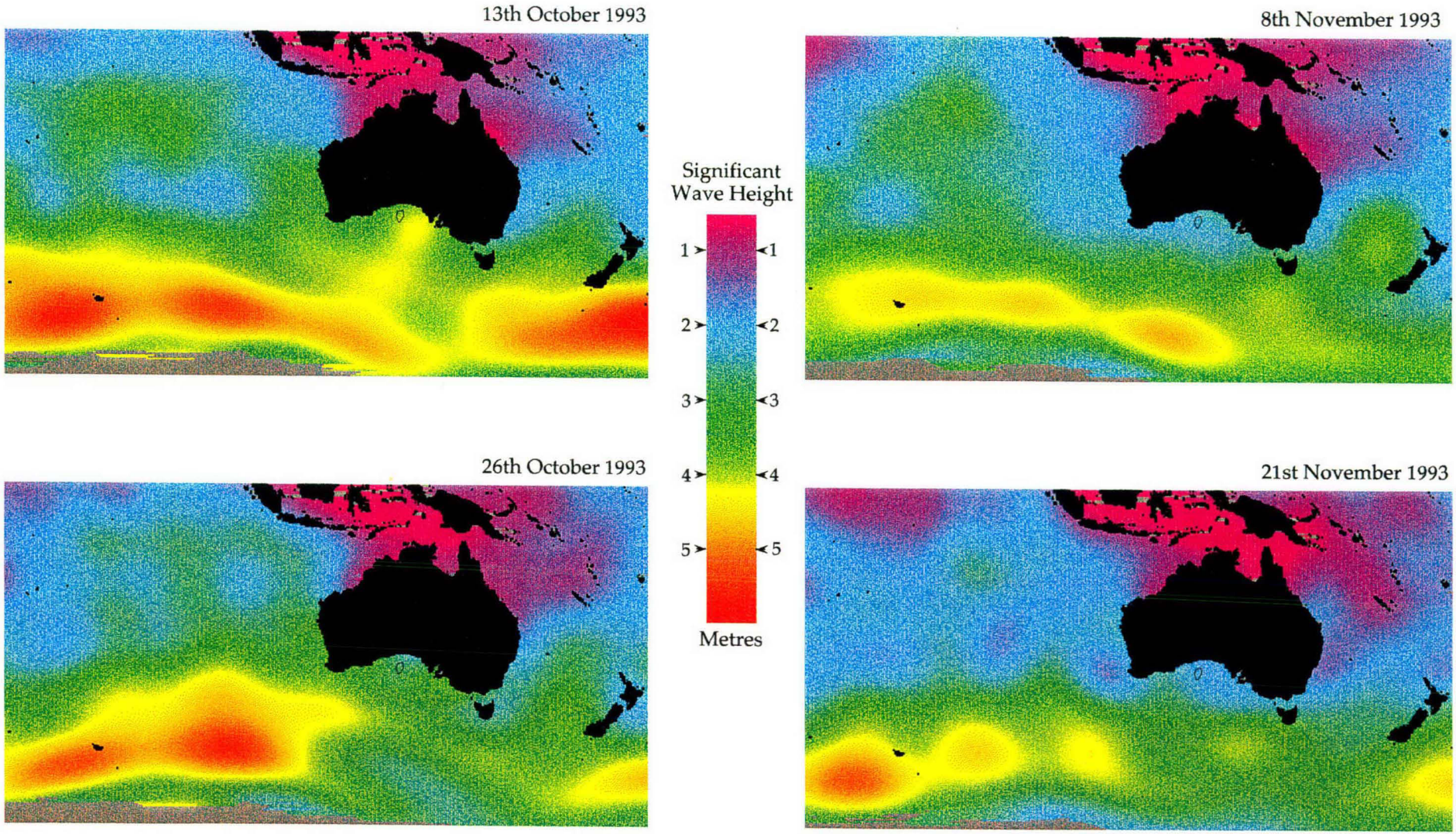


Figure 8. Typical wave height images generated from TOPEX/POSEIDON satellite data for October-November. The Leg 182 drilling transect is shown with a small polygon.

7. MAN-MADE HAZARDS

There are no known man-made hazards either in the vicinity of the Leg 182 sites, or elsewhere in the western Great Australian Bight. The southernmost sites (GAB-13B and GAB-01C) are still sufficiently far north to be out of the major shipping lane across the Great Australian Bight, so it is unlikely that the numerous bulk carriers that travel cross the Bight will approach the *JOIDES Resolution*.

8. DRILLING AND LOGGING STRATEGY

8.1 Drilling Strategy

The Leg 182 drilling strategy must be developed with the knowledge that although ODP has great experience with drilling deep-water pelagic carbonates, it is difficult to predict drilling conditions in the cool-water carbonates at the shallower sites with any certainty. Accordingly, operational considerations may dictate that significant changes to drilling strategies are necessary on-site. In particular, although easily drilled nanno-foram and foram-nanno oozes are expected to dominate the upper sequences at each site, there is the possibility that thin bioclastic grainstone horizons and/or thin chert horizons may complicate drilling at the shallowest sites. Consequently, alternation of hard and soft layers may dictate that it is necessary to alternate between APC and XCB. In addition, the order in which sites are drilled will need to be flexible, to accommodate operational restrictions dependant on sea state for the sites in less than 650 m water depth (GAB-05B, GAB-06B, GAB-07A, GAB-08A, and GAB-09A). This will be particularly important for the sites in less than 300 m water depth (GAB-06B and GAB-09A), where relatively calm conditions will be imperative.

Triple APC, XCB and RCB coring will be carried out at the four high-resolution paleoceanography and sealevel sites (GAB-01C, GAB-02B, GAB-06B, and GAB-13B) which comprise the shelf-to-basin transect (water depth range of 332-4465 m). After the cores and downhole logs have been tied to the extensive seismic data in the area, these sites will provide the fundamental basis for regional stratigraphic and lithologic characterization. Lithologies intersected at all these sites should pass from carbonate oozes in the upper parts down into more indurated calcareous siliciclastic sediments at the base. The 500-600 m high-resolution records of Plio-Pleistocene sealevel fluctuations within carbonate oozes targeted at sites GAB-07A, GAB-08A, and GAB-09A should be achievable with double APC and XCB drilling, with triple APC at site GAB-08A providing additional resolution as the shallowest (uppermost slope) component of the shelf-to-basin transect.

The sites predominantly targeting cool-water carbonate facies objectives (GAB-03B, GAB-04B, and GAB-05B) should be drilled using double APC and XCB, with the deeper (Cretaceous) parts of GAB-04B possibly requiring RCB and the siliciclastic sequence in the deeper part of GAB-05B certainly requiring RCB.

8.2 Logging Plan

All sites should be logged with standard logging tool strings (Triple Combo, FMS/Sonic), together with deployment of WST, GHMT, and GLT tool strings at selected sites. The geophysical logs (Triple Combo) will be important for evaluating the lithostratigraphic response of cool-water carbonates to sealevel and climatic fluctuations. The fine-scale characteristics of the bedding, including pore spaces, bioturbation, fractures and stylolites may be imaged through FMS. Integrated interpretation of FMS and geophysical logs should provide a good complement to cores in describing the lithostratigraphy. Diagenesis in carbonates usually is well expressed through changes in porosity and chemical precipitation of soluble elements (such as uranium), leading to large changes in log properties seen on sonic, resistivity,

density and neutron logs, as well as gamma-ray. Thus the diagenetic changes in the carbonate sediments, another key objective of the leg, may be evaluated through the petrophysical response measured in the wireline logs. Magneto-stratigraphic characterization at selected deeper penetration sites using the GHMT tool string should also contribute to the sedimentary/stratigraphic objectives and inter-site correlation.

Interstitial fluid characterization from cores will be the primary tool for the fluid flow objectives, with logging data being of secondary importance. However, the assessment of fracture networks and basic fluid properties using sonic and resistivity logs, together with FMS images and GLT profiles at selected sites, should provide an important contribution to this leg objective.

A detailed correlation between cores-logs and the extensive suite of high quality seismic reflection data, including the closely-spaced site survey grids and regional 2-D lines, will be critical for understanding the three-dimensional architecture of the Cenozoic sequences and compiling a detailed sequence stratigraphy. Accordingly, check-shot (WST) surveys, at 50 m spacing, should also be run at all sites except GAB-08A (where data from adjacent sites GAB-07A and GAB-09A will be applicable).

9. LEG 182 SITE DESCRIPTIONS

The following descriptions of the Leg 182 drill sites in the western Great Australian Bight include a summary of the scientific objectives for each group of sites; portions of uninterpreted and interpreted multichannel seismic lines showing seismic sequences to be intersected by each drillhole; velocity data and time-depth curves; graphic logs; and a series of maps showing two-way-traveltime to sequence boundaries and specific horizons.

SITE	LOCATION	INTERSECTION OF LINES:	WD	EST. TD	CLEARANCE REQUESTED
GAB-13B	34°45.49400'S 127°35.43583'E	169/08 (SP 3987.5) 169/09 (SP 3457.5)	4465 m	769 m	800 m
GAB-01C	34°23.46717'S 127°35.43933'E	169/08 (SP 729.5) 169/11 (SP 1962.5)	3884 m	651 m	700 m
GAB-02B	33°32.37300'S 128°54.30017'E	169/07 (SP 428.0) 169/07 (SP 3550.0)	1043 m	1727 m	1750 m
GAB-03B	33°31.72550'S 127°15.85650'E	169/01 (SP 1668.5) 169/01 (SP 4696.0)	704 m	520 m	550 m
GAB-04B	33°30.55683'S 128°03.99500'E	169/03 (SP 1131.5) 169/03 (SP 3209.5)	790 m	544 m	570 m
GAB-05B	33°25.21217'S 127°36.13817'E	169/13 (SP 995.0) 169/13 (SP 13195.0)	488 m	581 m	600 m
GAB-06B	33°18.98417'S 127°36.12867'E	169/13 (SP 1916.0) 169/13 (SP 7400.0)	220 m	707 m	720 m
GAB-07A	33°21.44983'S 128°28.87717'E	169/05 (SP 600.0) 169/05 (SP 10569.5)	480 m	561 m	580 m
GAB-08A	33°19.56283'S 128°28.87883'E	169/05 (SP 879.0) 169/05 (SP 8253.5)	332 m	620 m	650 m
GAB-09A	33°17.37933'S 128°28.87483'E	169/05 (SP 1202.0) 169/05 (SP 5574.5)	200 m	580 m	600 m

Table showing location of Leg 182 drill sites, together with a calculated depth to TD for each site (based on seismic stacking velocities) and a requested total depth clearance for consideration by PPSP and the TAMU safety panel.

9.1 SITES GAB-01C, GAB-02B AND GAB-13B

Sites GAB-13B (southern Australian middle continental rise), GAB-01C (upper continental rise), and GAB-02B (mid-upper slope) are paleoceanographic sites located to intersect sections that collectively span the entire Cenozoic succession, and a substantial part of the late Cretaceous section. These sites comprise the deep-water component of the shelf-to-basin transect.

Principal Objective:

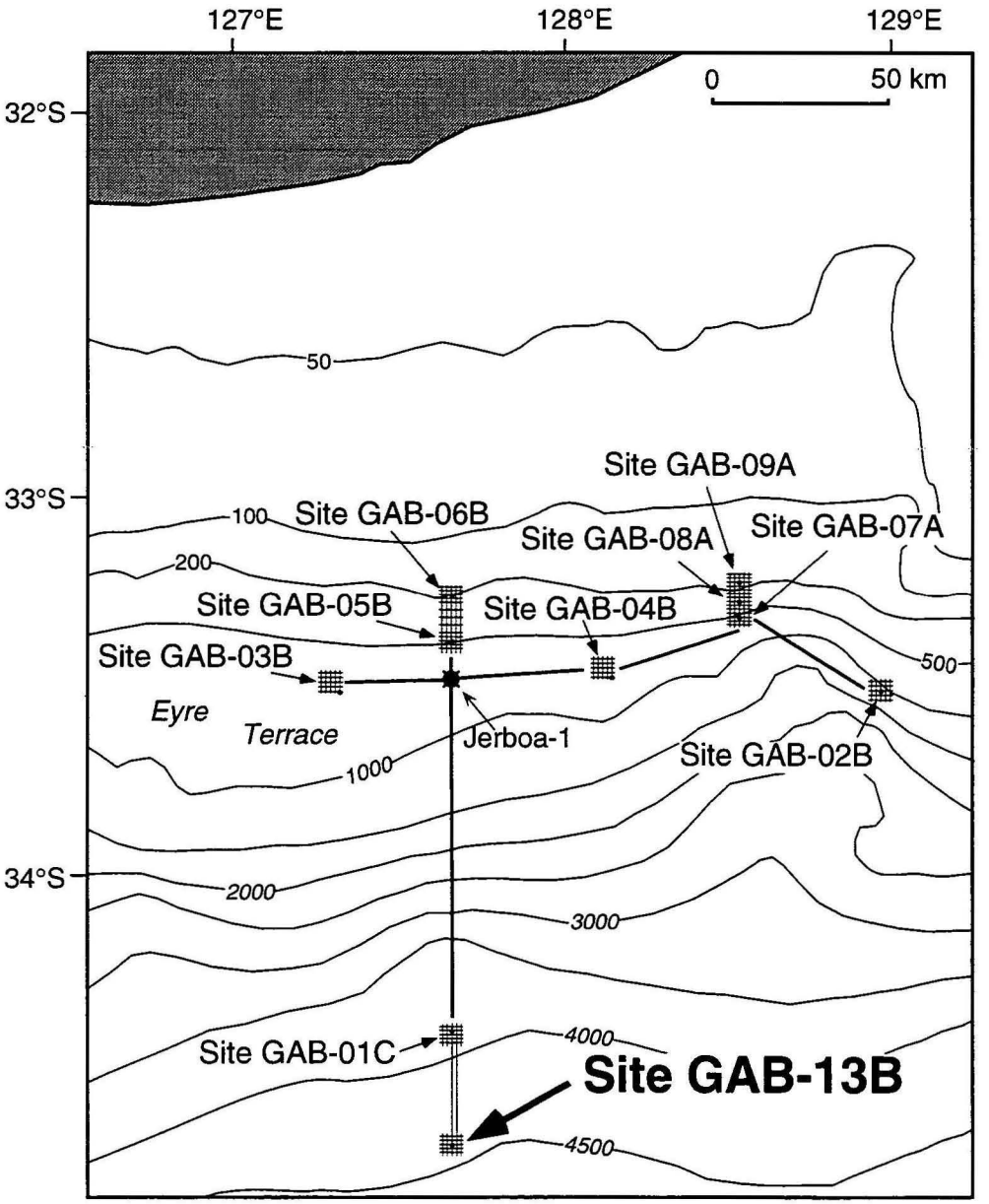
- to obtain a complete record of the Cenozoic section in a deep oceanic setting, with the principal aim of elucidating the evolution of the circum-Antarctic Current within the evolving seaway between Australia and Antarctica. As the condensed section in Jerboa-1 contains early Oligocene faunas, there is a high probability that the intermediate and deep pelagic successions will together contain a more expanded record of this critically important time of Antarctic ice cap evolution and Southern Ocean paleoceanographic development.

Additional Objective:

- to determine depositional and diagenetic facies in mid-upper slope and continental rise settings.
- to recover a Cretaceous and condensed Cenozoic section recording the history of CCD fluctuations and a partial history of deep water mass variations during evolution of the Southern Ocean

Note: because this is essentially a starved margin, there are unlikely to be major sediment gravity flow components at any of these sites.

SITE GAB-13B


127°E
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Site GAB-09A
Site GAB-06B
Site GAB-08A
Site GAB-07A
Site GAB-05B
Site GAB-04B
Site GAB-03B
Eyre
Terrace
Jerboa-1
Site GAB-02B
Site GAB-01C
Site GAB-13B

Revised October 1992

SAFETY CHECK SHEET
JOIDES POLLUTION PREVENTION AND SAFETY PANEL

1) Basic site information.

Leg: **182**	*Site designation:* **GAB-13B**	*Latitude:* **34°45.4940'S**	*Longitude:* **127°35.4358'E**
Water Depth: **4465 m**	*Distance from land:* **150.4 n. mi.**	*Jurisdiction:* **Australia**	
General location or geomorphic province: **Eucla Basin; western Great Australian Bight**			
Probable thickness of sediments: **>3.5 km**	*Proposed total penetration:* **985 m**		

2) Upon what geophysical and/or geological data was this site selection made?

Multichannel Seismic lines: **AGSO (1996) 169/08 (SP 3987.59) and 169/09I (SP 3457.57)**
Single Channel Seismic lines: **Nil**
DSDP/ODP holes: **Nil**
Piston cores: **Gravity core 173/GC21 (2.88 m) nearby**
Other:

3) What is your proposed drilling program?

Triple APC; XCB; RCB; no re-entry system required.

4) What is your proposed logging program?

Triple Combo; FMS/Sonic; WST; GHMT, Geochem.

5) From previous DSDP/ODP drilling in this area, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock:

No relevant DSDP/ODP drilling in the area.

6) From available information, list all commercial drilling in this area that produced or yielded significant shows. Give depths and ages of hydrocarbon-bearing deposits:

No relevant commercial drilling in the area.

7) Is there any indication of gas hydrates at this location?

No indication of gas hydrates; no BSR present.

8) Is there any reason to expect any hydrocarbon accumulation at this site? Please comment.

No hydrocarbon accumulation expected.

9) What "special" precautions will be taken during drilling?

Standard hydrocarbon monitoring.

10) What abandonment procedures do you plan to follow?

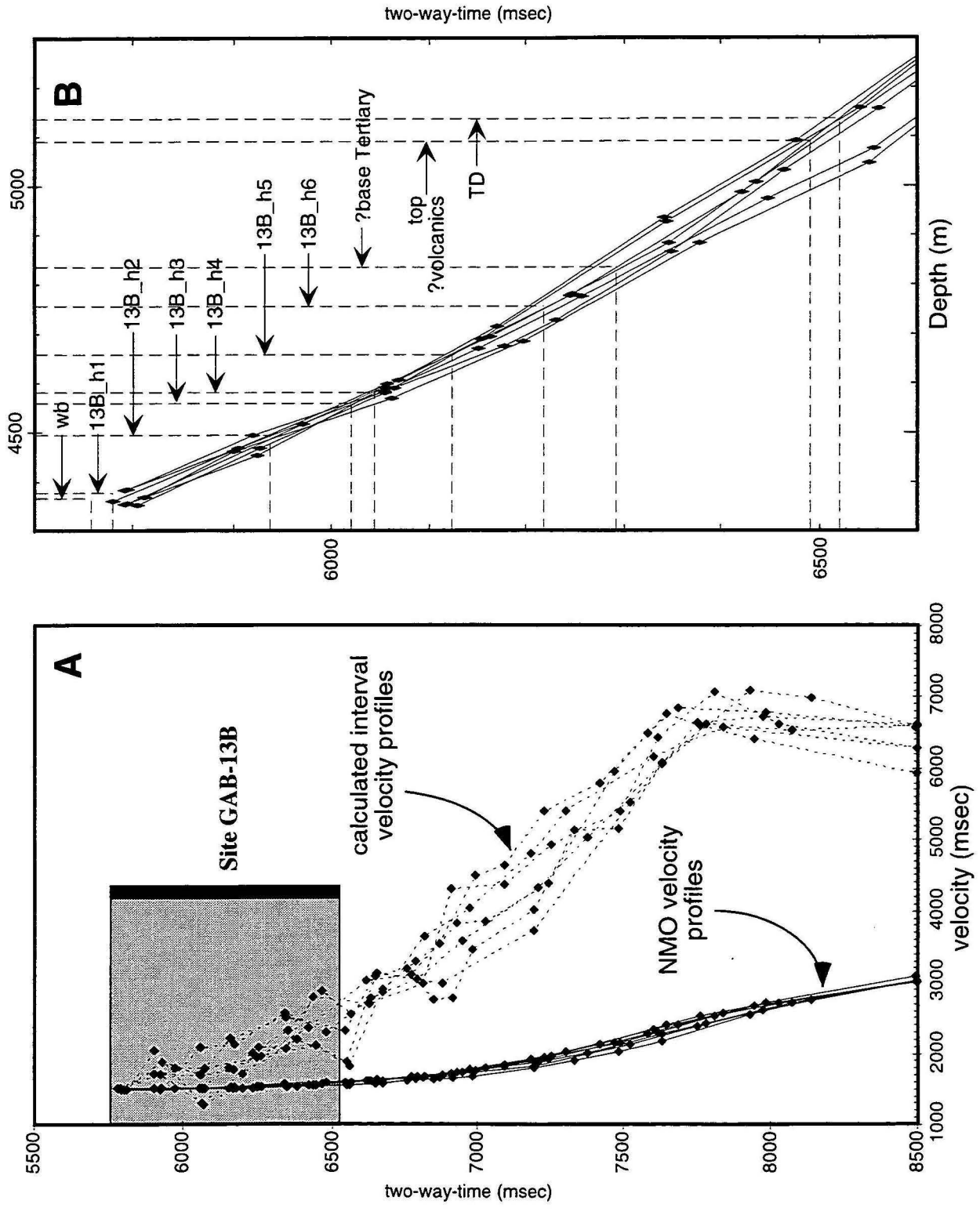
Standard abandonment procedures.

Summary: *What do you consider to be the major risks in drilling at this site?*

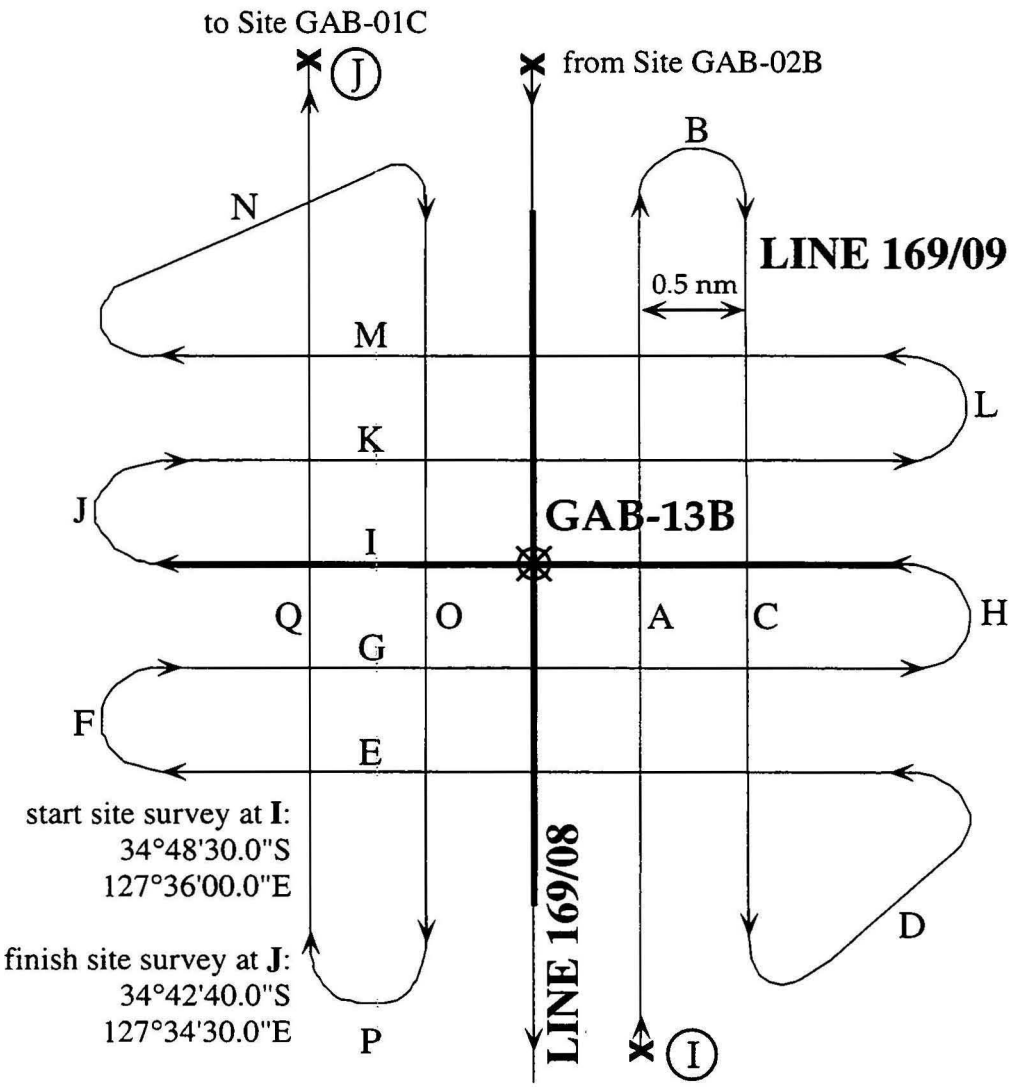
No significant drilling risks are anticipated at this site.

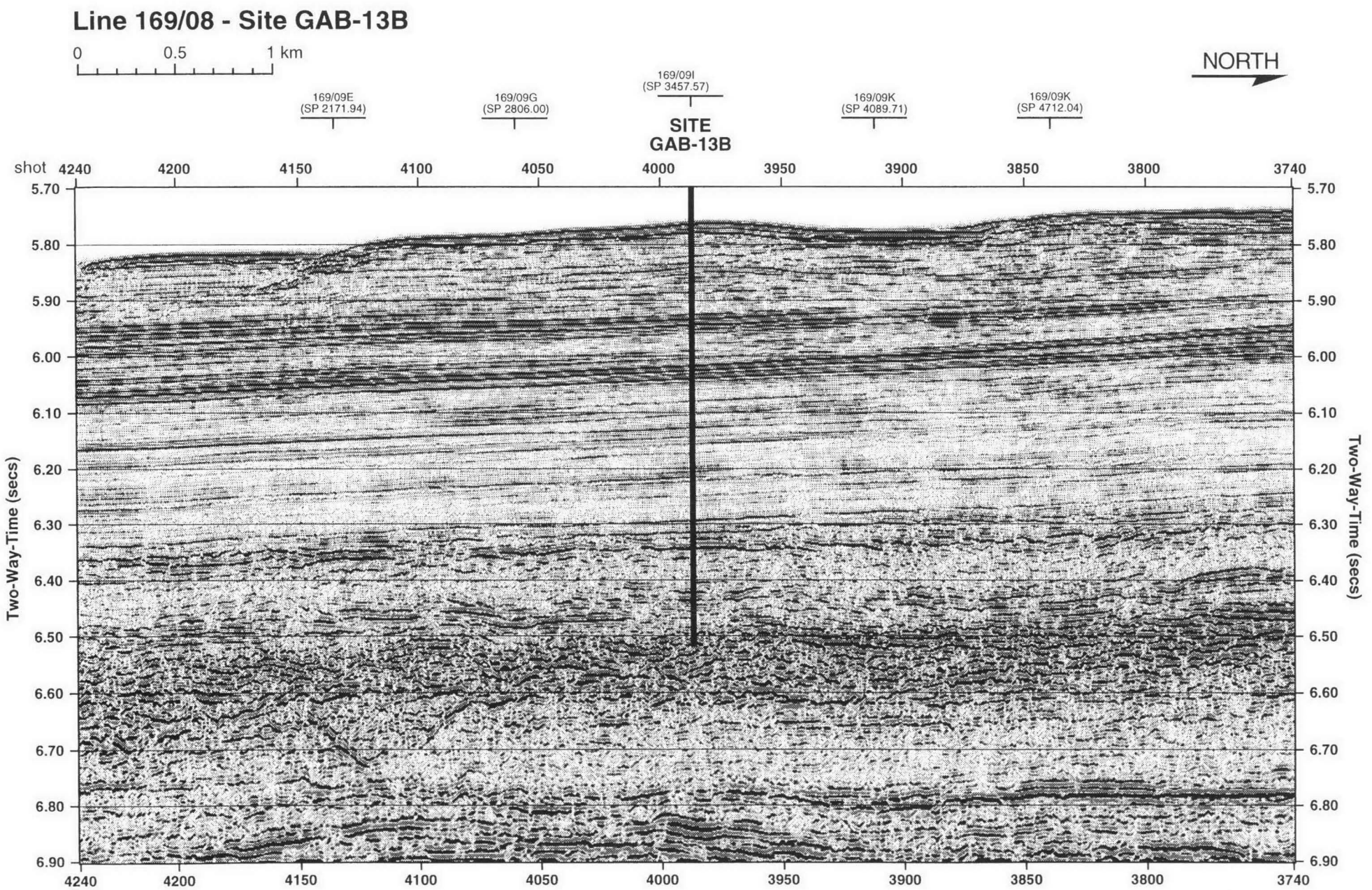
Velocity Calculations: Site GAB-13B

Velocity analysis for site GAB-13B, from seismic lines 169/08 and 169/09. The six closest NMO (stacking) velocities to the site have been used to derive interval velocity profiles (A) and time-depth curves (B). Approximate depths to horizons shown on seismic sections presented on the following pages can then be derived from these time-depth curves.



AGSO Survey 169 (February 1996) track map - Site GAB-13B




Line 169/08 - Site GAB-13B
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1 km
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169/09E
(SP 2171.94)
169/09G
(SP 2806.00)
169/09I
(SP 3457.57)
SITE
GAB-13B
169/09K
(SP 4089.71)
169/09K
(SP 4712.04)
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4200
4150
4100
4050
4000
3950
3900
3850
3800
3740
5.70
5.80
5.90
6.00
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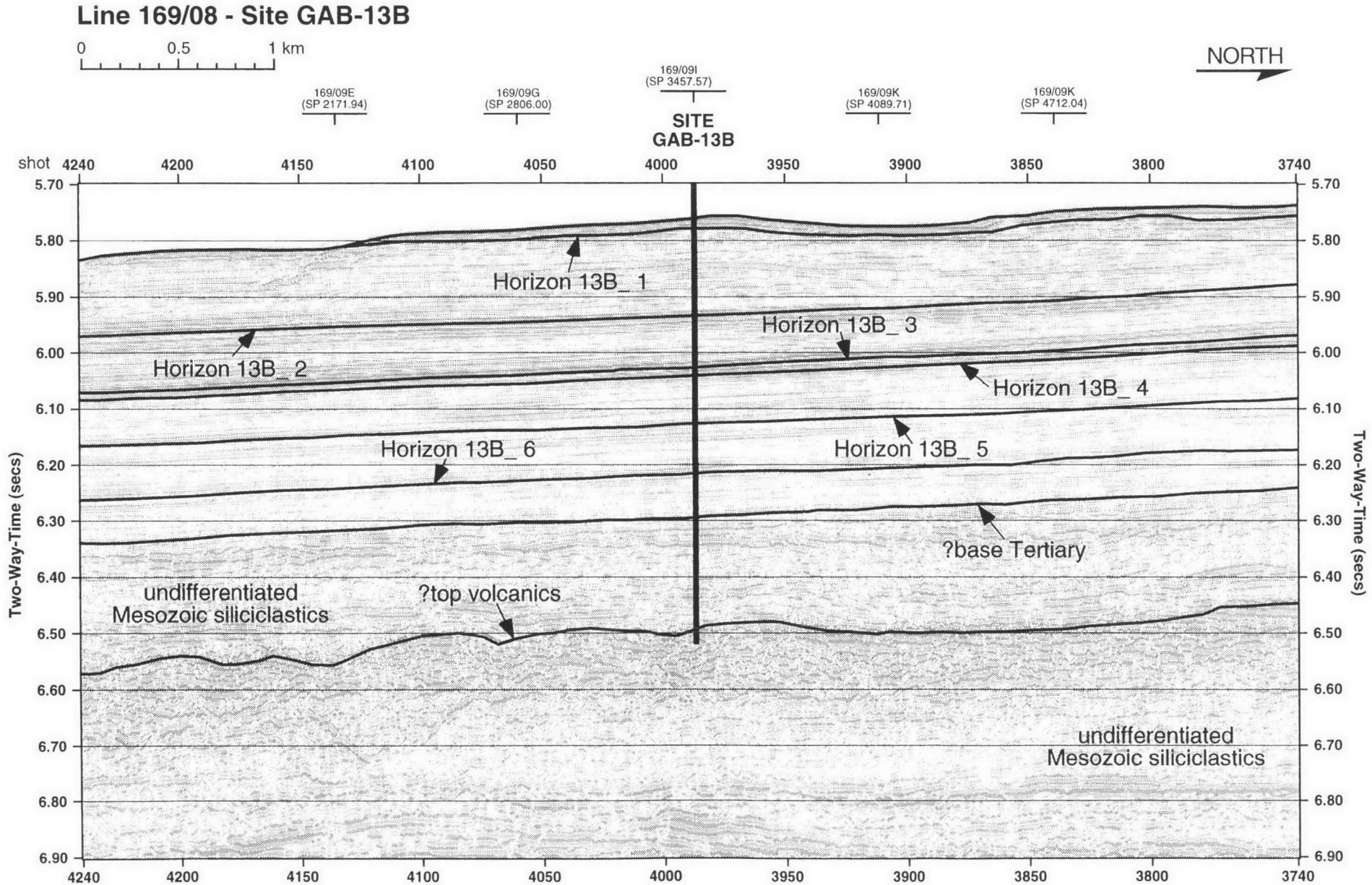
Two-Way-Time (secs)


Line 169/08 - Site GAB-13B
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Two-Way-Time (secs)
Horizon 13B_ 1
Horizon 13B_ 2
Horizon 13B_ 3
Horizon 13B_ 4
Horizon 13B_ 5
Horizon 13B_ 6
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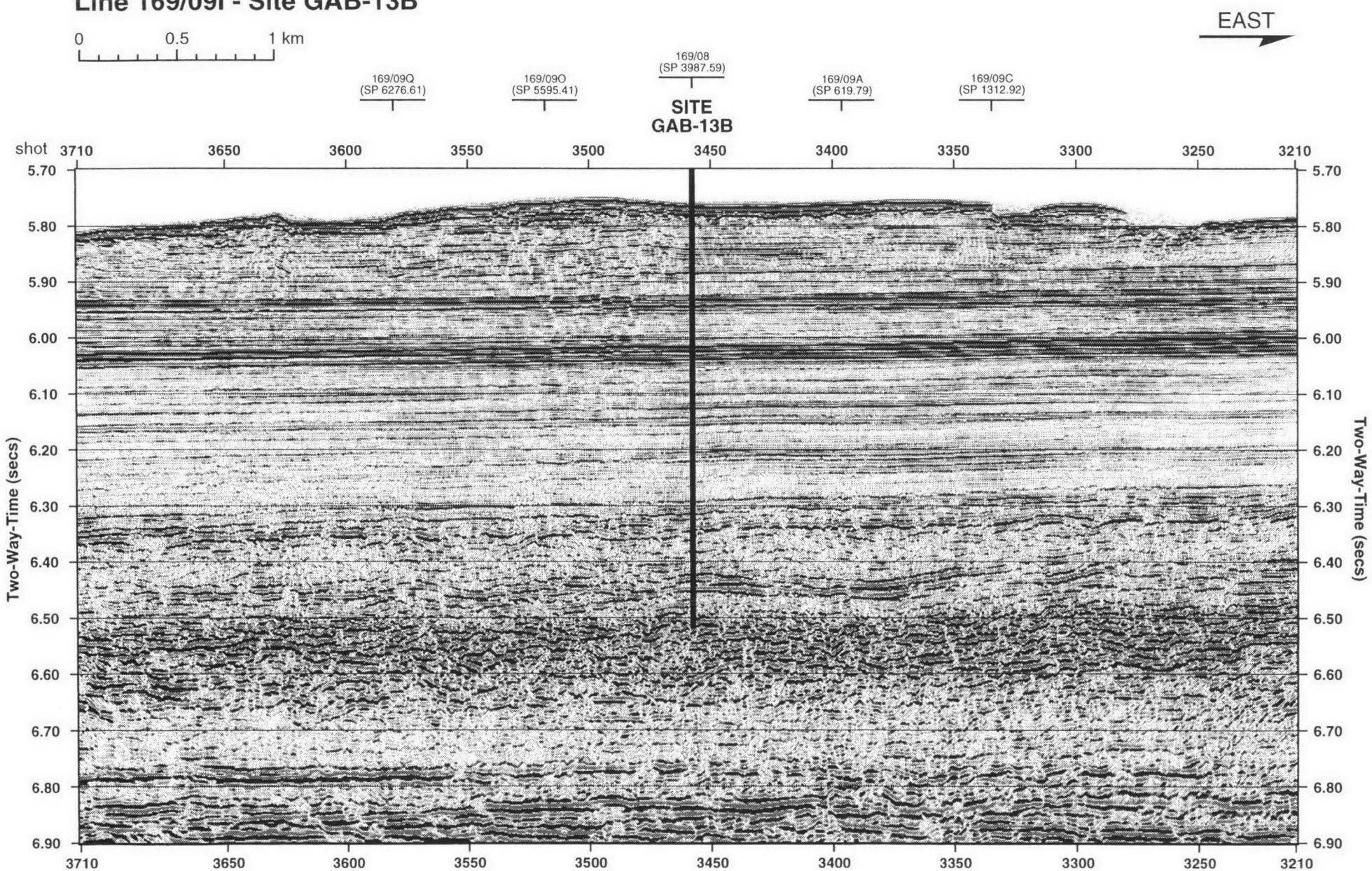
Mesozoic siliciclastics
?top volcanics
undifferentiated
Mesozoic siliciclastics


Line 169/09I - Site GAB-13B
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1 km
EAST
169/09Q
(SP 6276.61)
169/09O
(SP 5595.41)
169/08
(SP 3987.59)
SITE
GAB-13B
169/09A
(SP 619.79)
169/09C
(SP 1312.92)
shot
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3550
3500
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3400
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3300
3250
3210
5.70
5.80
5.90
6.00
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6.40
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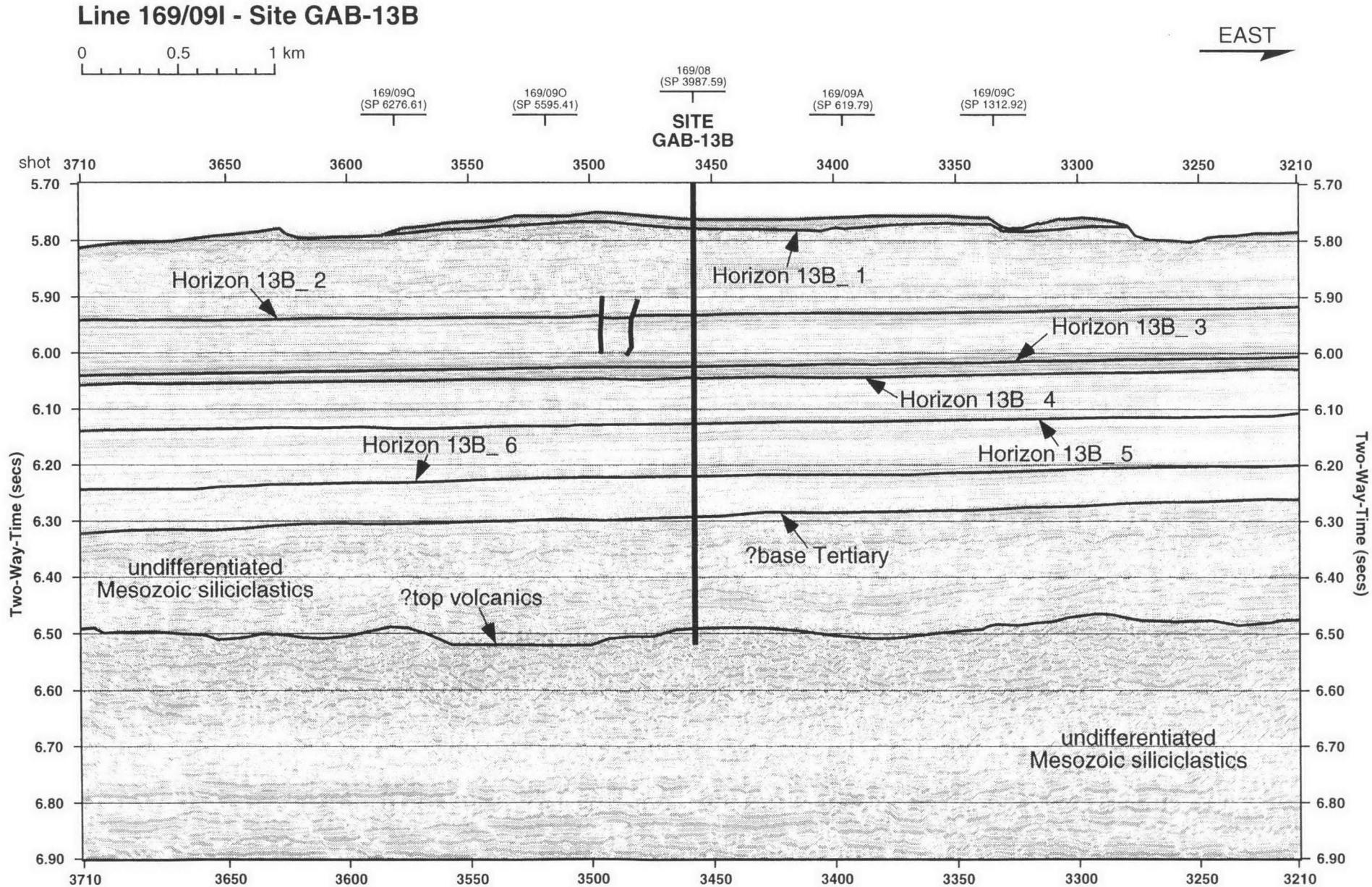
6.70
6.80
6.90
Two-Way-Time (secs)


Line 169/09I - Site GAB-13B
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1 km
EAST
169/09Q
(SP 6276.61)
169/09O
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GAB-13B
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shot
3710
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6.90
Two-Way-Time (secs)
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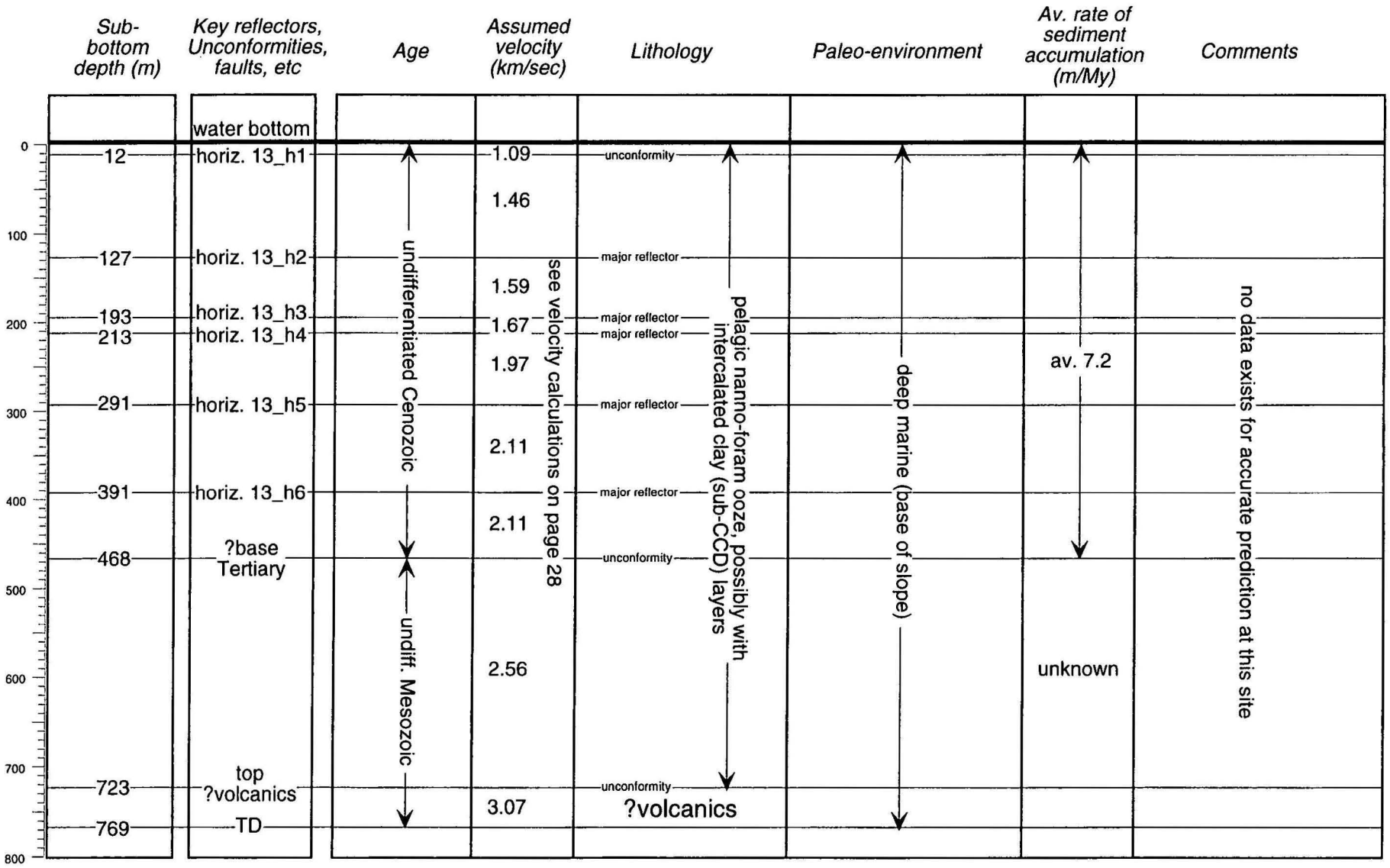
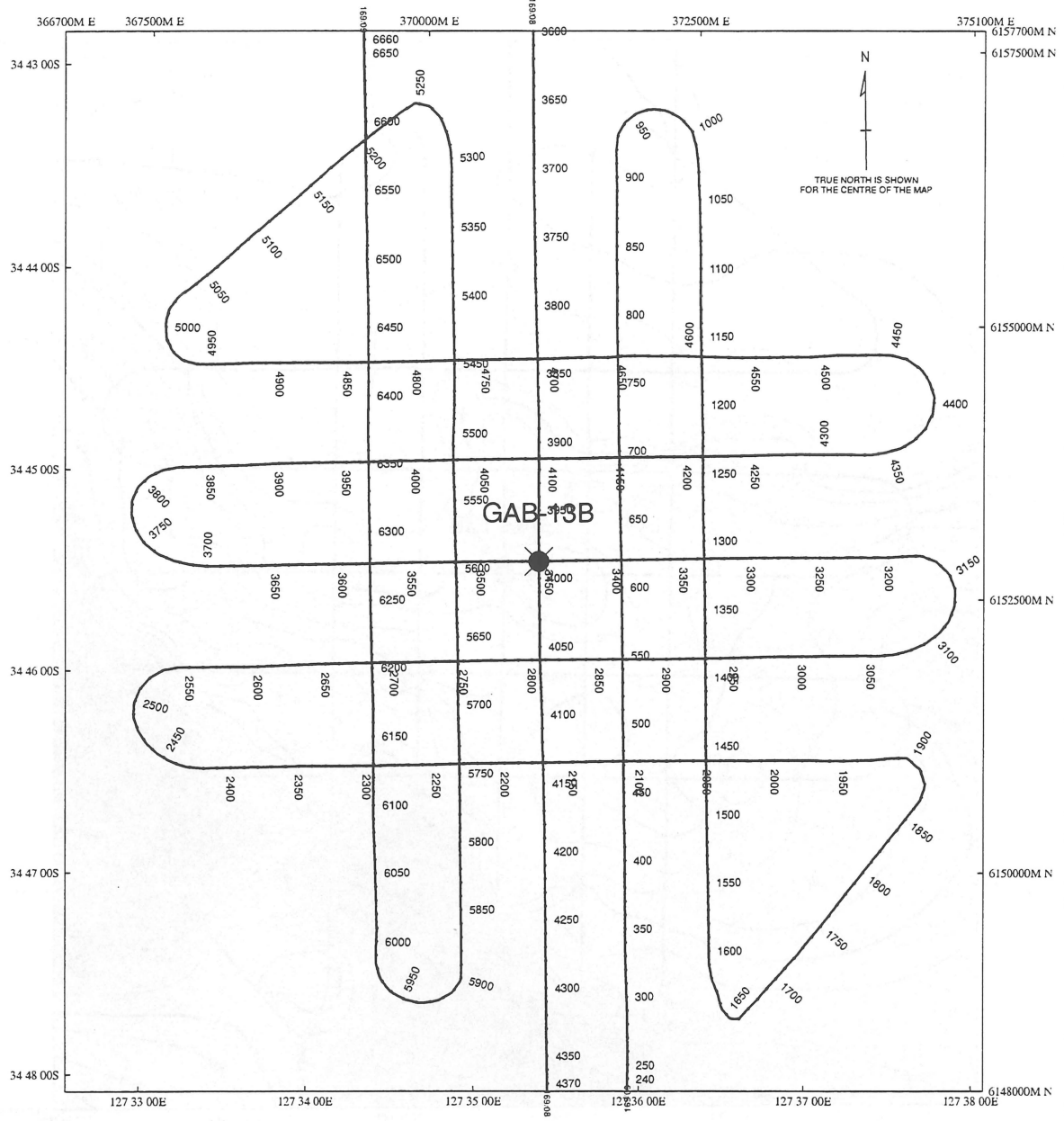
Horizon 13B_ 1
Horizon 13B_ 3
Horizon 13B_ 4
Horizon 13B_ 5
Horizon 13B_ 6
?base Tertiary
undifferentiated
Mesozoic siliciclastics
?top volcanics
undifferentiated
Mesozoic siliciclastics

GRAPHIC SUMMARY, SITE GAB-13B



EUCLA BASIN: ODP Site GAB-13B



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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

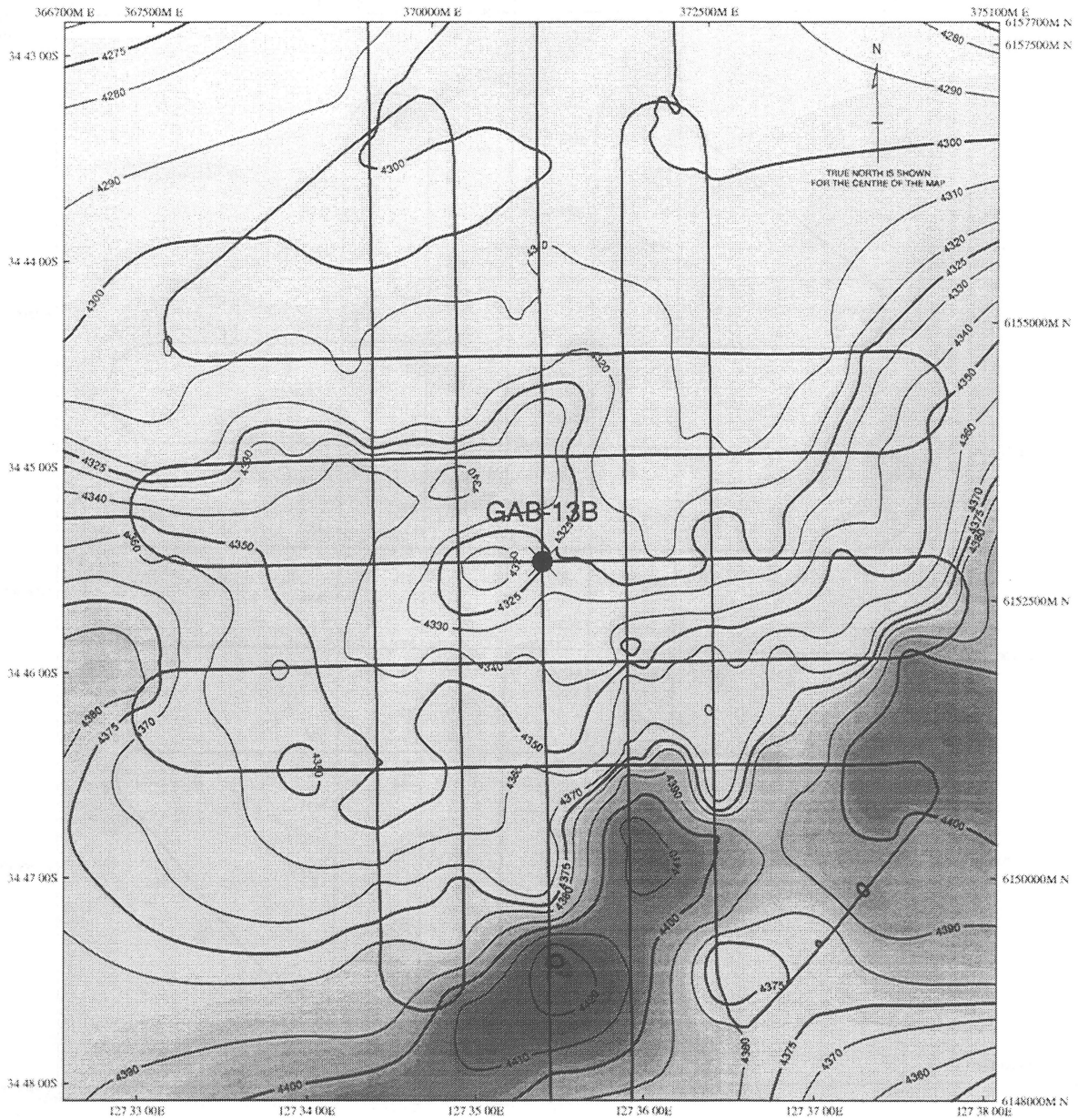
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

SHOT POINT MAP

David A. Feary

EUCLA BASIN: ODP Site GAB-13B



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CENTRAL MERIDIAN 129 00 00E

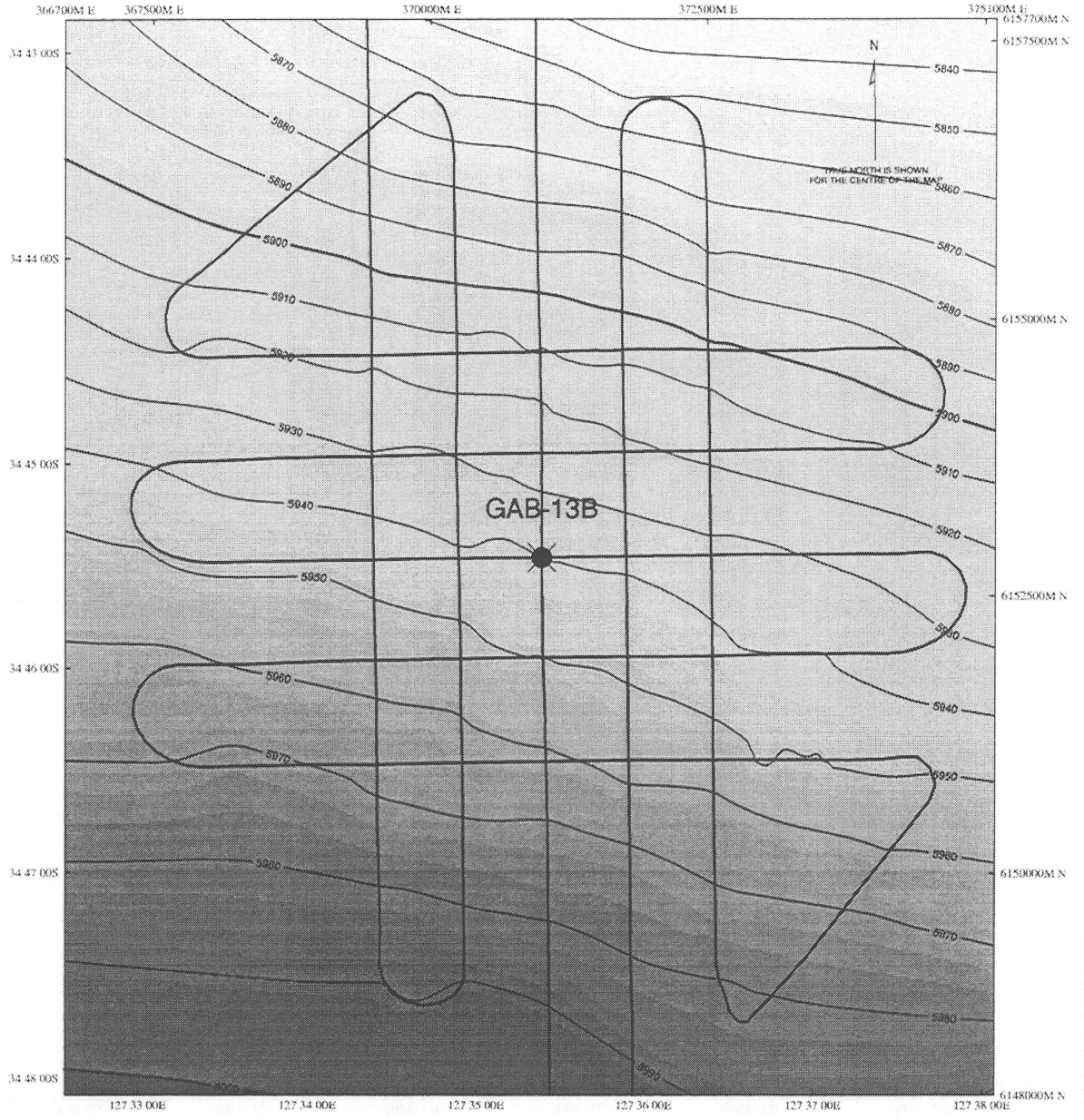
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

BATHYMETRY
(10 m contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-13B



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

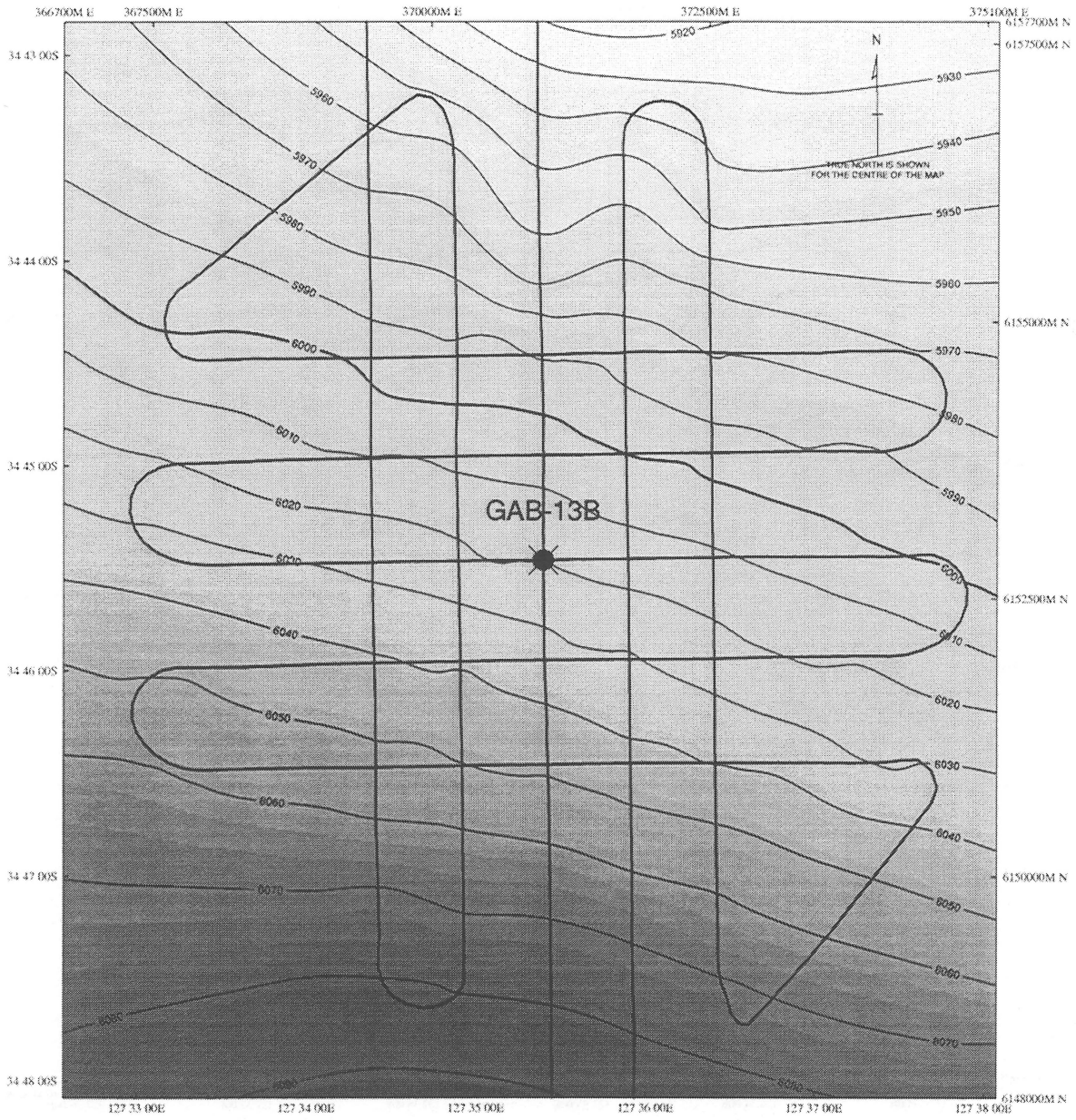
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO HORIZON 13_2
(10 msecs contour interval)

		David A. Feary

EUCLA BASIN: ODP Site GAB-13B



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Eucla Basin - ODP Leg 182		
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)		
TWT TO HORIZON 13_3 (10 msec contour interval)		
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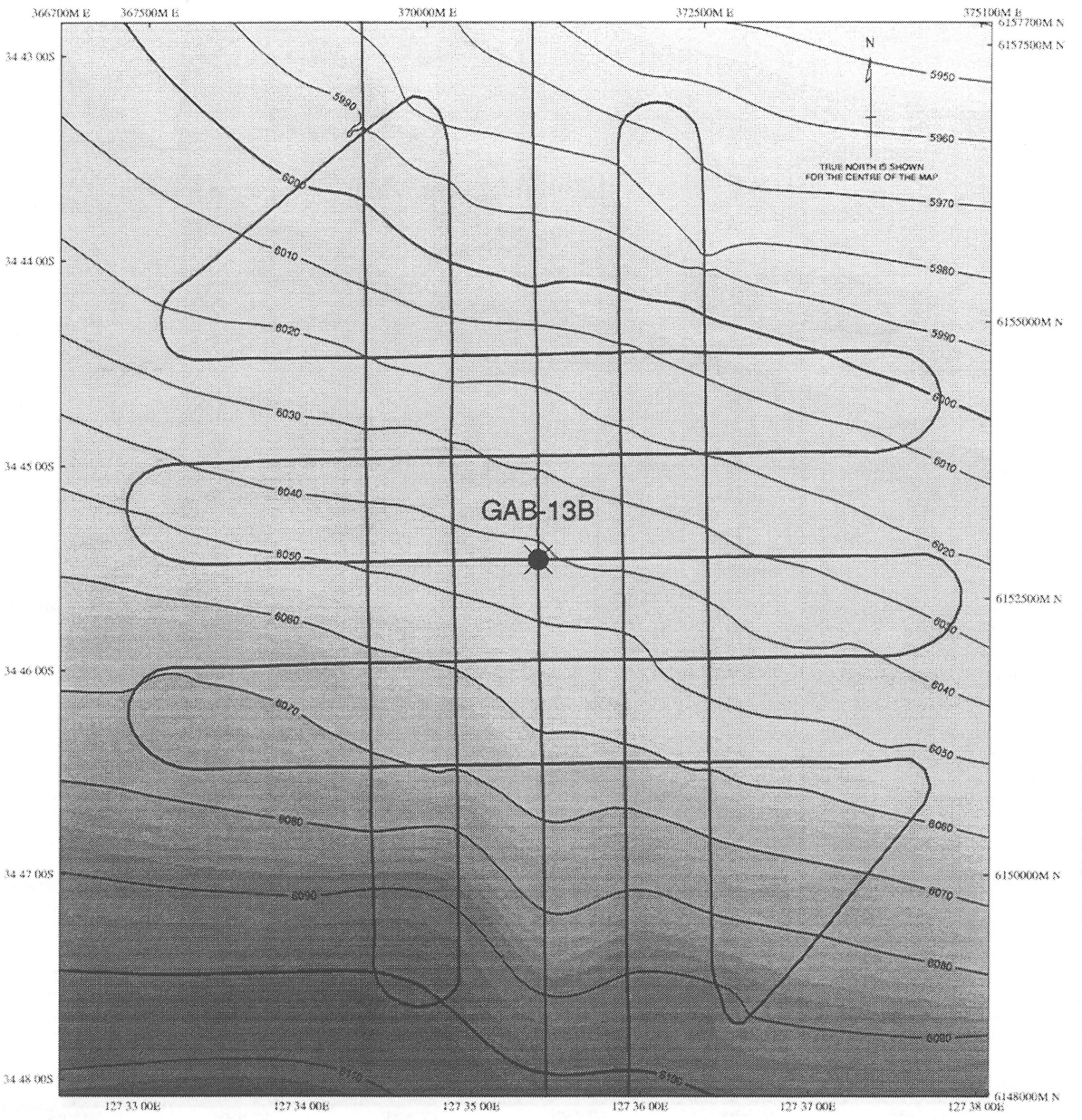
EUCLA BASIN: ODP Site GAB-13B



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

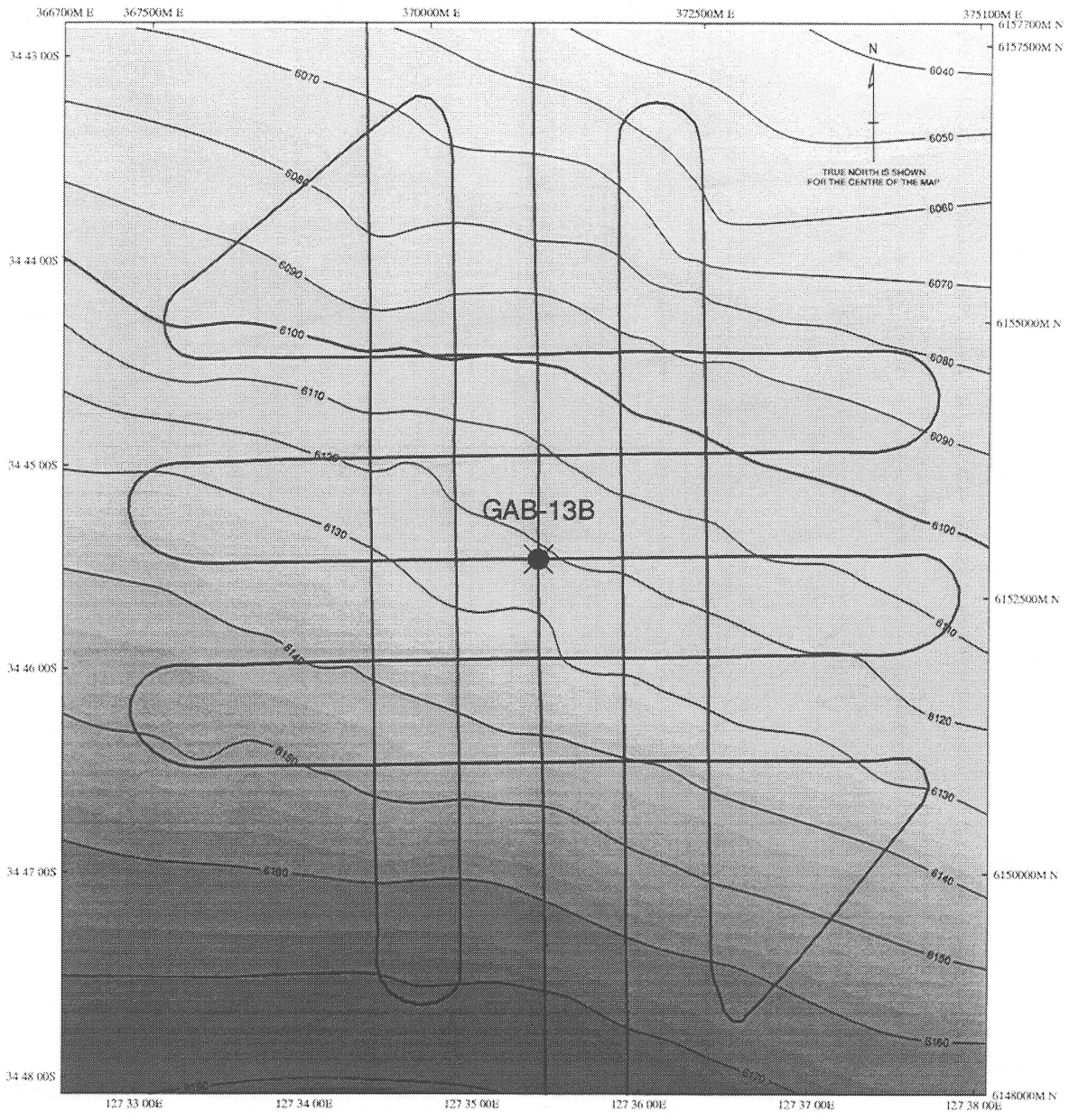
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO HORIZON 13_4
(10 msec contour interval)

		David A. Feary

EUCLA BASIN: ODP Site GAB-13B



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182		
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)		
TWT TO HORIZON 13_5 (10 msec contour interval)		
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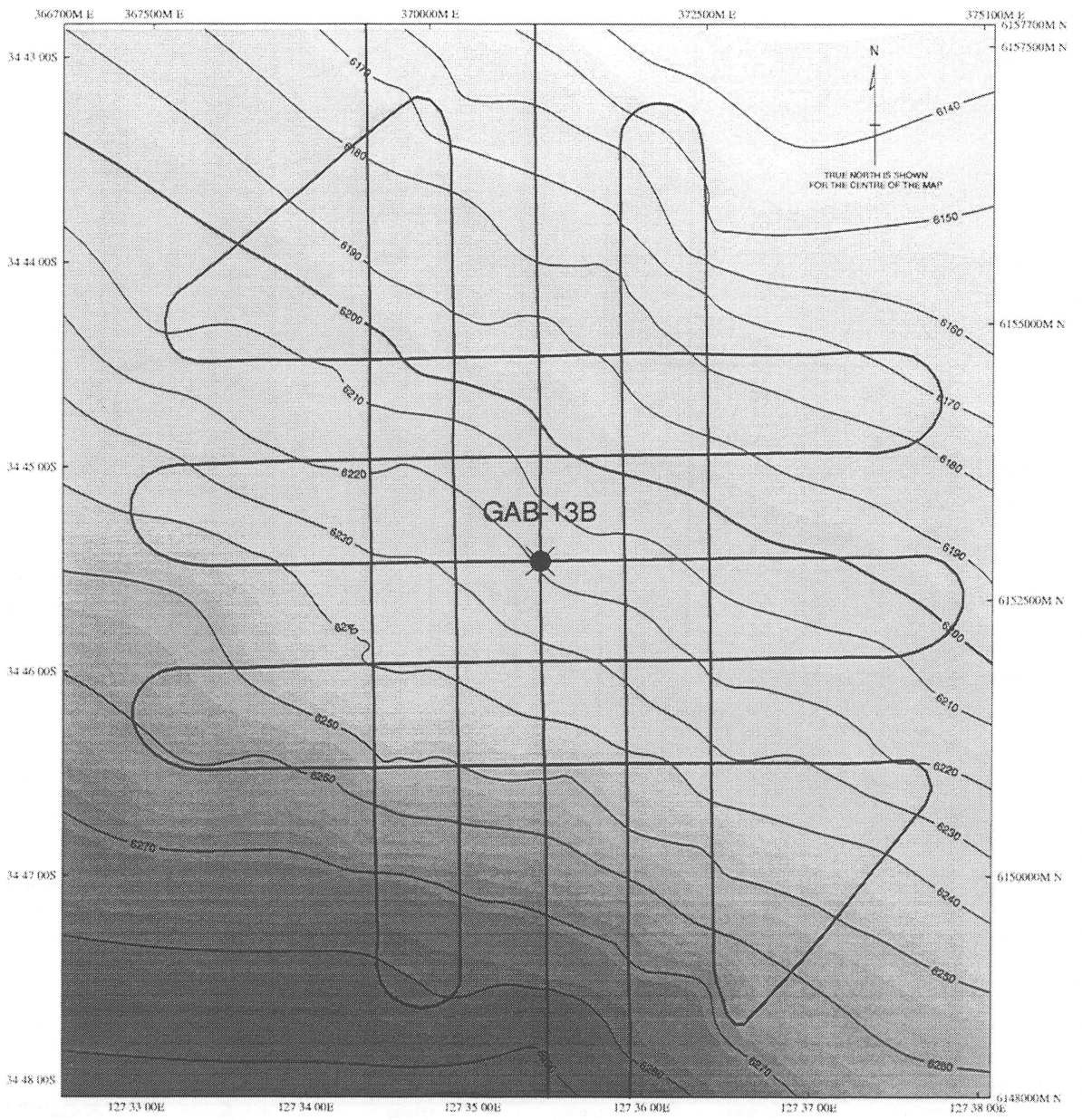

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CENTRAL MERIDIAN 129 00 00E

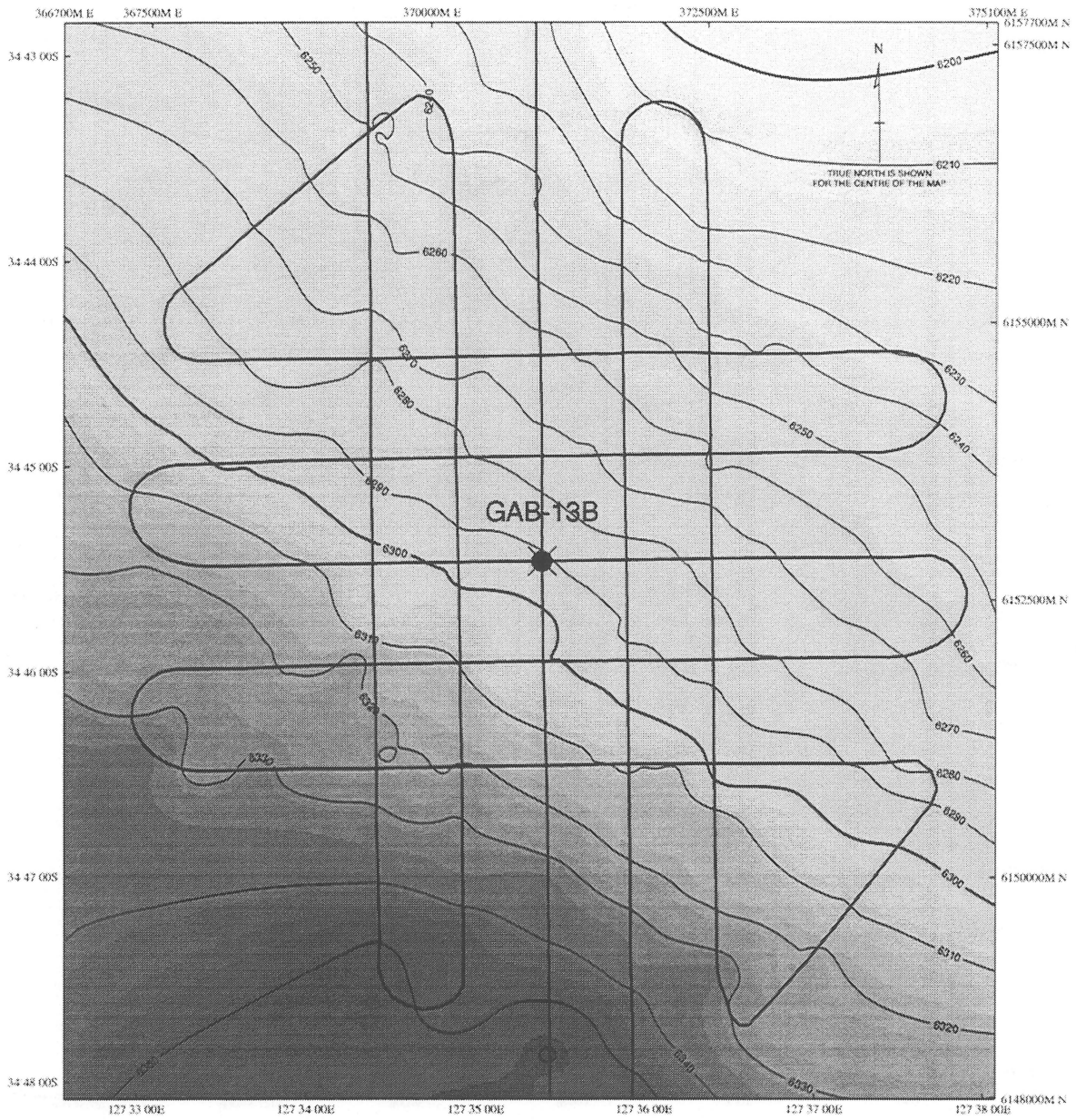
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO HORIZON 13_6
(10 msec contour interval)

David A. Foary

EUCLA BASIN: ODP Site GAB-13B



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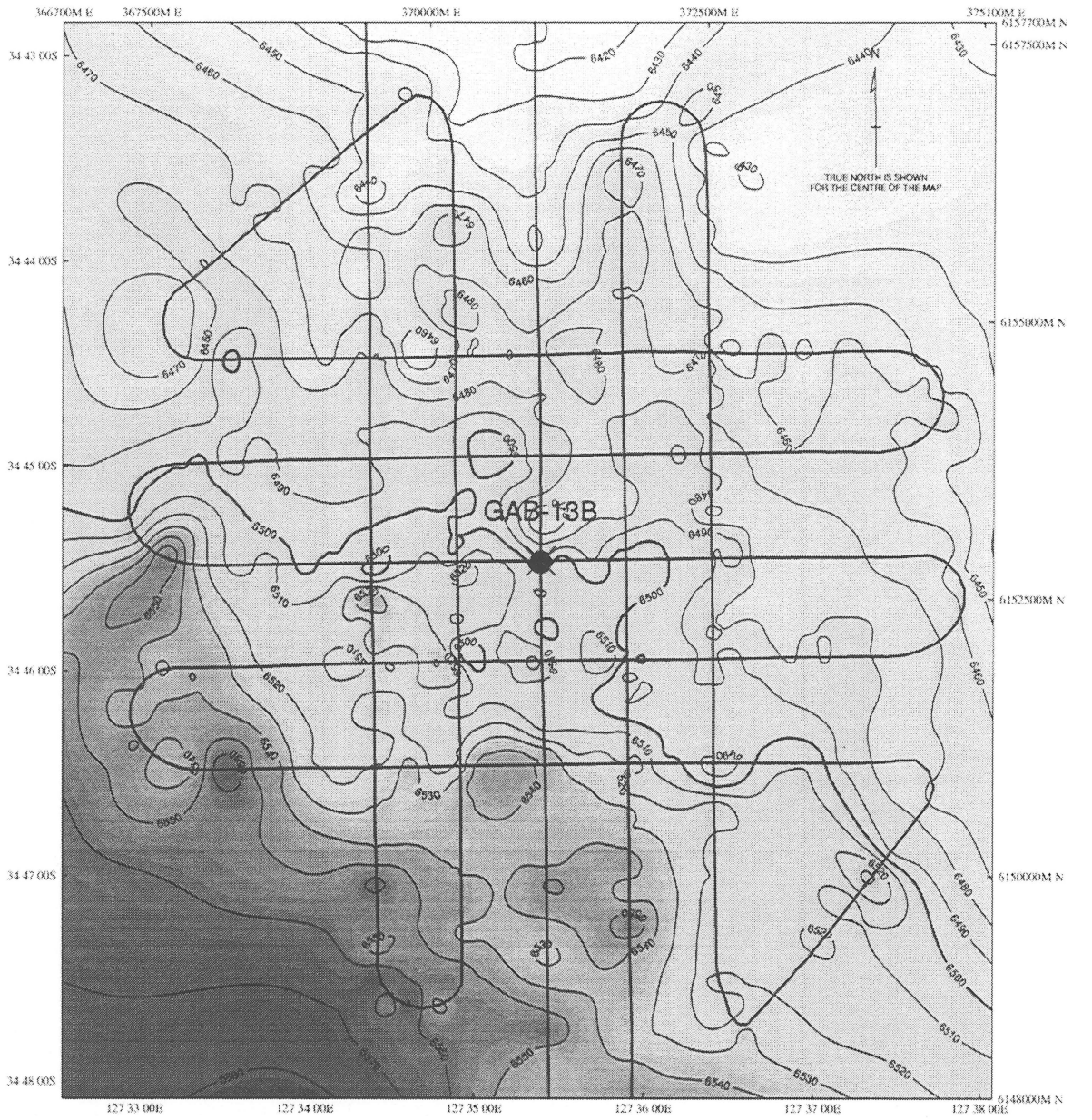
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182		
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996) TWT TO ?BASE TERTIARY (10 msec contour interval)		
		David A. Feary

EUCLA BASIN: ODP Site GAB-13B



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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

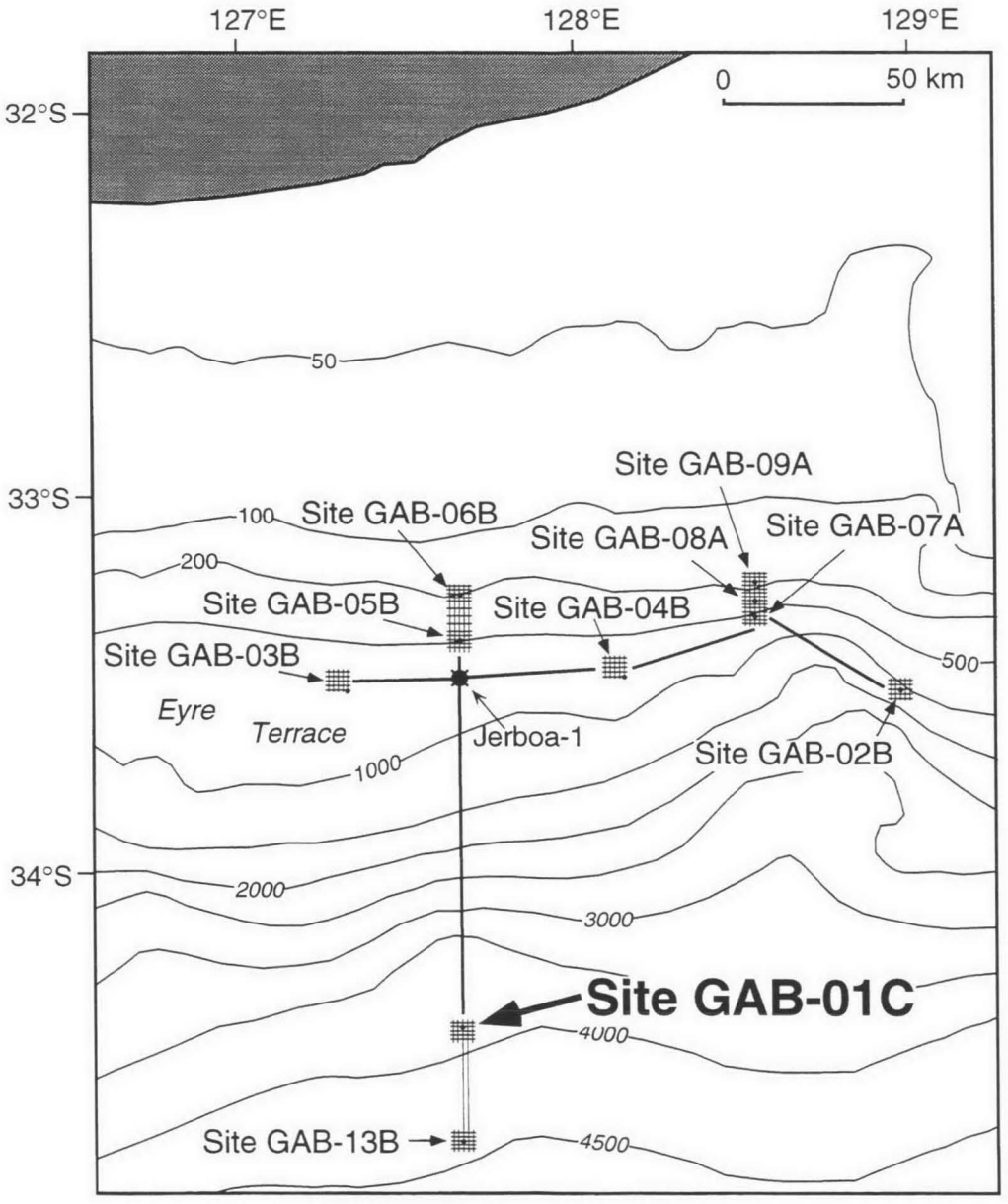
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO TOP VOLCANICS
(10 msec contour interval)

		David A. Feary

SITE GAB-01C


127°E
128°E
129°E
0
50 km
32°S
33°S
34°S
50
100
200
500
1000
2000
3000
4000
4500
Site GAB-09A
Site GAB-06B
Site GAB-08A
Site GAB-07A
Site GAB-05B
Site GAB-04B
Site GAB-03B
Eyre
Terrace
Jerboa-1
Site GAB-02B
Site GAB-01C
Site GAB-13B

Revised October 1992

SAFETY CHECK SHEET
JOIDES POLLUTION PREVENTION AND SAFETY PANEL

1) Basic site information.

Leg: **182**	*Site designation:* **GAB-01C**	*Latitude:* **34°23.4672'S**	*Longitude:* **127°35.4393'E**
Water Depth: **3884 m**	*Distance from land:* **128.5 n. mi.**	*Jurisdiction:* **Australia**	
General location or geomorphic province: **Eucla Basin; western Great Australian Bight**			
Probable thickness of sediments: **≈5950 m**		*Proposed total penetration:* **615 m**	

2) Upon what geophysical and/or geological data was this site selection made?

Multichannel Seismic lines: **AGSO (1996) 169/08 (SP 729.48) and 169/11E (SP 1962.52)**
Single Channel Seismic lines: **Nil**
DSDP/ODP holes: **Nil**
Piston cores: **Gravity cores 173/GC22 (1.89 m) and 173/GC23 (2.62 m) nearby**
Other: **Also on JNOC (1990) multichannel seismic line JA90-23 (SP 9520.13)**

3) What is your proposed drilling program?

Triple APC; XCB; RCB; no re-entry system required.

4) What is your proposed logging program?

Triple Combo; FMS/Sonic; WST; GHMT.

5) From previous DSDP/ODP drilling in this area, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock:

No relevant DSDP/ODP drilling in the area.

6) From available information, list all commercial drilling in this area that produced or yielded significant shows. Give depths and ages of hydrocarbon-bearing deposits:

No relevant commercial drilling in the area.

7) Is there any indication of gas hydrates at this location?

No indication of gas hydrates; no BSR present.

8) Is there any reason to expect any hydrocarbon accumulation at this site? Please comment.

No hydrocarbon accumulation expected.

9) What "special" precautions will be taken during drilling?

Standard hydrocarbon monitoring.

10) What abandonment procedures do you plan to follow?

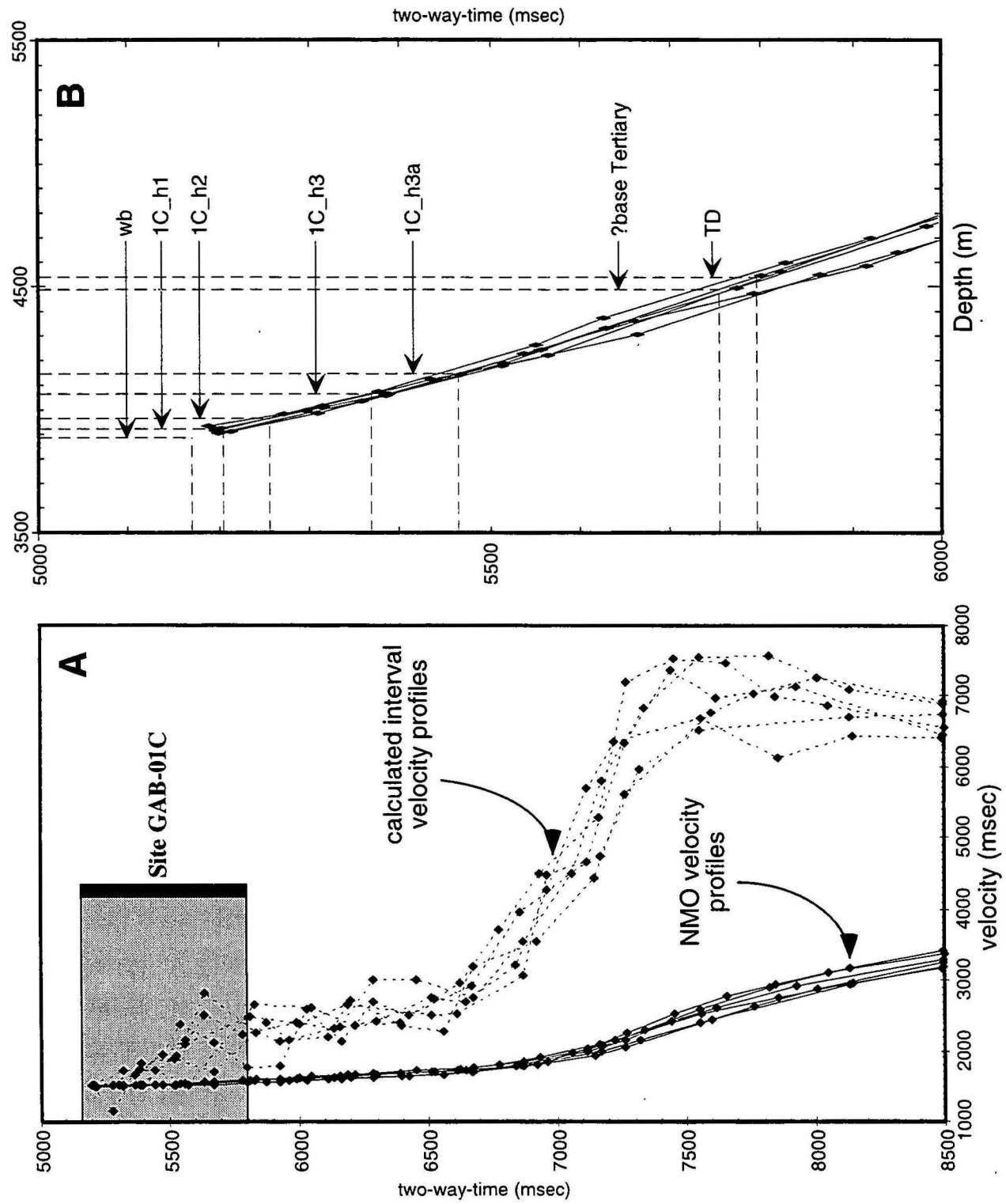
Standard abandonment procedures.

Summary: *What do you consider to be the major risks in drilling at this site?*

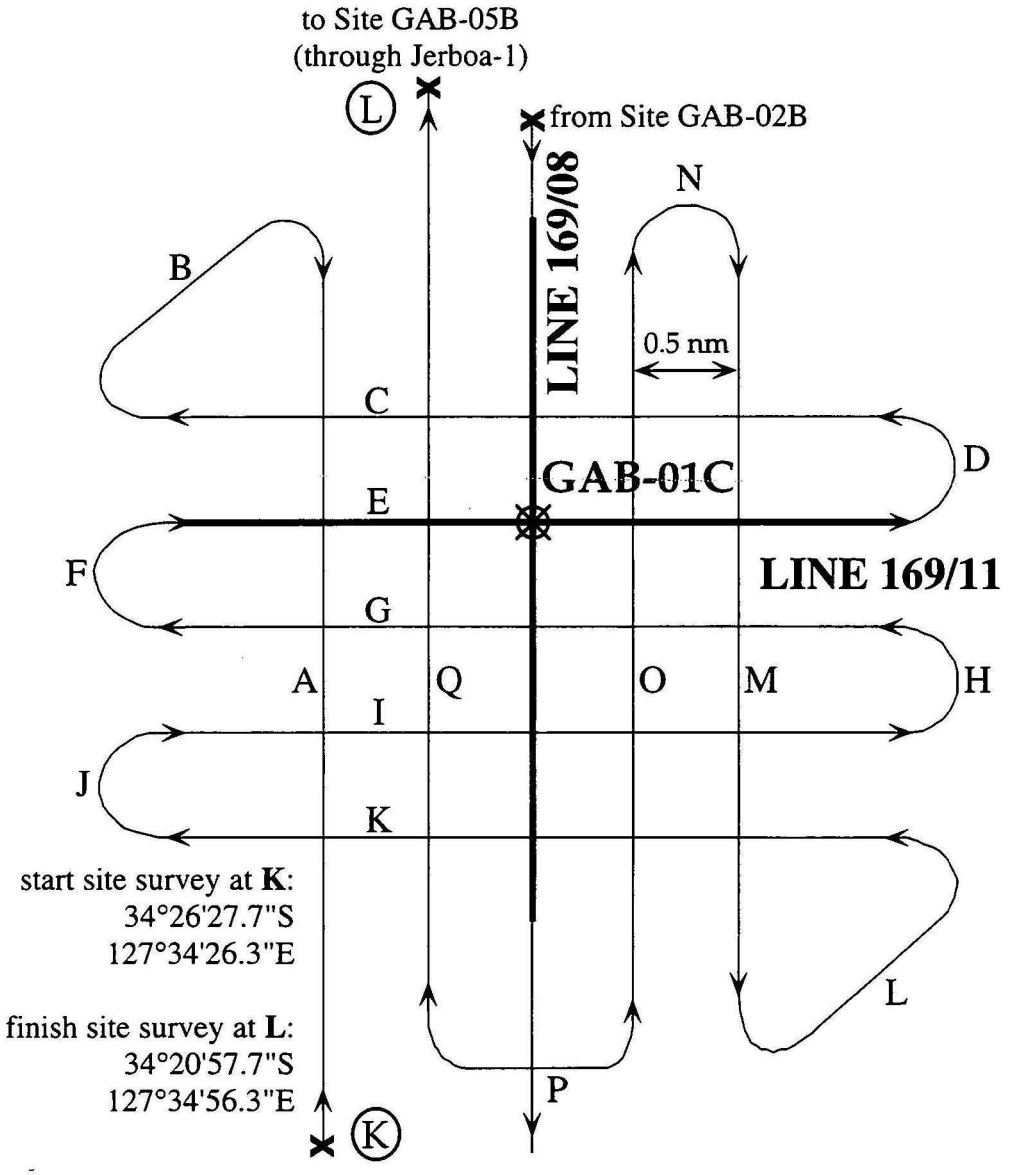
No significant drilling risks are anticipated at this site.

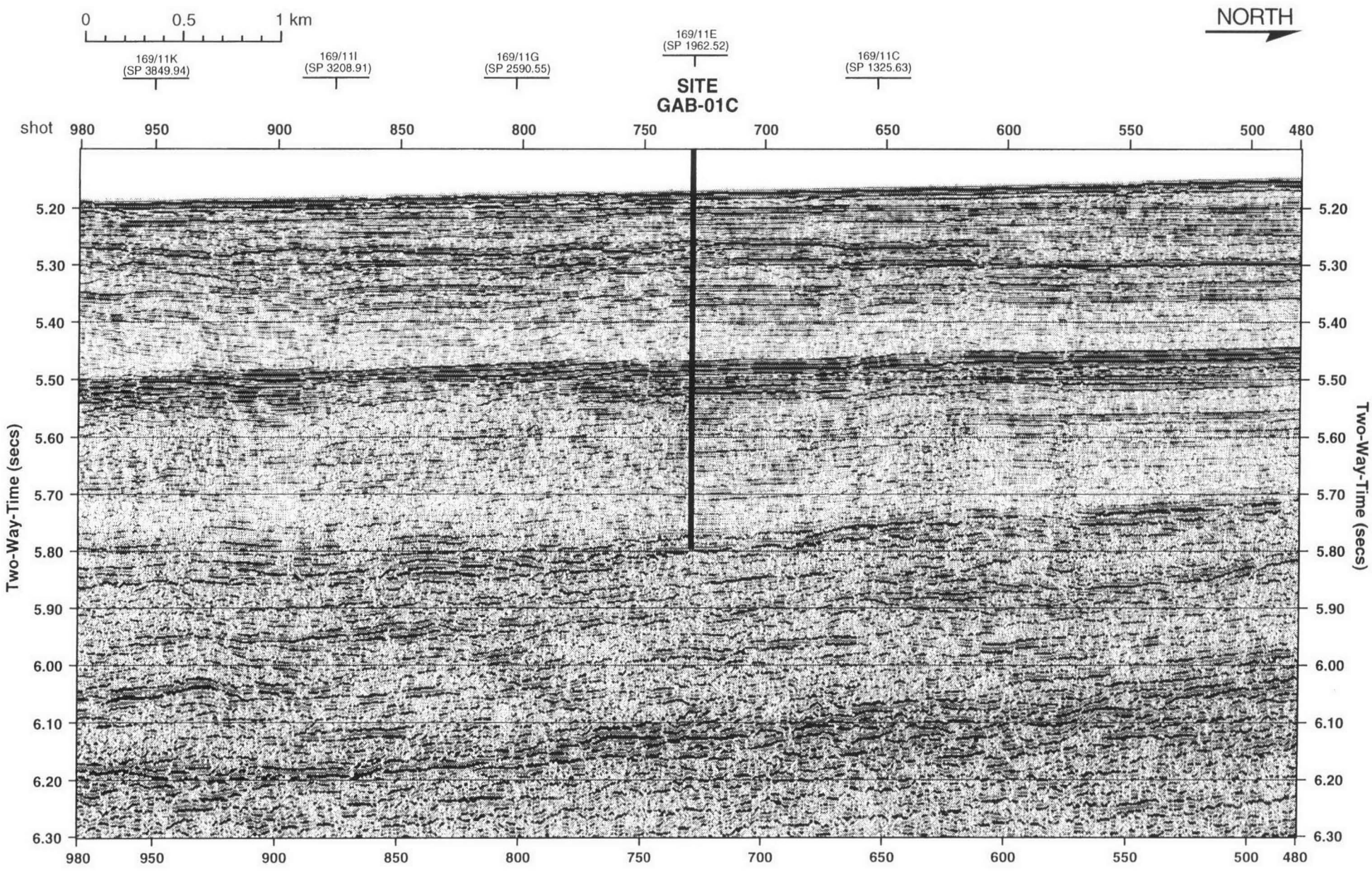
Velocity Calculations: Site GAB-01C

Velocity analysis for site GAB-01C, from seismic lines 169/08 and 169/13. The six closest NMO (stacking) velocities to the site have been used to derive interval velocity profiles (A) and time-depth curves (B). Approximate depths to horizons shown on seismic sections presented on the following pages can then be derived from these time-depth curves.

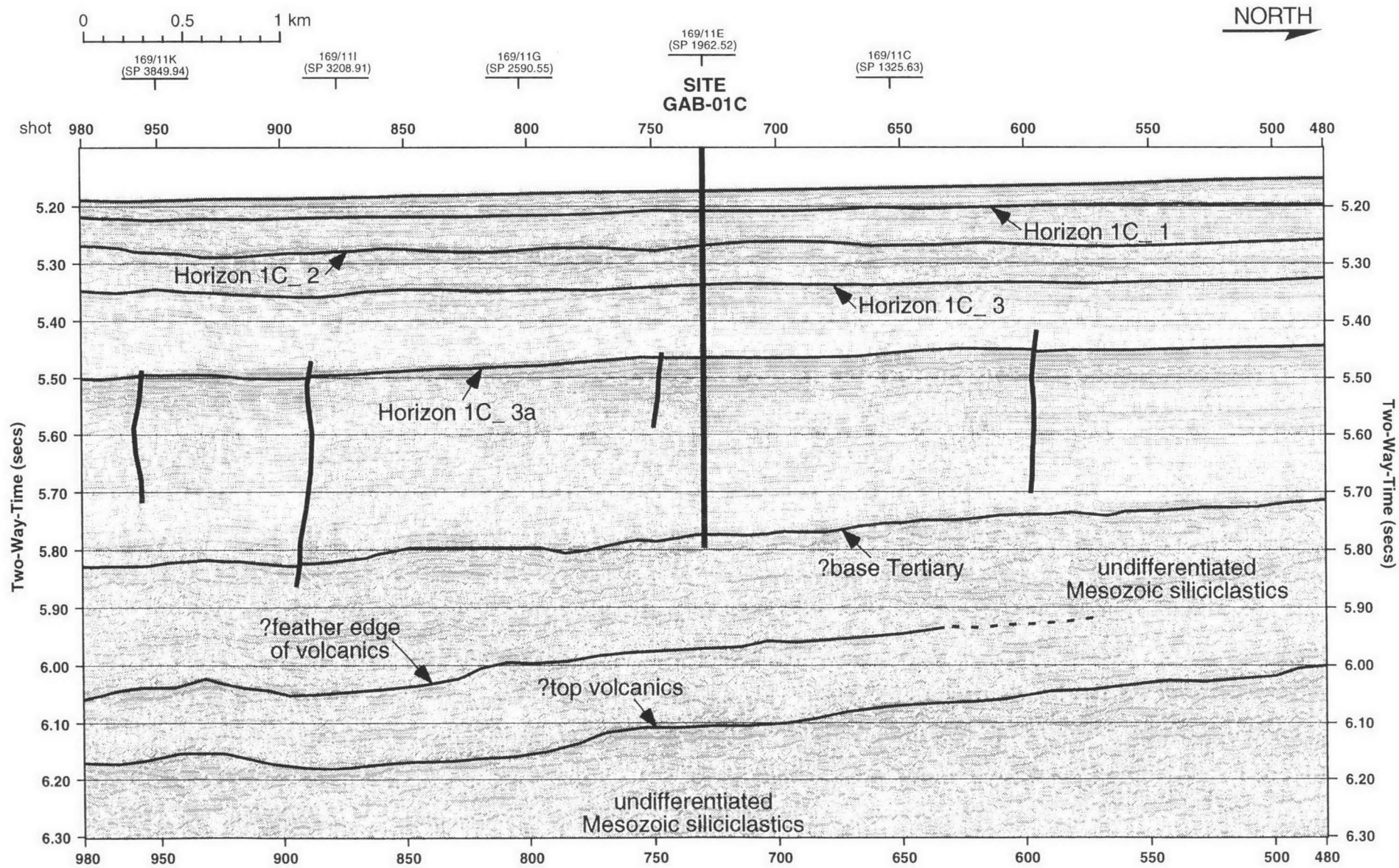


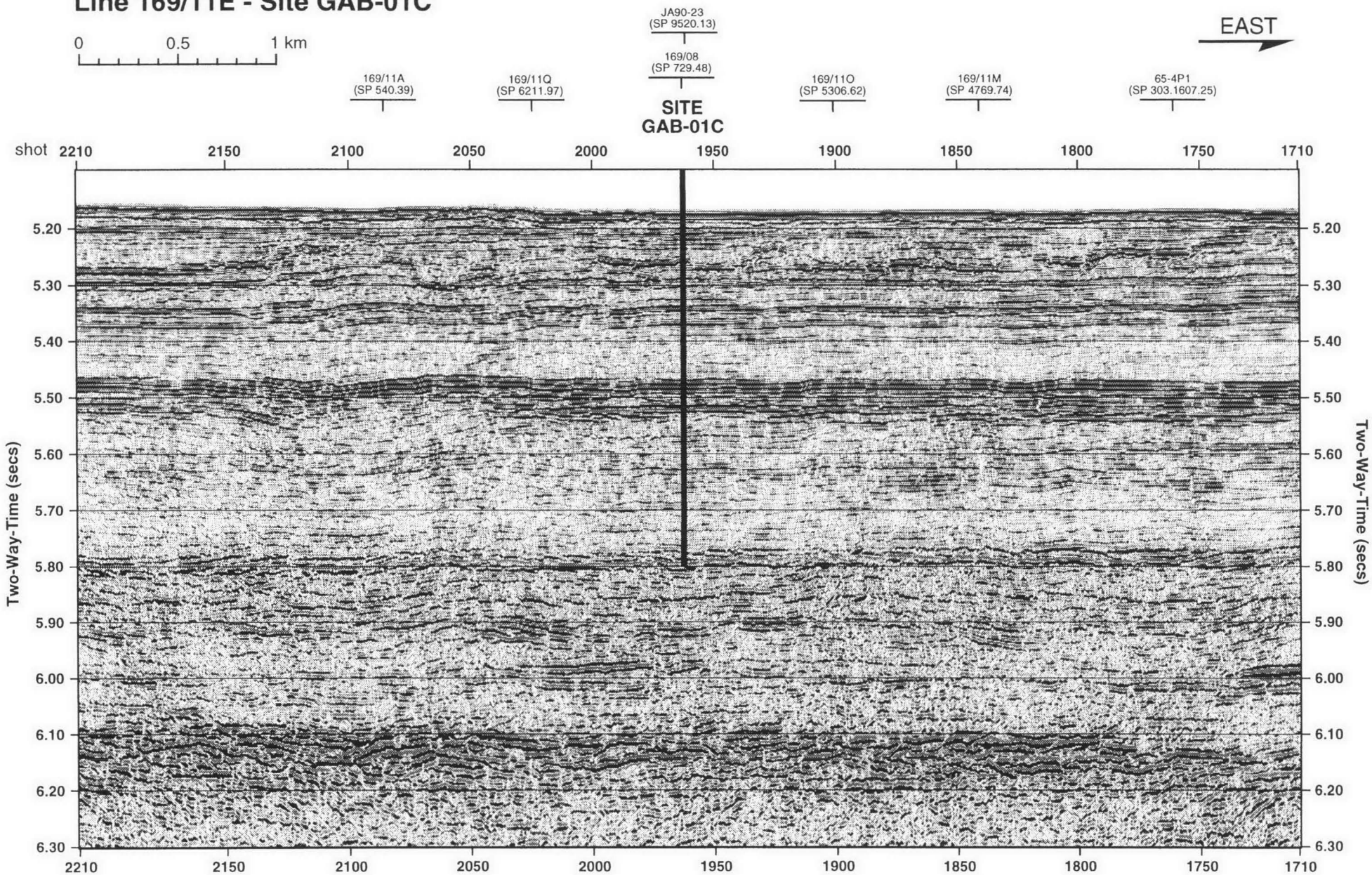
AGSO Survey 169 (February 1996) track map - Site GAB-01C

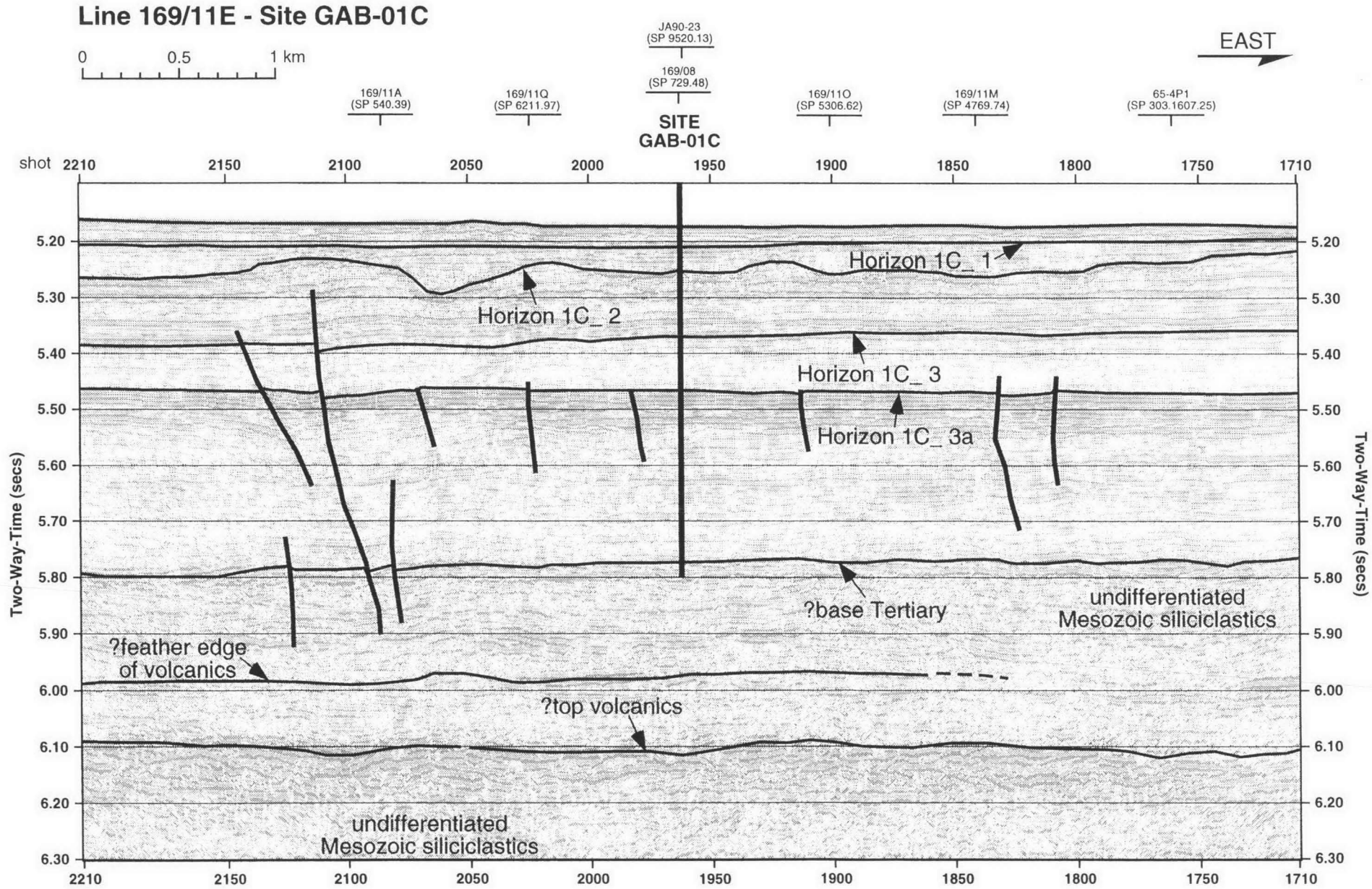



Line 169/08 - Site GAB-01C
0
0.5
1 km
NORTH
169/11K
(SP 3849.94)
169/11I
(SP 3208.91)
169/11G
(SP 2590.55)
169/11E
(SP 1962.52)
SITE
GAB-01C
169/11C
(SP 1325.63)
shot
980
950
900
850
800
750
700
650
600
550
500
480
Two-Way-Time (secs)
5.20
5.30
5.40
5.50
5.60
5.70
5.80
5.90
6.00
6.10
6.20
6.30

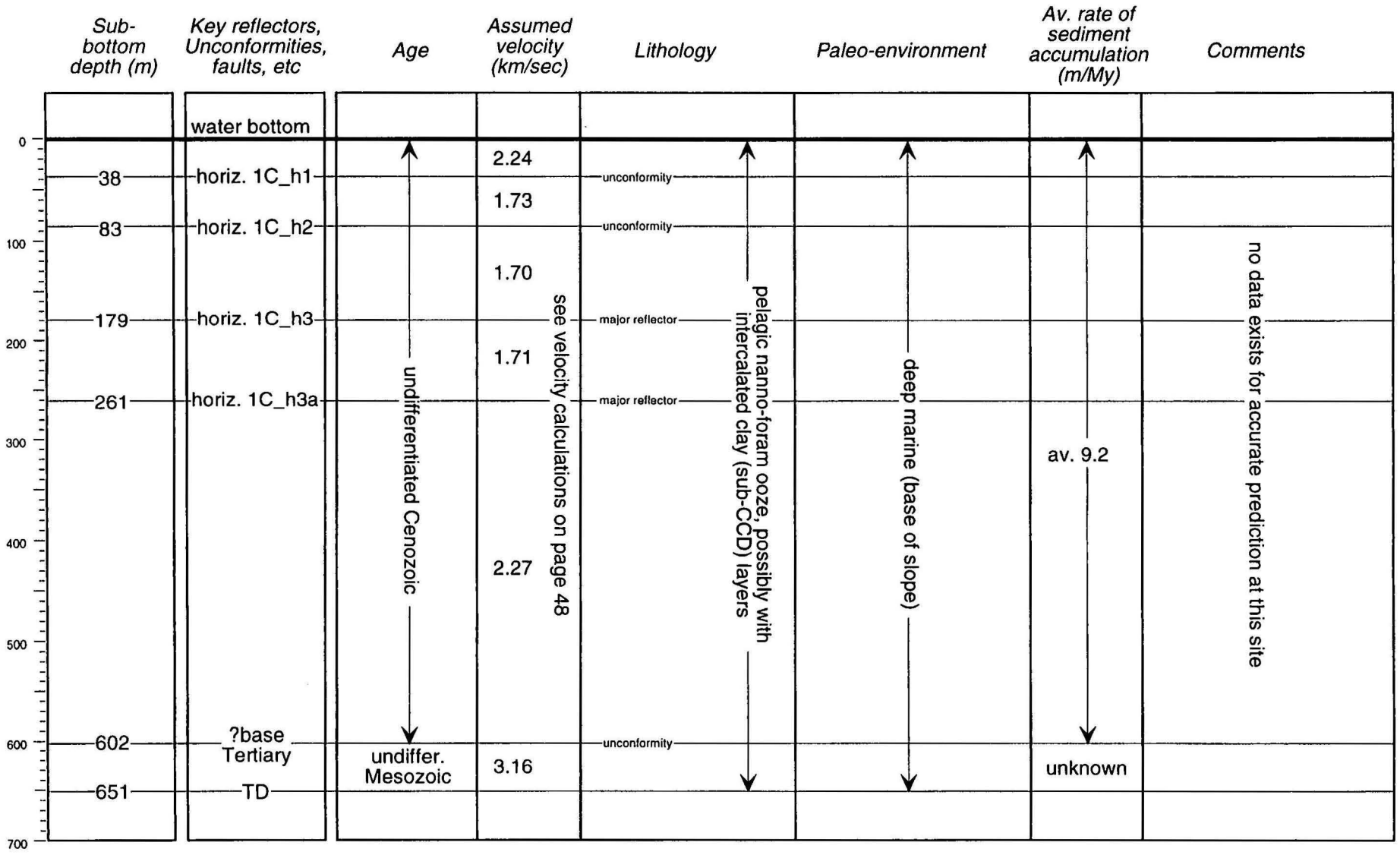
Line 169/08 - Site GAB-01C



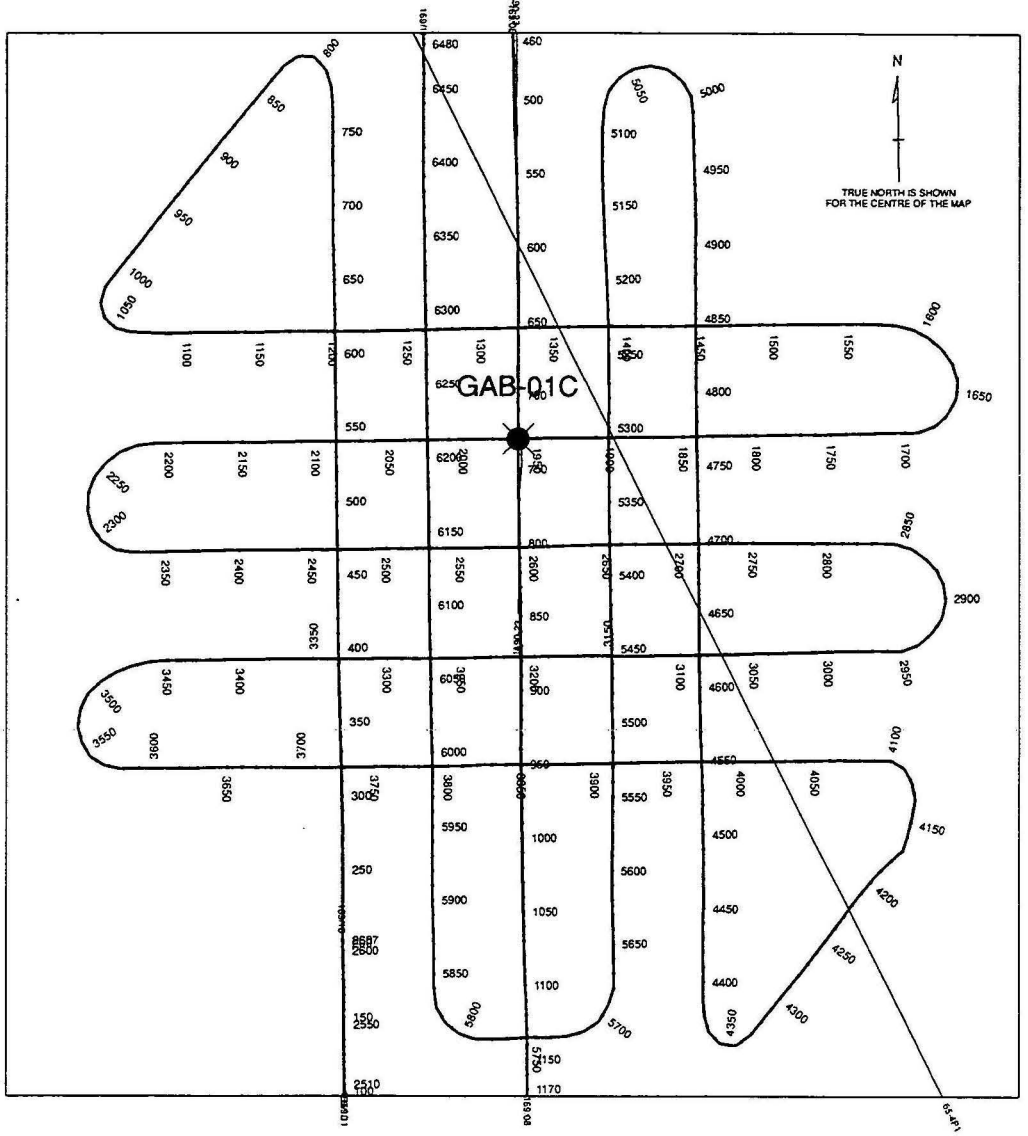

Line 169/11E - Site GAB-01C
0
0.5
1 km
EAST
JA90-23
(SP 9520.13)
169/08
(SP 729.48)
169/11A
(SP 540.39)
169/11Q
(SP 6211.97)
SITE
GAB-01C
169/11O
(SP 5306.62)
169/11M
(SP 4769.74)
65-4P1
(SP 303.1607.25)
shot
2210
2150
2100
2050
2000
1950
1900
1850
1800
1750
1710
Two-Way-Time (secs)
5.20
5.30
5.40
5.50
5.60
5.70
5.80
5.90
6.00
6.10
6.20
6.30


Line 169/11E - Site GAB-01C
0
0.5
1 km
EAST
JA90-23
(SP 9520.13)
169/08
(SP 729.48)
169/11A
(SP 540.39)
169/11Q
(SP 6211.97)
SITE
GAB-01C
169/11O
(SP 5306.62)
169/11M
(SP 4769.74)
65-4P1
(SP 303.1607.25)
shot
2210
2150
2100
2050
2000
1950
1900
1850
1800
1750
1710
Two-Way-Time (secs)
5.20
5.30
5.40
5.50
5.60
5.70
5.80
5.90
6.00
6.10
6.20
6.30
Horizon 1C_ 1
Horizon 1C_ 2
Horizon 1C_ 3
Horizon 1C_ 3a
?base Tertiary
undifferentiated
Mesozoic siliciclastics
?feather edge
of volcanics
?top volcanics
undifferentiated
Mesozoic siliciclastics

GRAPHIC SUMMARY, SITE GAB-01C



EUCLA BASIN: ODP Site GAB-01C



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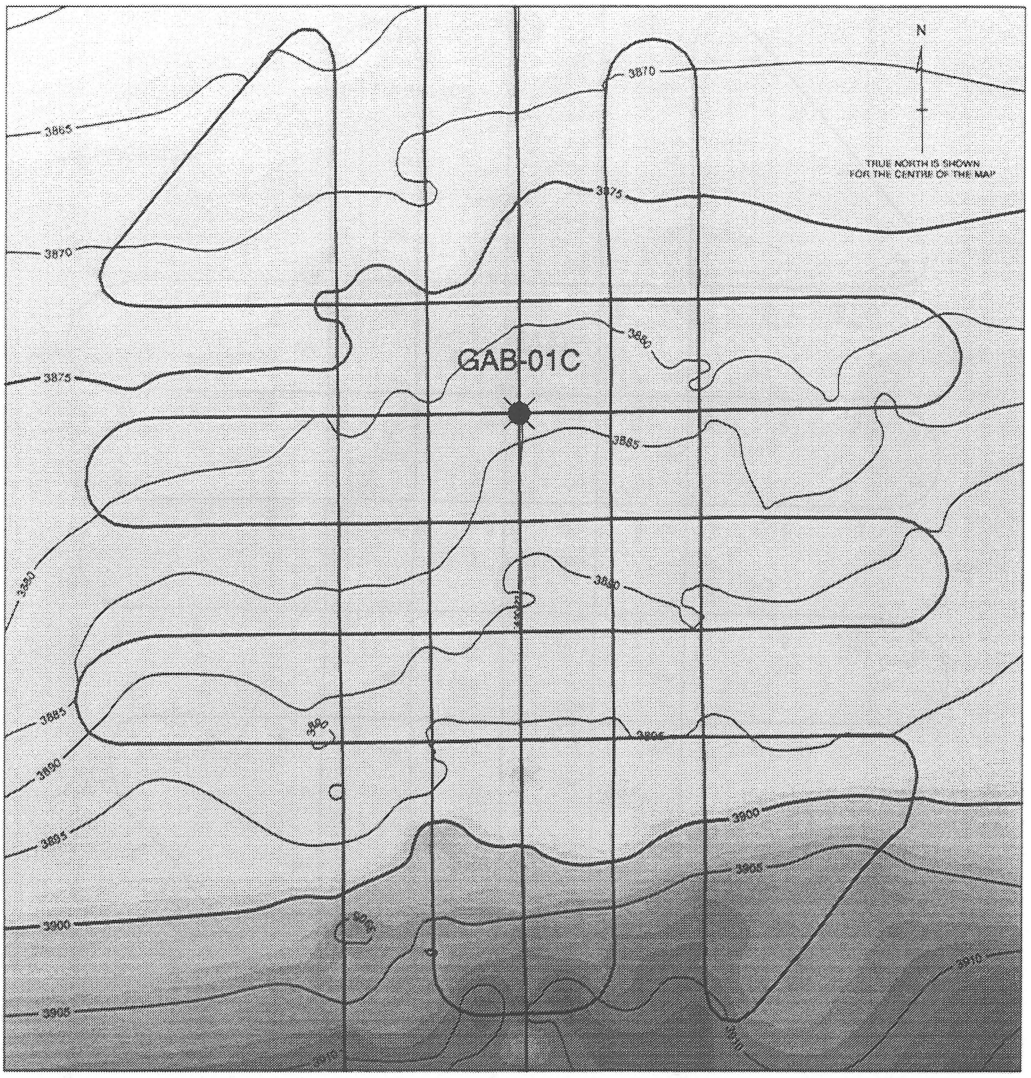
Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)
SHOT POINT MAP
David A. Foary

EUCLA BASIN: ODP Site GAB-01C



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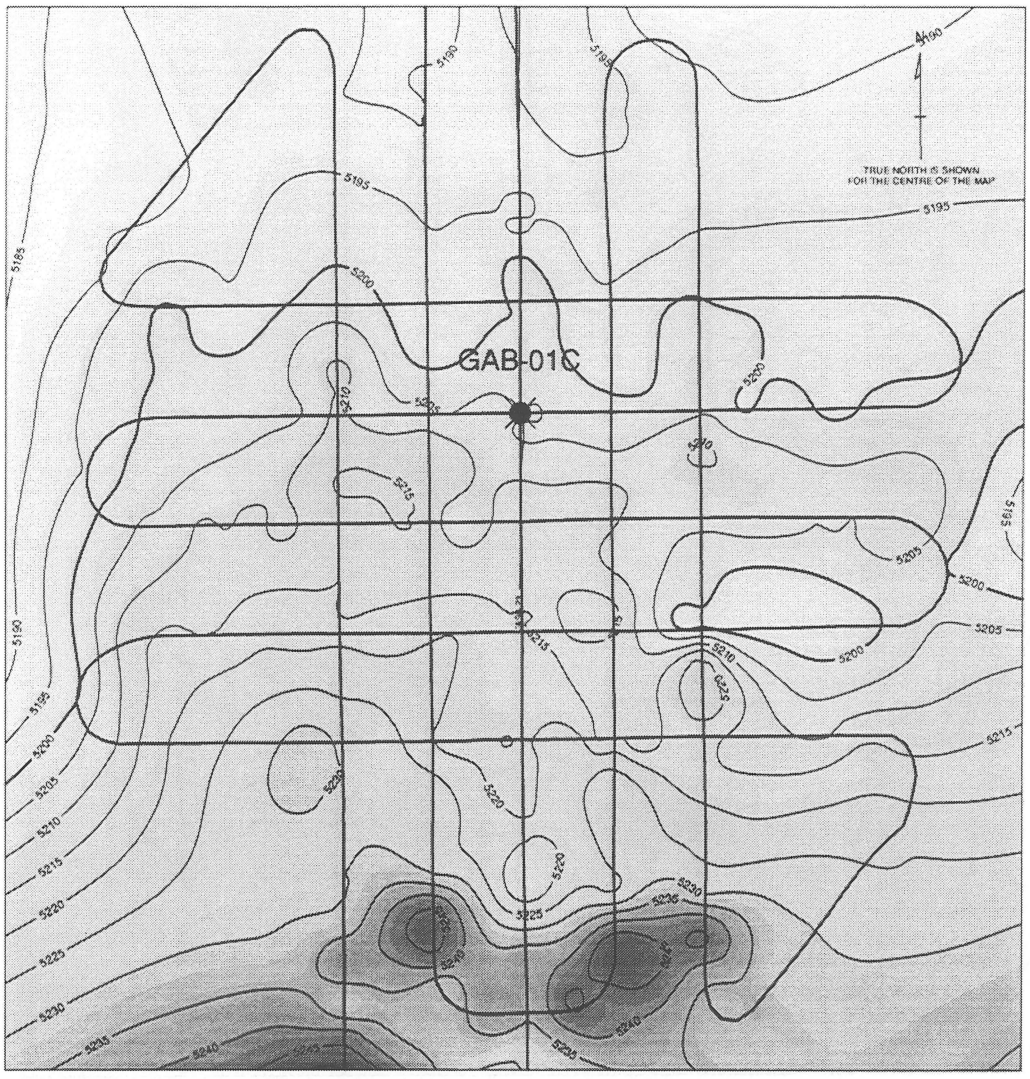
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

BATHYMETRY
(5 m contour interval)

David A. Foary

EUCLA BASIN: ODP Site GAB-01C



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

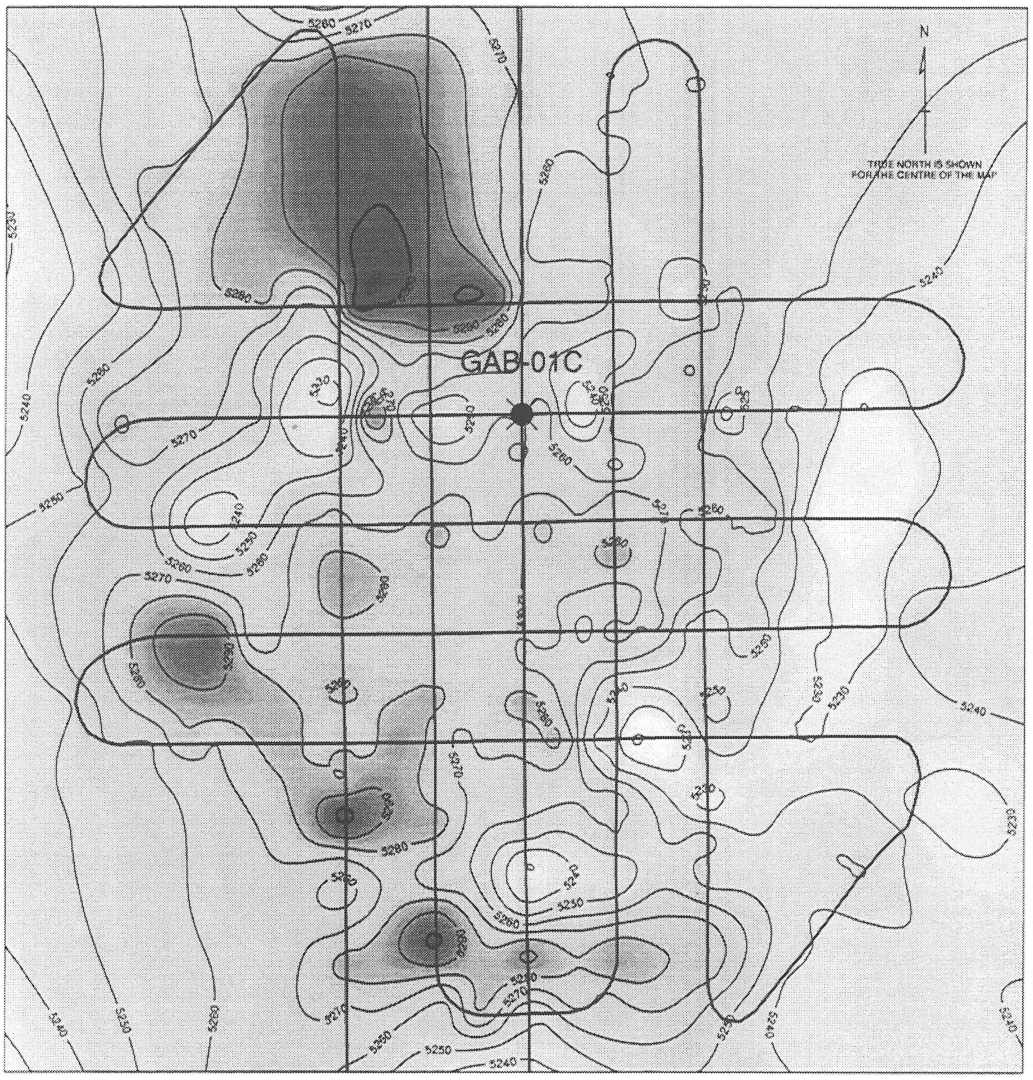
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO HORIZON 1C_1
(5 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-01C



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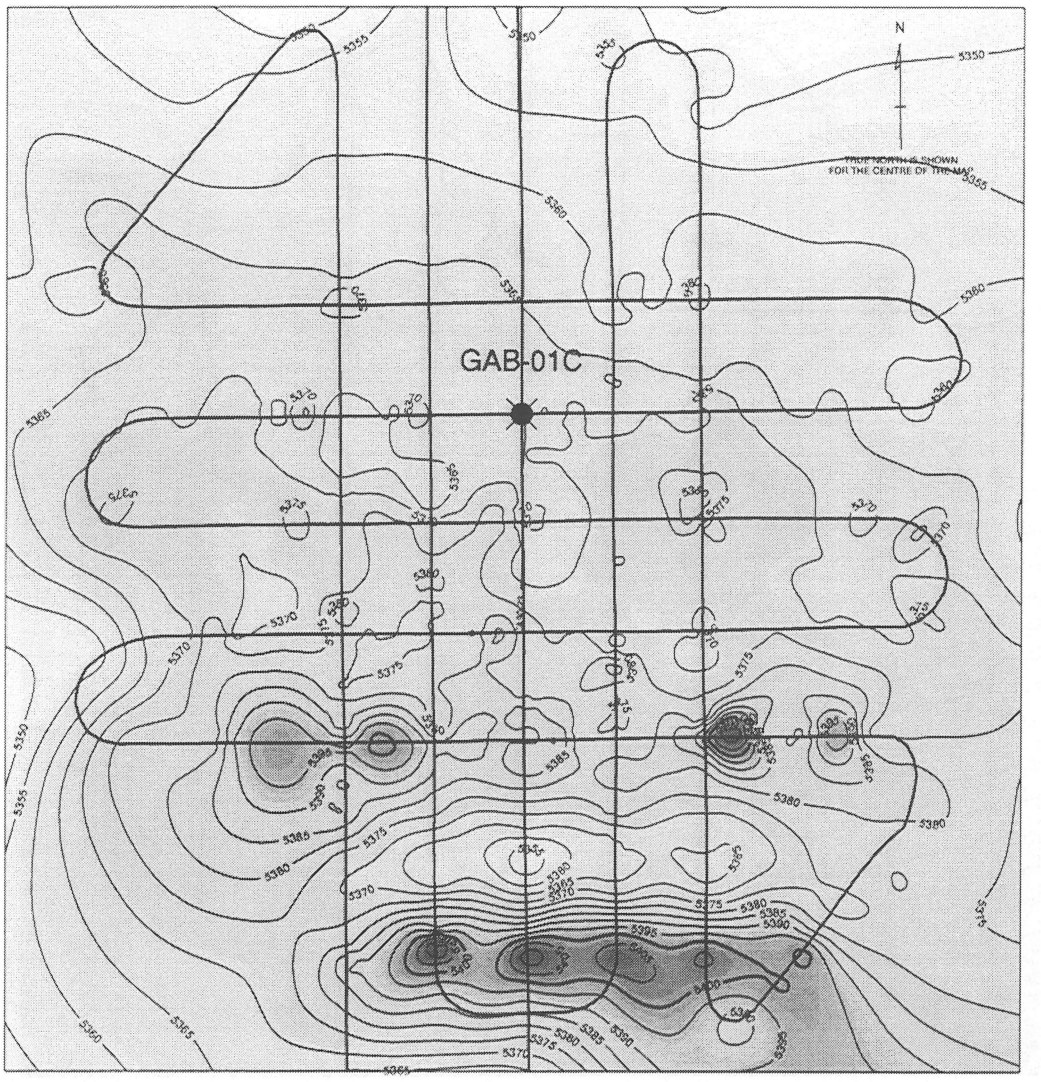
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182		
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)		
TWT TO HORIZON 1C_2 (10 msec contour interval)		
		David A. Feary

EUCLA BASIN: ODP Site GAB-01C



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129:00:00E

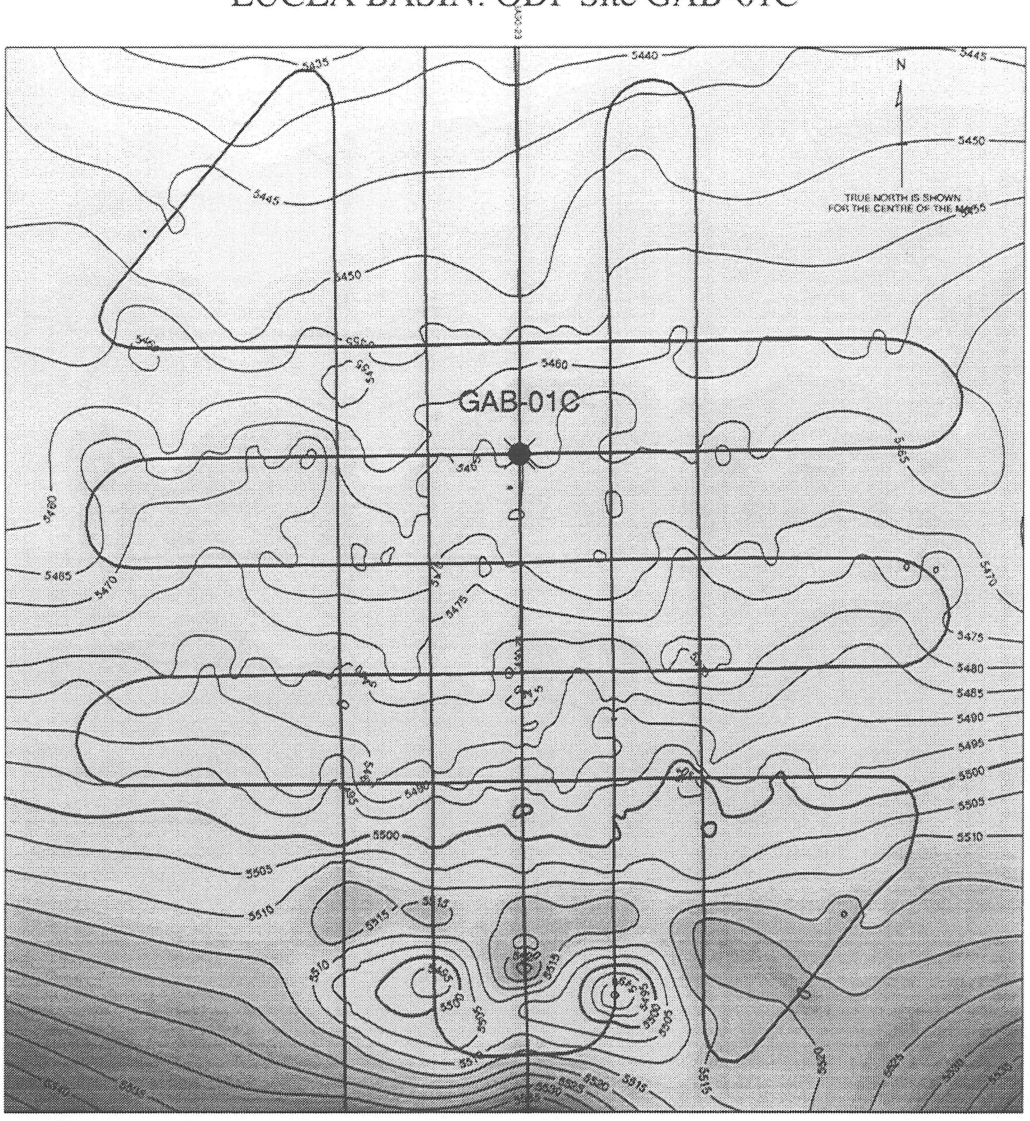
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO HORIZON 1C_3
(5 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-01C



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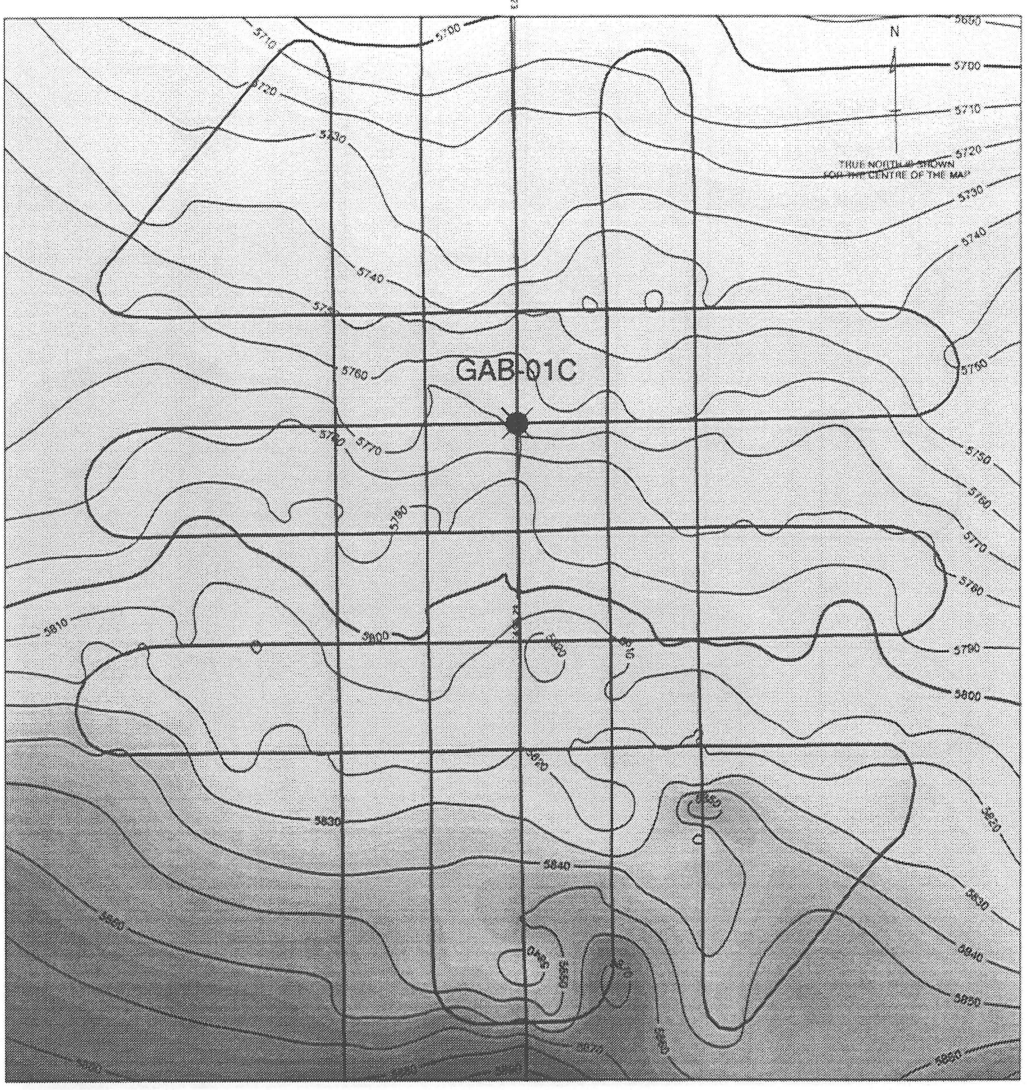
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)
TWT TO HORIZON 1C_3A (5 msec contour interval)
David A. Feary

EUCLA BASIN: ODP Site GAB-01C



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

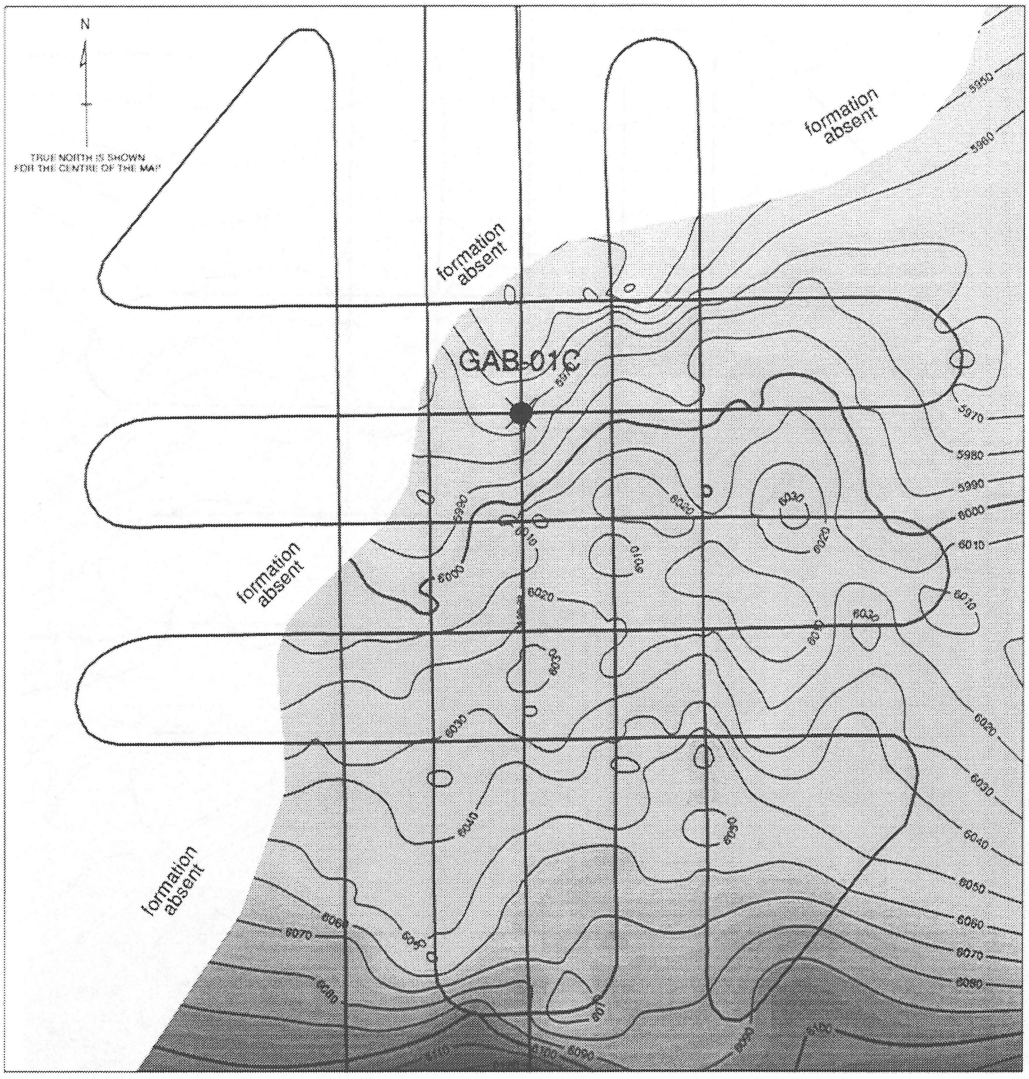
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO ?BASE TERTIARY
(10 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-01C



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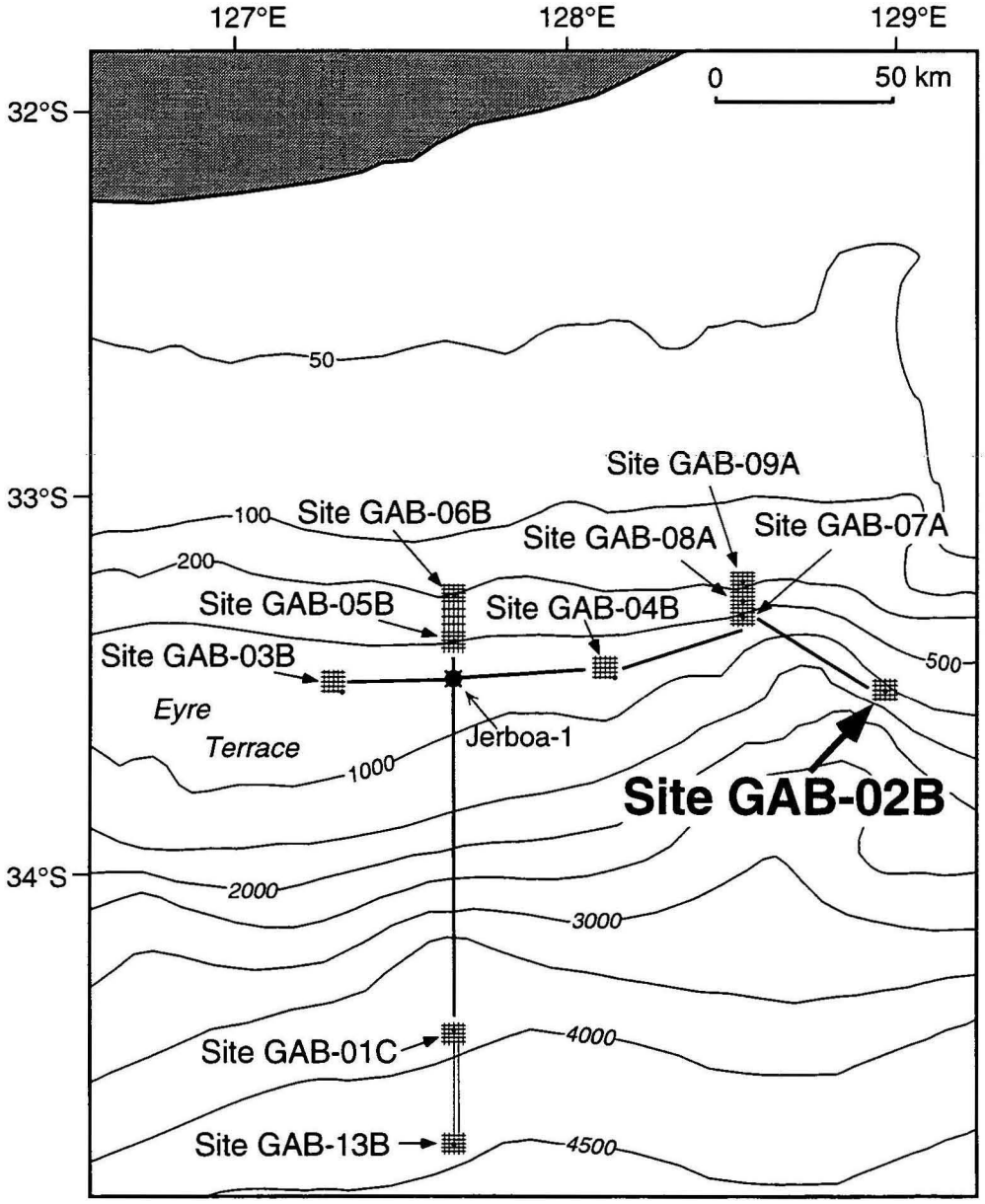
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182		
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996) TWT TO TOP VOLCANICS (10 msec contour interval)		
		David A. Feary

SITE GAB-02B


127°E
128°E
129°E
0
50 km
32°S
33°S
34°S
50
100
200
500
1000
2000
3000
4000
4500
Site GAB-09A
Site GAB-06B
Site GAB-08A
Site GAB-07A
Site GAB-05B
Site GAB-04B
Site GAB-03B
Eyre
Terrace
Jerboa-1
Site GAB-02B
Site GAB-01C
Site GAB-13B

Revised October 1992

SAFETY CHECK SHEET
JOIDES POLLUTION PREVENTION AND SAFETY PANEL

1) Basic site information.

Leg: **182**	*Site designation:* **GAB-02B**	*Latitude:* **34°32.3730'S**	*Longitude:* **128°54.3002'E**
Water Depth: **1043 m**	*Distance from land:* **98.3 n. mi.**	*Jurisdiction:* **Australia**	
General location or geomorphic province: **Eucla Basin; western Great Australian Bight**			
Probable thickness of sediments: **≈4600 m**	*Proposed total penetration:* **1710 m**		

2) Upon what geophysical and/or geological data was this site selection made?

Multichannel Seismic lines: **AGSO (1996) 169/07A (SP 427.69) and 169/07K (SP 3550.10)**
Single Channel Seismic lines: **Nil**
DSDP/ODP holes: **Nil**
Piston cores: **Gravity cores 173/GC16 (6.40 m) and 173/GC17 (7.00 m)**
Other: **Also on JNOC (1990) multichannel seismic line JA90-35 (SP 7484.57)**

3) What is your proposed drilling program?

Triple APC; XCB; RCB; no re-entry system required.

4) What is your proposed logging program?

Triple Combo; FMS/Sonic; WST; GHMT, Geochem.

5) From previous DSDP/ODP drilling in this area, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock:

No relevant DSDP/ODP drilling in the area.

6) From available information, list all commercial drilling in this area that produced or yielded significant shows. Give depths and ages of hydrocarbon-bearing deposits:

Only relevant commercial drilling in the area is Jerboa-1, 66 n mi. to the west, which targetted the Mesozoic section in the Eyre Sub-basin. Jerboa-1 encountered no significant shows, with vitrinite reflectance indicating an immature to marginally mature Mesozoic section to TD.

7) Is there any indication of gas hydrates at this location?

No indication of gas hydrates; no BSR present.

8) Is there any reason to expect any hydrocarbon accumulation at this site? Please comment.

No hydrocarbon accumulation expected.

9) What "special" precautions will be taken during drilling?

Standard hydrocarbon monitoring.

10) What abandonment procedures do you plan to follow?

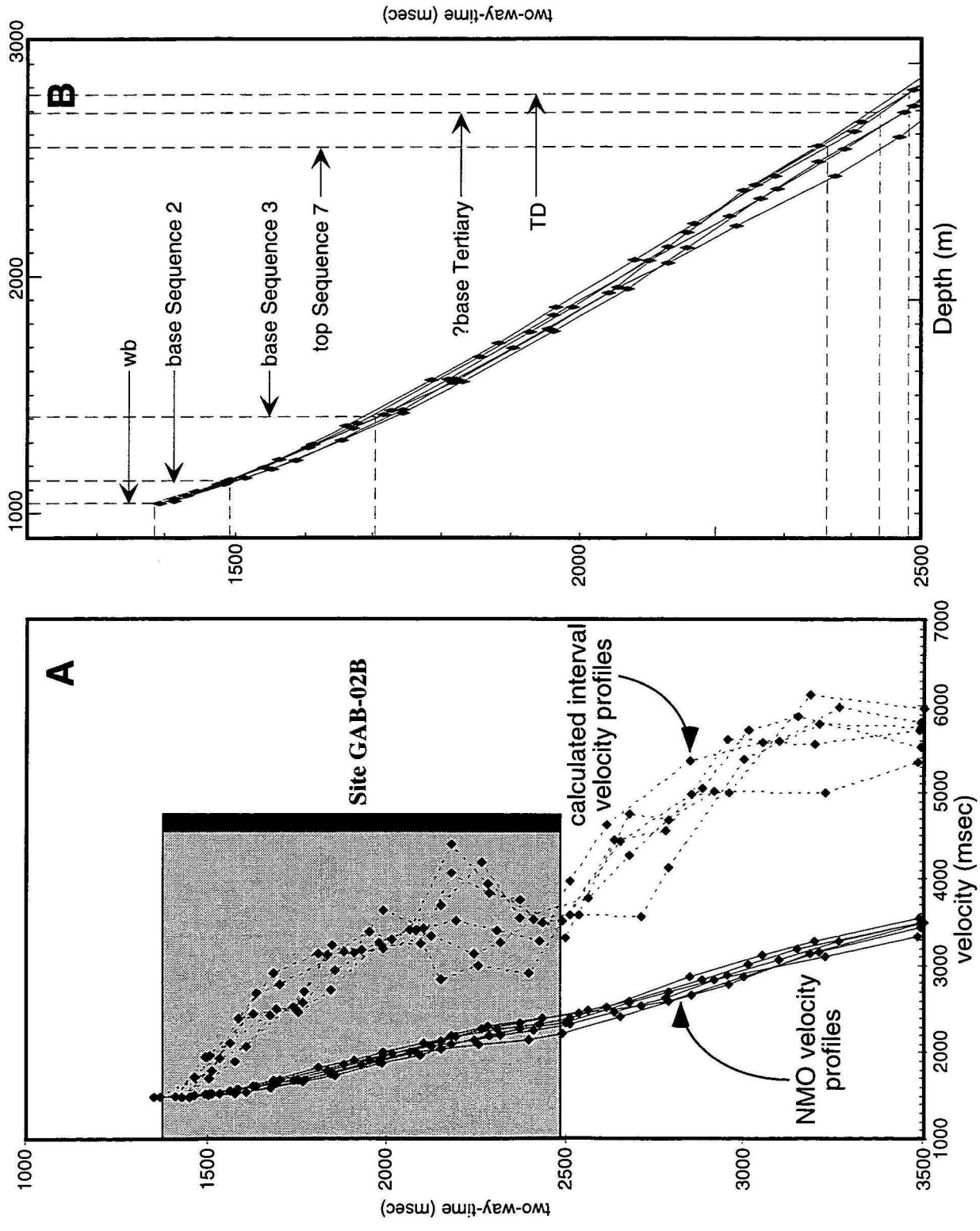
Standard abandonment procedures.

Summary: *What do you consider to be the major risks in drilling at this site?*

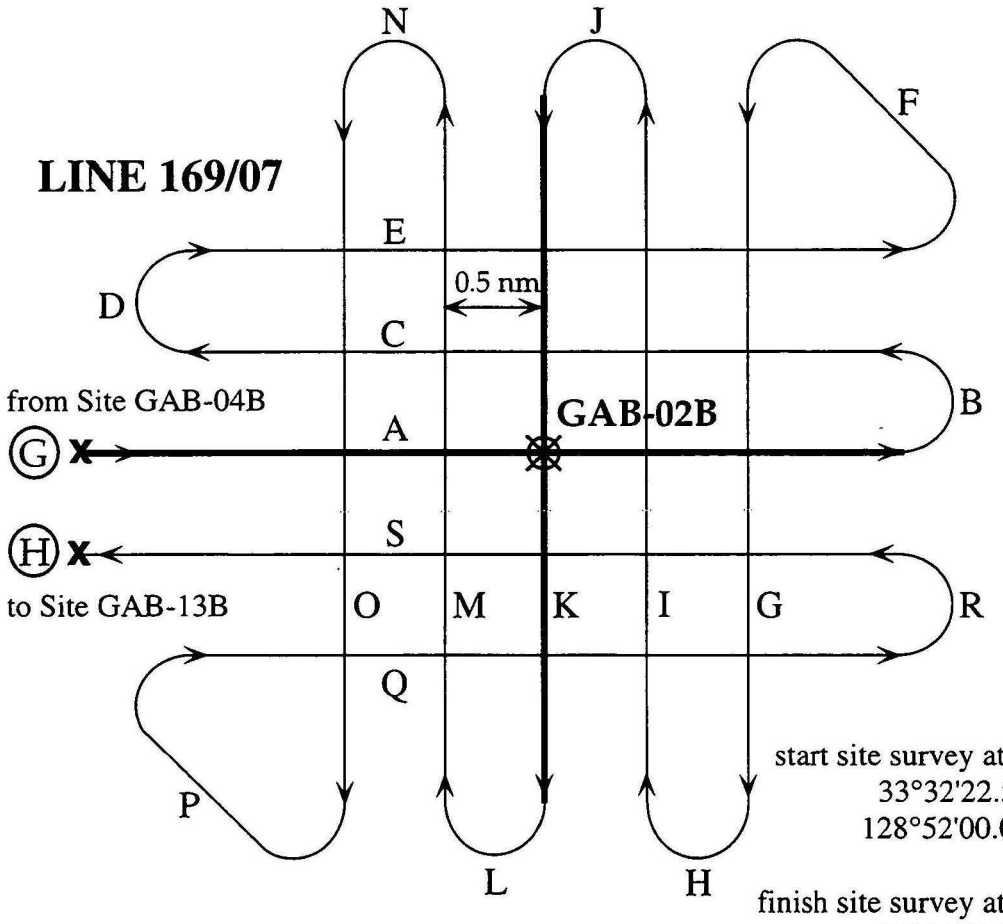
No significant drilling risks are anticipated at this site.

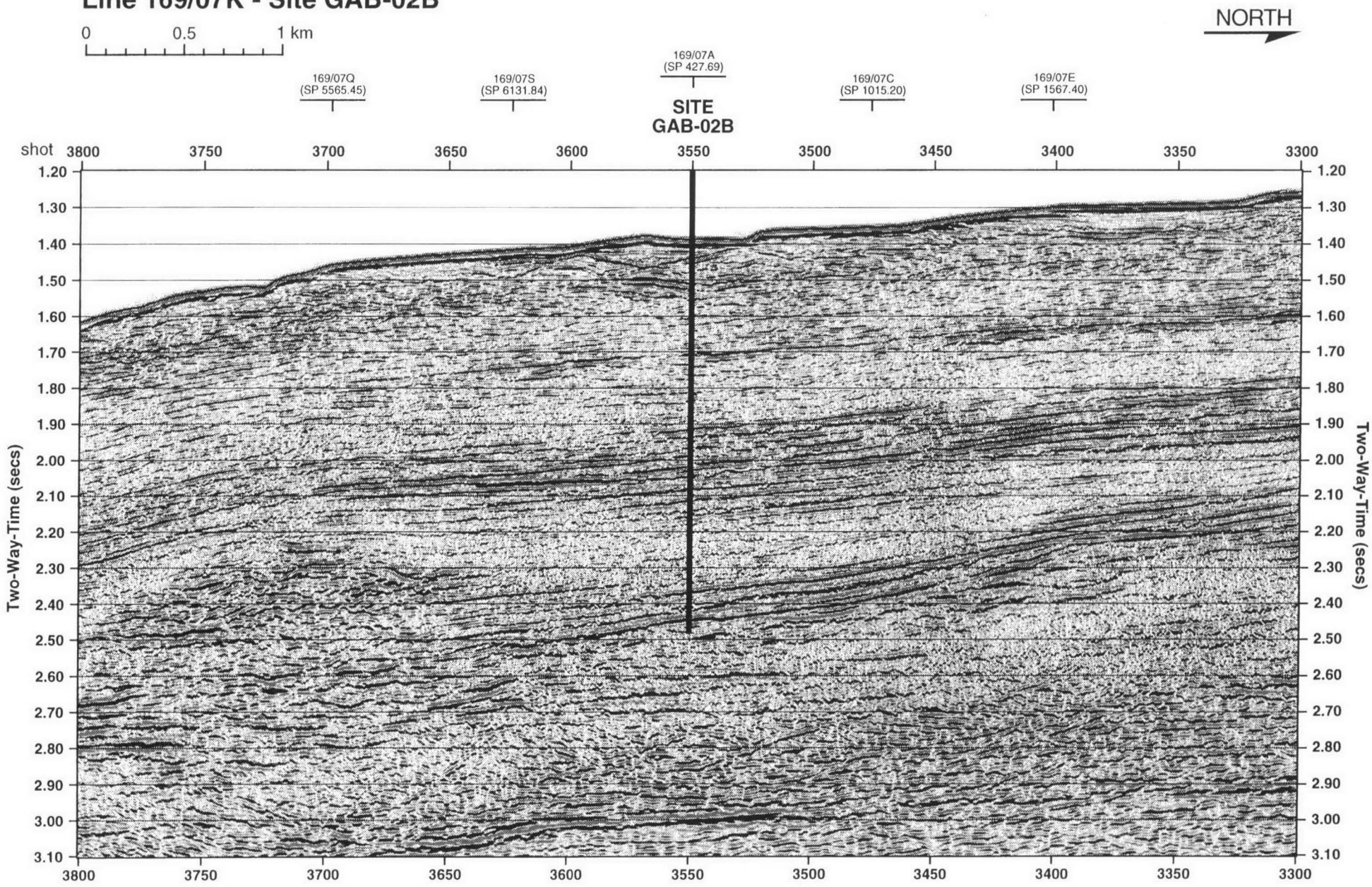
Velocity Calculations: Site GAB-02B

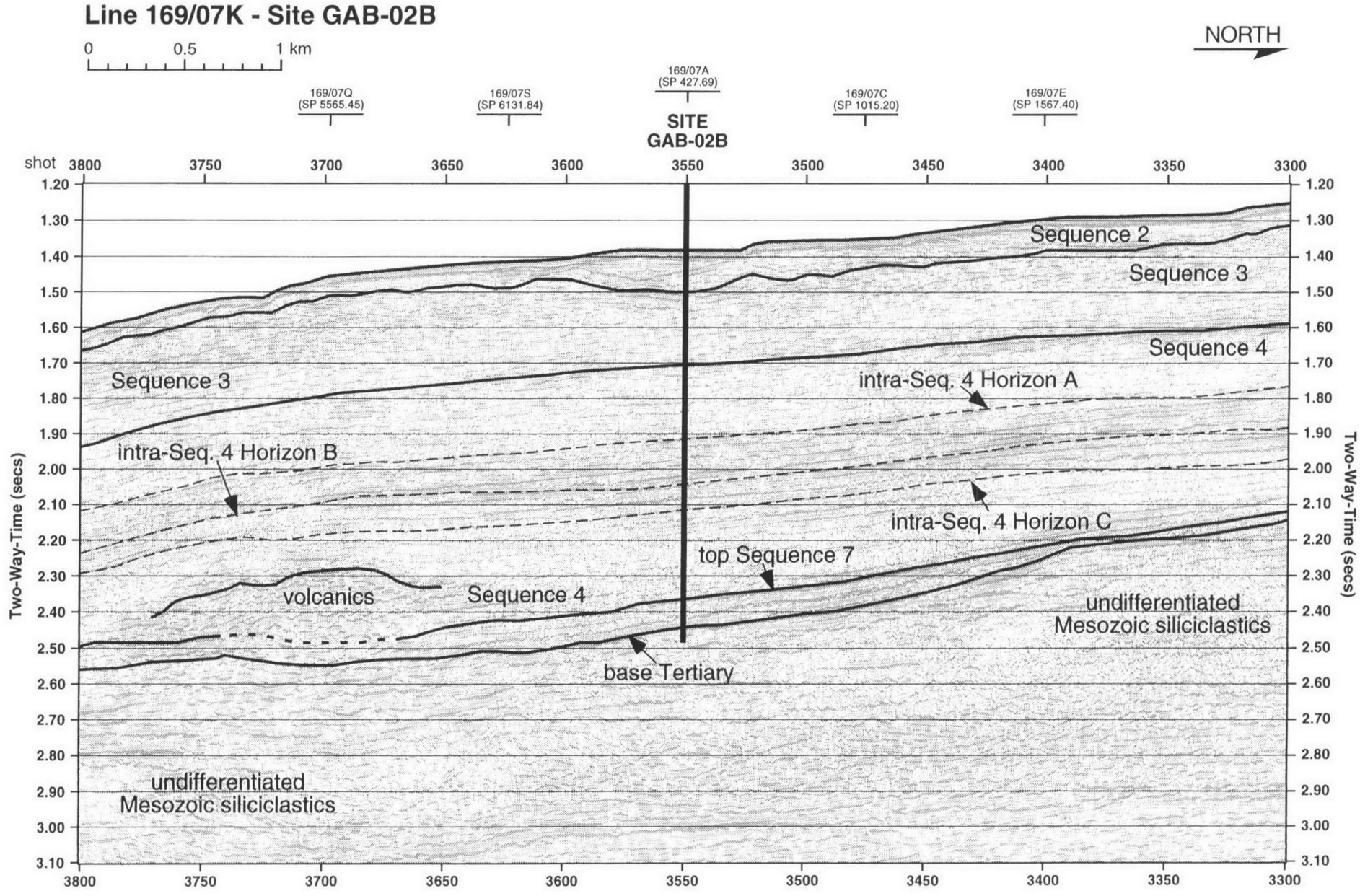
Velocity analysis for site GAB-02B, from seismic line 169/07. The six closest NMO (stacking) velocities to the site have been used to derive interval velocity profiles (A) and time-depth curves (B). Approximate depths to horizons shown on seismic sections presented on the following pages can then be derived from these time-depth curves.

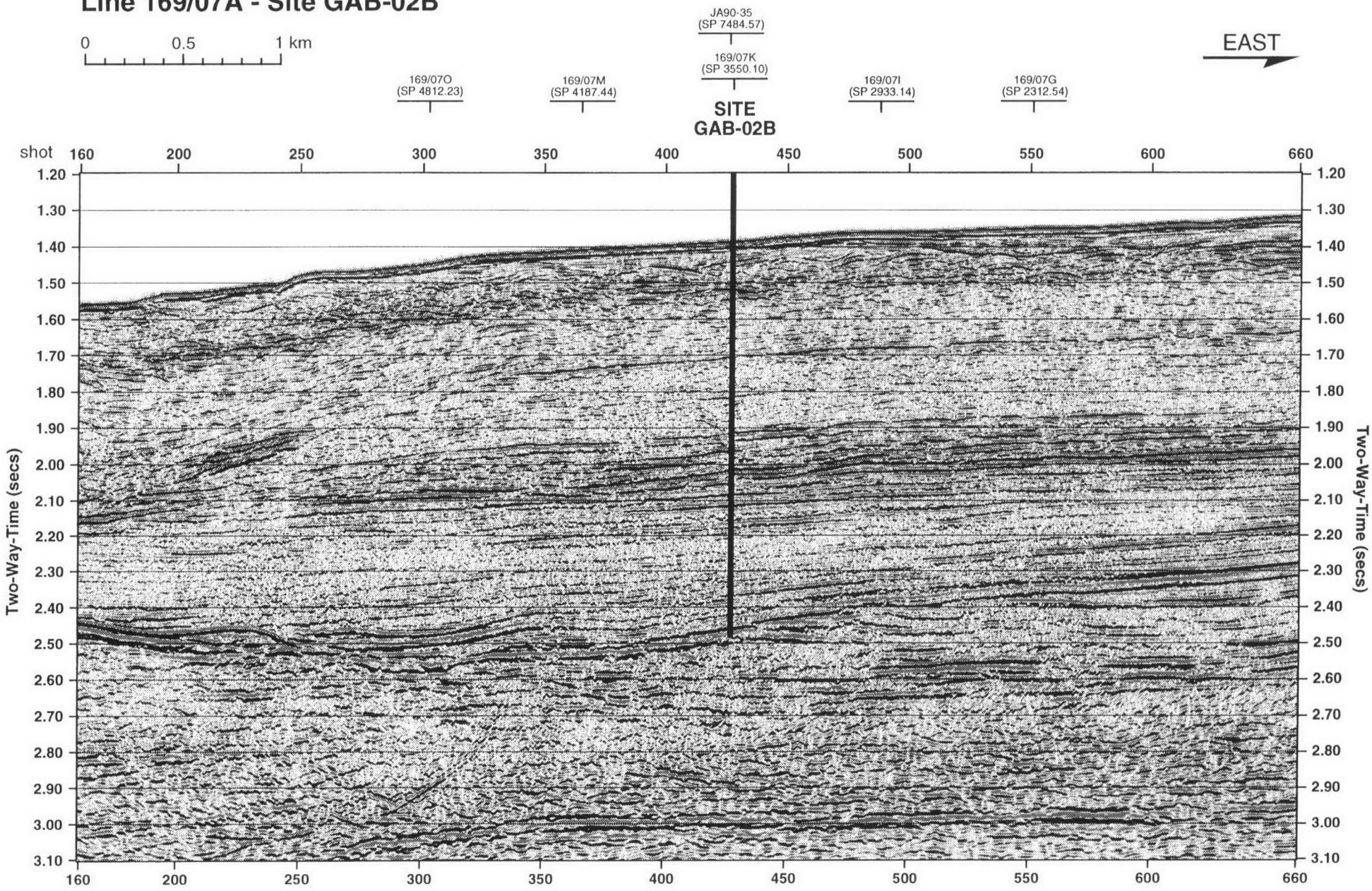


AGSO Survey 169 (February 1996) track map - Site GAB-02B




Line 169/07K - Site GAB-02B
0
0.5
1 km
NORTH
169/07Q
(SP 5565.45)
169/07S
(SP 6131.84)
169/07A
(SP 427.69)
SITE
GAB-02B
169/07C
(SP 1015.20)
169/07E
(SP 1567.40)
shot
3800
3750
3700
3650
3600
3550
3500
3450
3400
3350
3300
Two-Way-Time (secs)
1.20
1.30
1.40
1.50
1.60
1.70
1.80
1.90
2.00
2.10
2.20
2.30
2.40
2.50
2.60
2.70
2.80
2.90
3.00
3.10


Line 169/07K - Site GAB-02B
0
0.5
1 km
NORTH
169/07Q (SP 5565.45)
169/07S (SP 6131.84)
169/07A (SP 427.69)
SITE GAB-02B
169/07C (SP 1015.20)
169/07E (SP 1567.40)
shot
3800
3750
3700
3650
3600
3550
3500
3450
3400
3350
3300
Two-Way-Time (secs)
1.20
1.30
1.40
1.50
1.60
1.70
1.80
1.90
2.00
2.10
2.20
2.30
2.40
2.50
2.60
2.70
2.80
2.90
3.00
3.10
Sequence 2
Sequence 3
Sequence 4
Sequence 3
intra-Seq. 4 Horizon A
intra-Seq. 4 Horizon B
intra-Seq. 4 Horizon C
top Sequence 7
volcanics
Sequence 4
undifferentiated Mesozoic siliciclastics
base Tertiary
undifferentiated Mesozoic siliciclastics


Line 169/07A - Site GAB-02B
0
0.5
1 km
JA90-35
(SP 7484.57)
169/07K
(SP 3550.10)
EAST
169/07O
(SP 4812.23)
169/07M
(SP 4187.44)
SITE
GAB-02B
169/07I
(SP 2933.14)
169/07G
(SP 2312.54)
shot
160
200
250
300
350
400
450
500
550
600
660
Two-Way-Time (secs)
1.20
1.30
1.40
1.50
1.60
1.70
1.80
1.90
2.00
2.10
2.20
2.30
2.40
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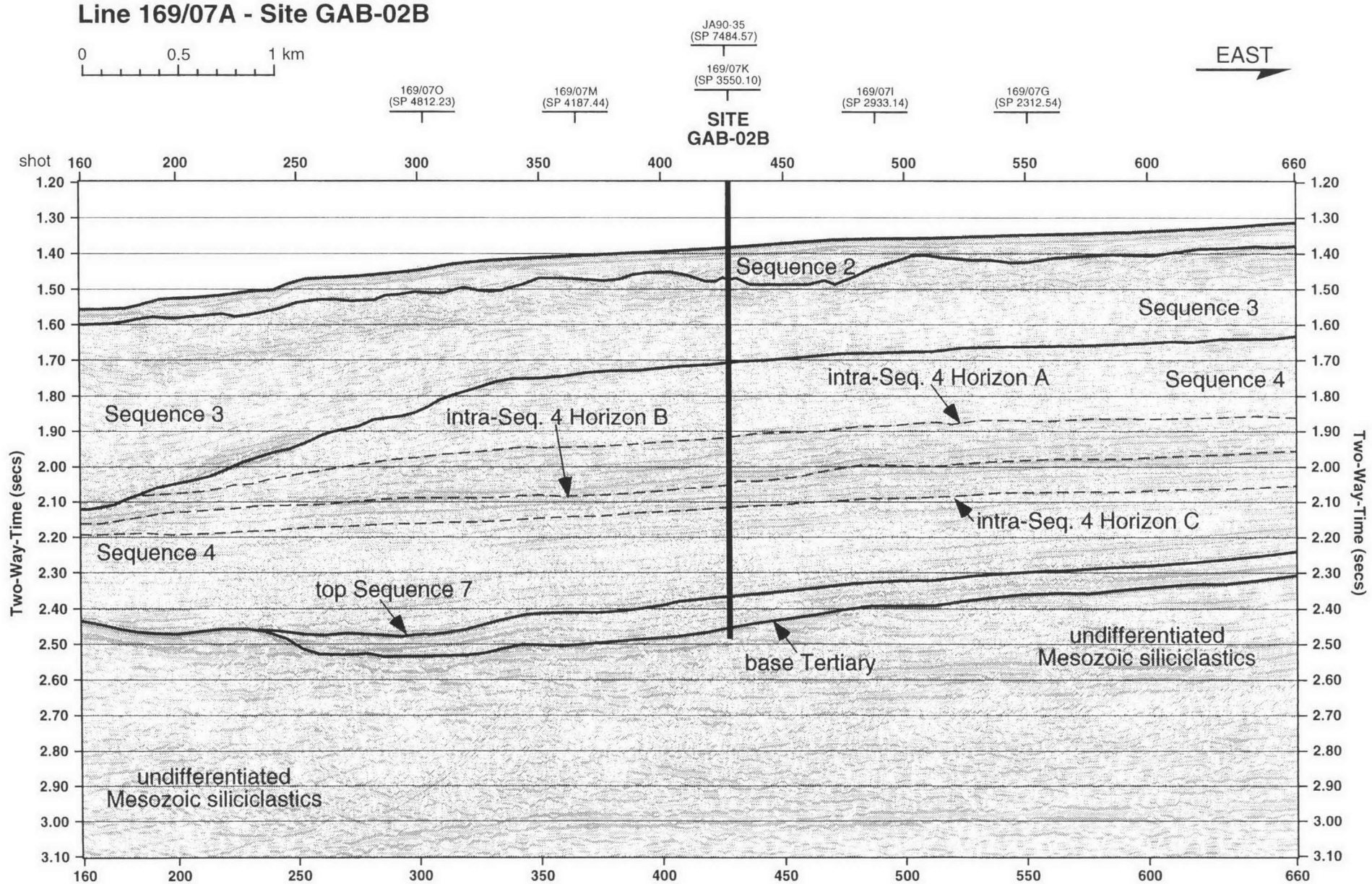
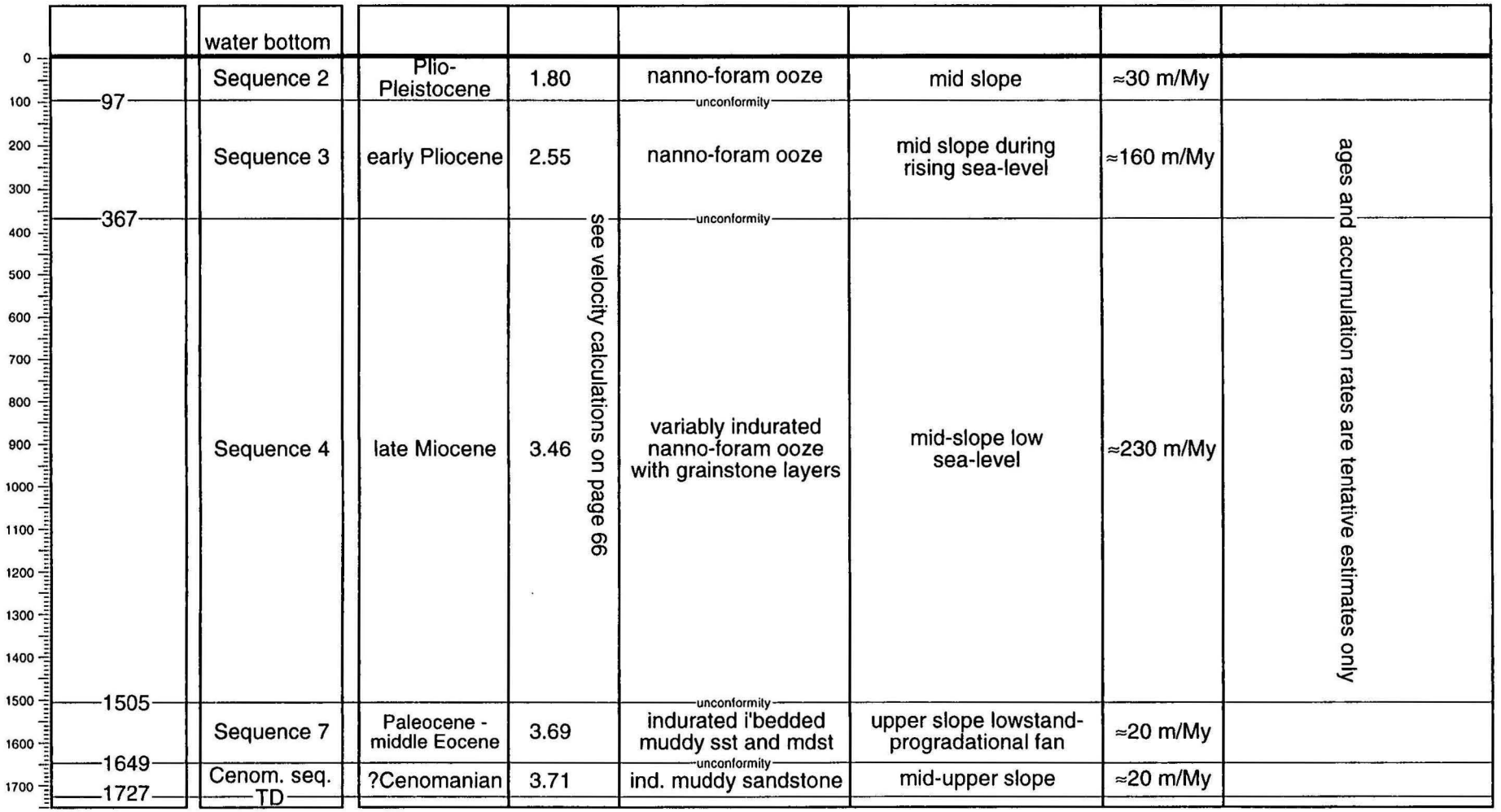
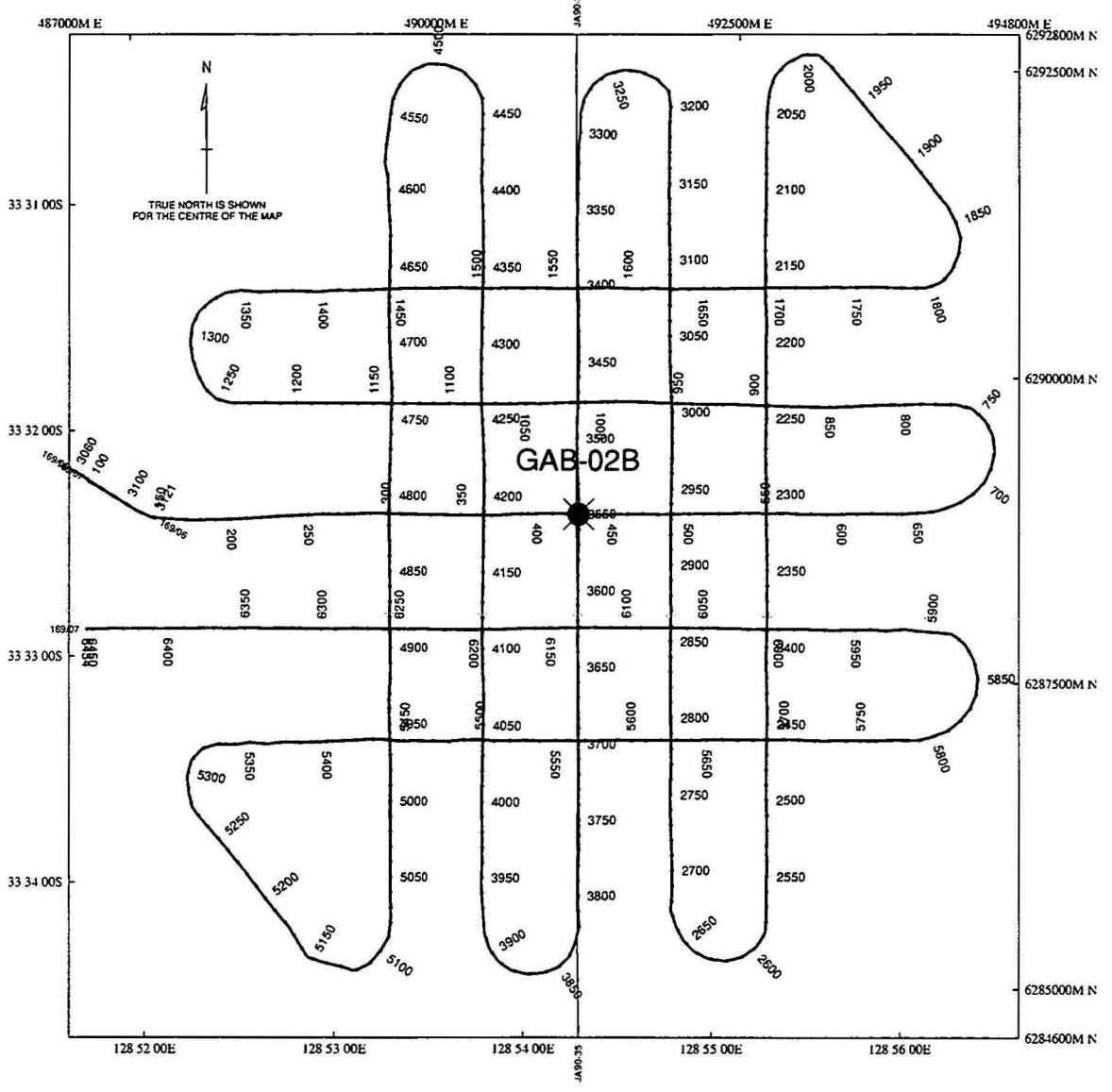
2.80
2.90
3.00
3.10


Line 169/07A - Site GAB-02B
0
0.5
1 km
EAST
JA90-35
(SP 7484.57)
169/07K
(SP 3550.10)
169/07O
(SP 4812.23)
169/07M
(SP 4187.44)
169/07I
(SP 2933.14)
169/07G
(SP 2312.54)
SITE
GAB-02B
shot
160
200
250
300
350
400
450
500
550
600
660
Two-Way-Time (secs)
1.20
1.30
1.40
1.50
1.60
1.70
1.80
1.90
2.00
2.10
2.20
2.30
2.40
2.50
2.60
2.70
2.80
2.90
3.00
3.10
Sequence 2
Sequence 3
Sequence 4
intra-Seq. 4 Horizon A
intra-Seq. 4 Horizon B
intra-Seq. 4 Horizon C
top Sequence 7
base Tertiary
undifferentiated
Mesozoic siliciclastics

GRAPHIC SUMMARY, SITE GAB-02B



EUCLA BASIN: ODP Site GAB-02B



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Petroleum and Marine Division

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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 EAST

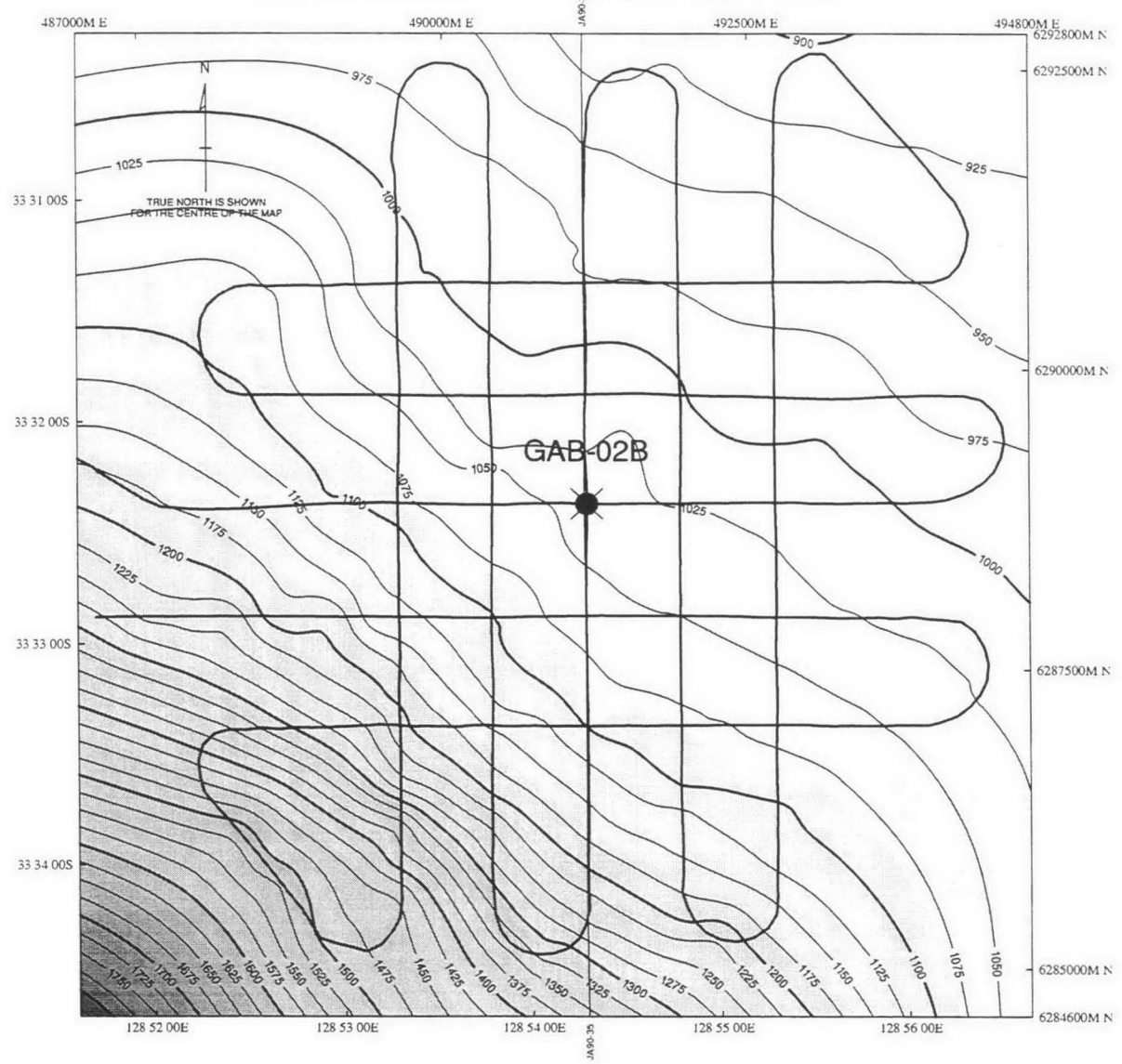
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

SHOT POINT MAP

David A. Feary

EUCLA BASIN: ODP Site GAB-02B



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

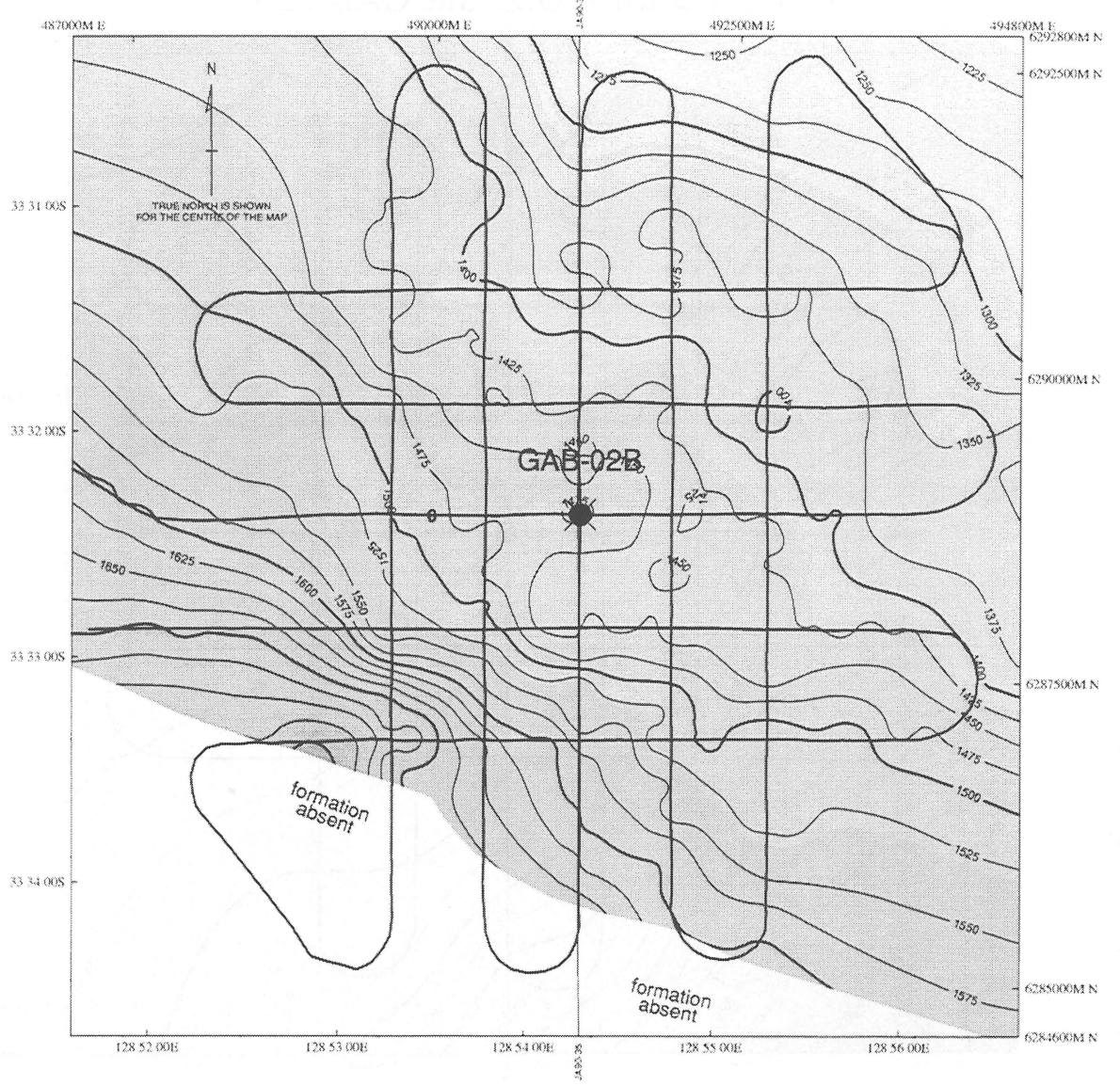
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

BATHYMETRY
(25 m contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-02B



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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Petroleum and Marine Division

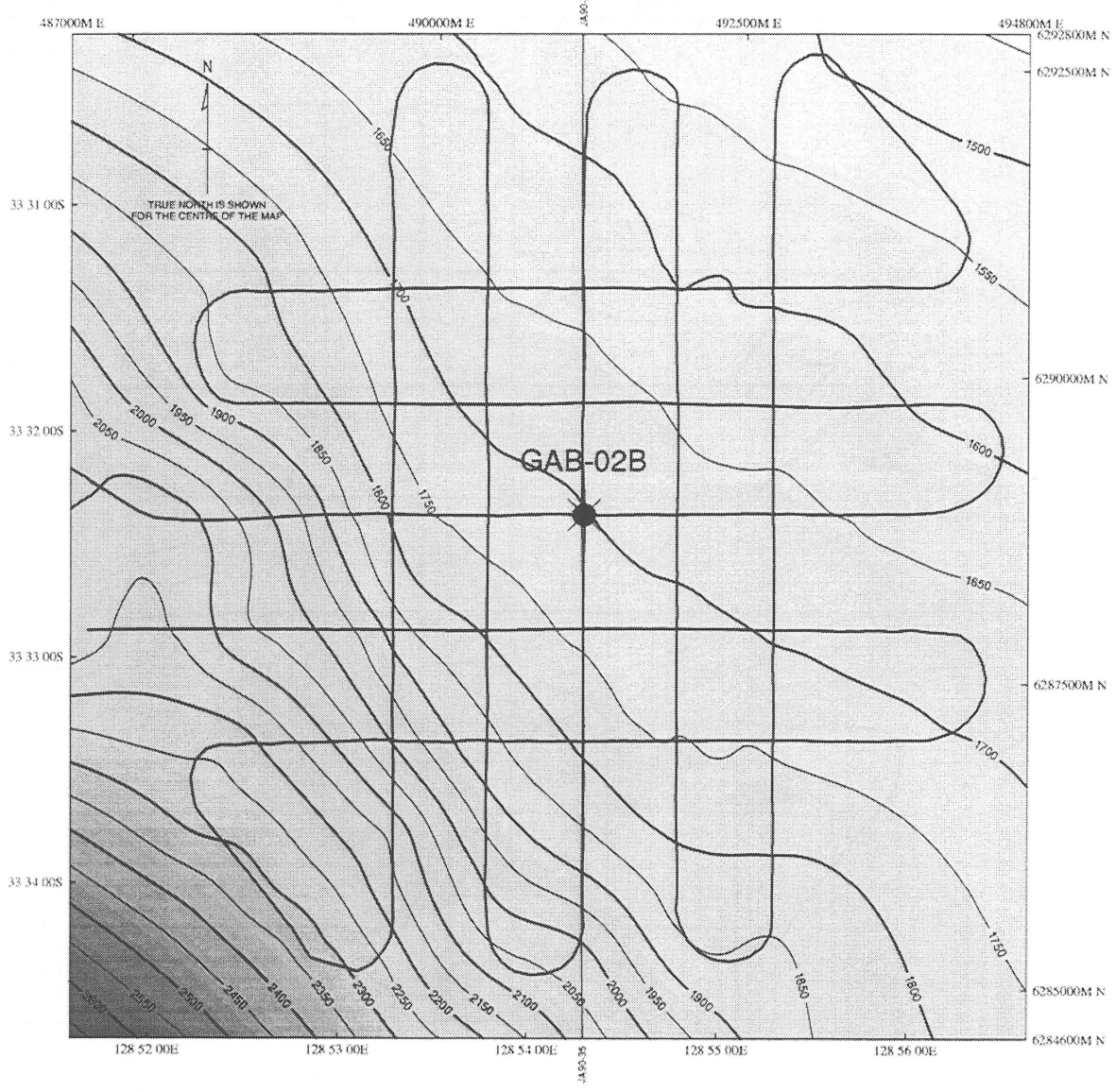
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO BASE SEQUENCE 2
(25 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-02B



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

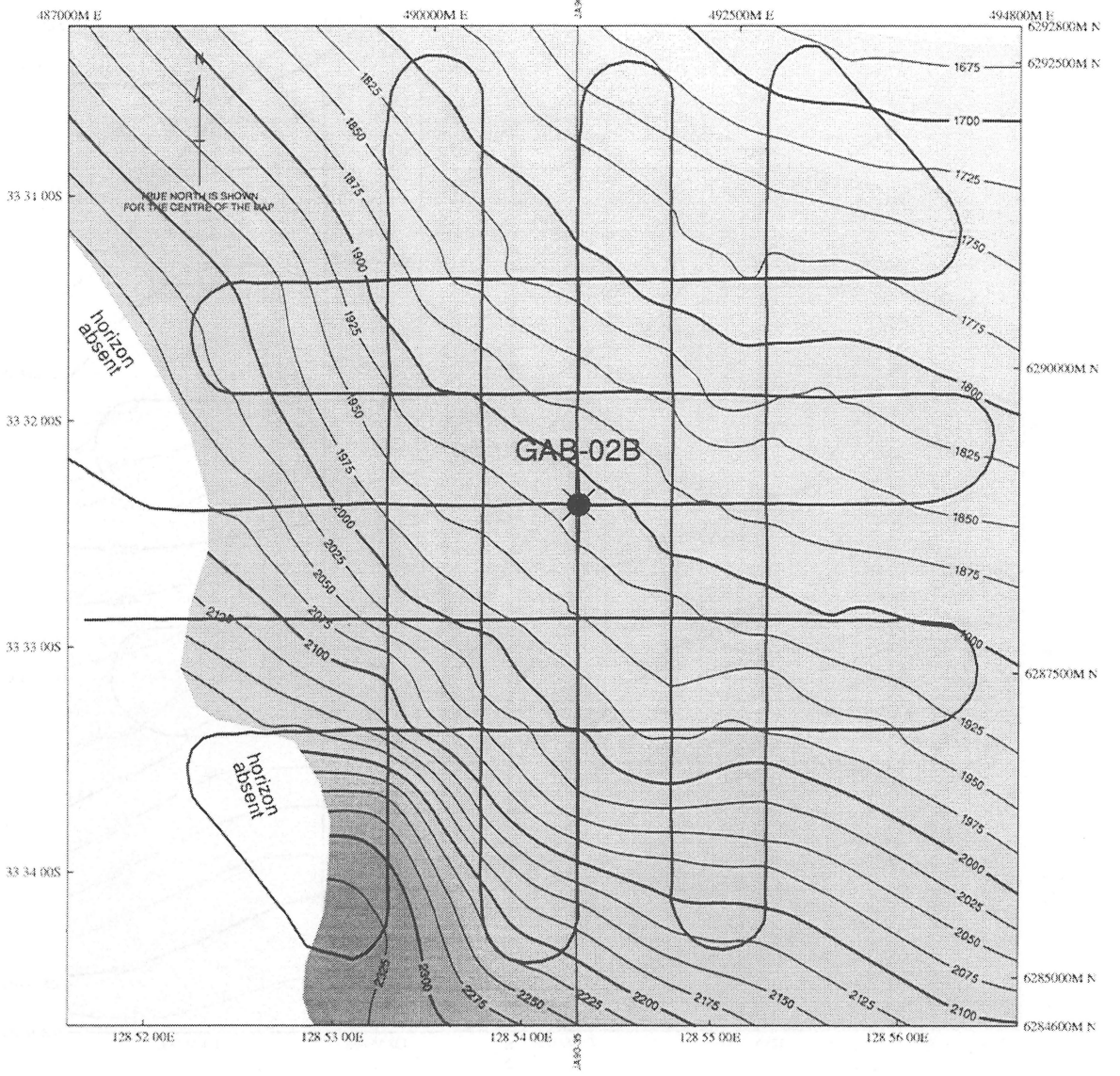
Eucla Basin - ODP

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO BASE SEQUENCE 3
(50 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-02B



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

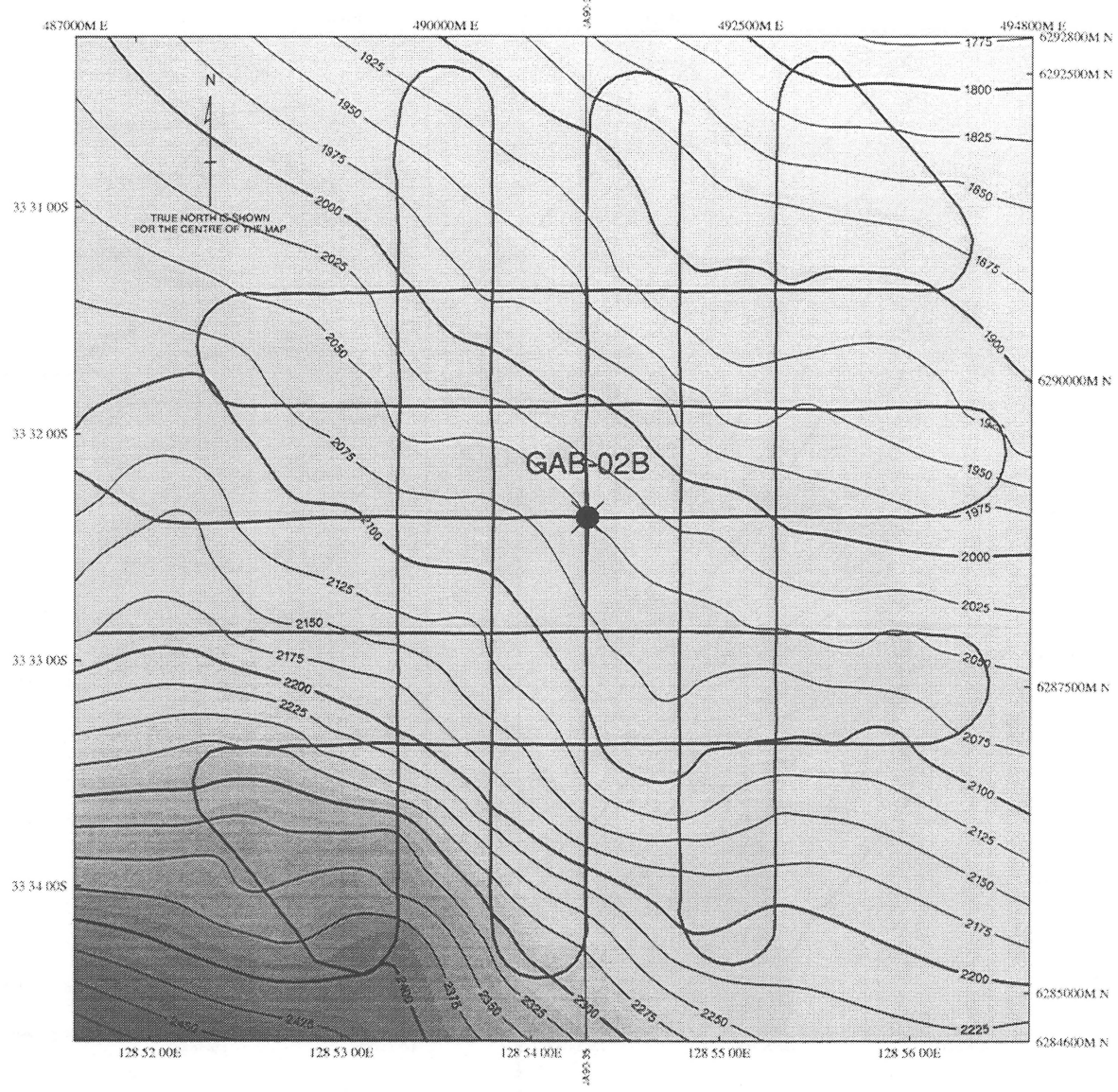
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO INTRA-SEQ. 4 Hor. A
(25 msec contour interval)

		David A. Feary

EUCLA BASIN: ODP Site GAB-02B



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

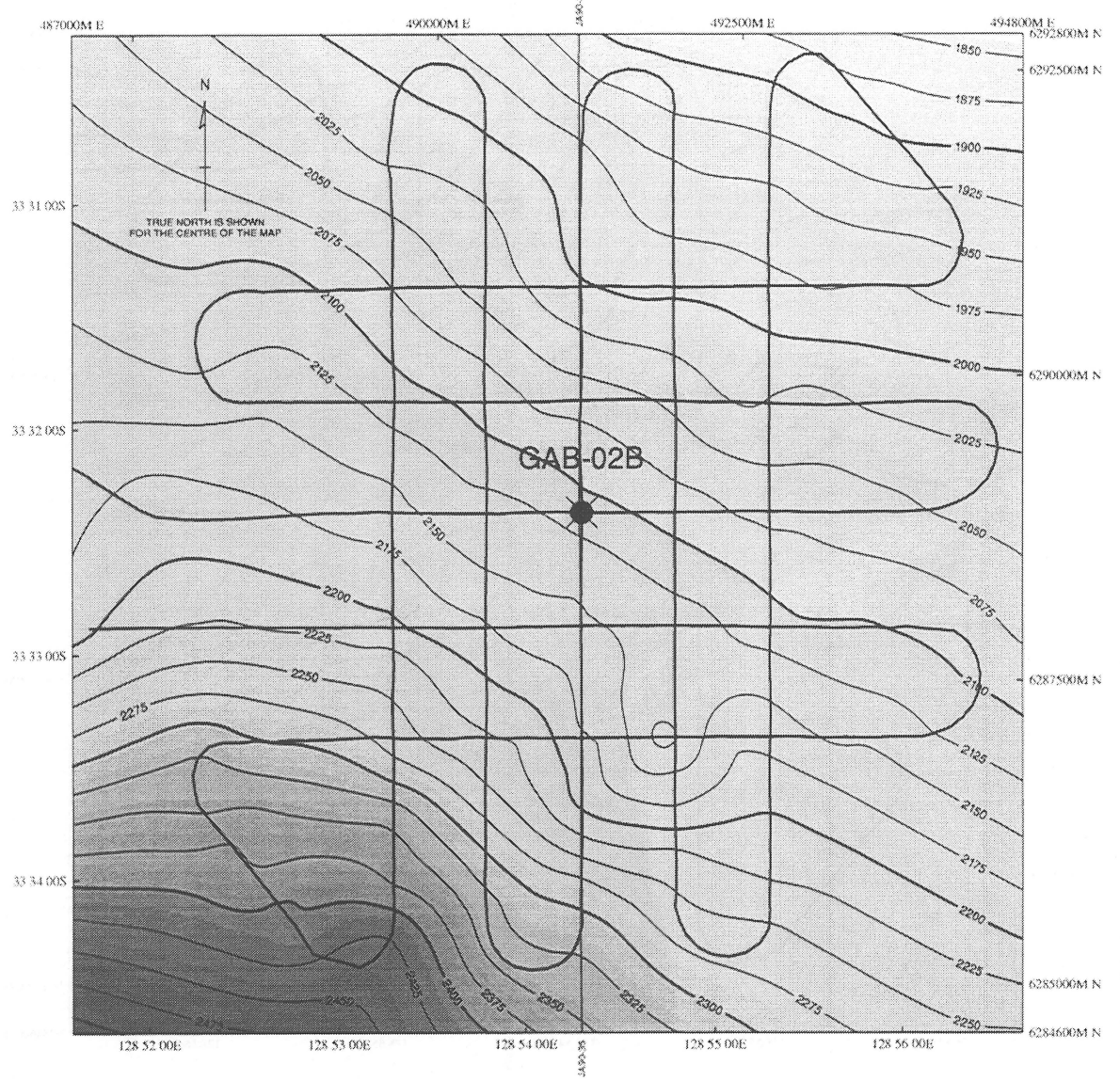
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO INTRA-SEQ. 4 Hor. B
(25 msec contour interval)

		David A. Feary

EUCLA BASIN: ODP Site GAB-02B



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

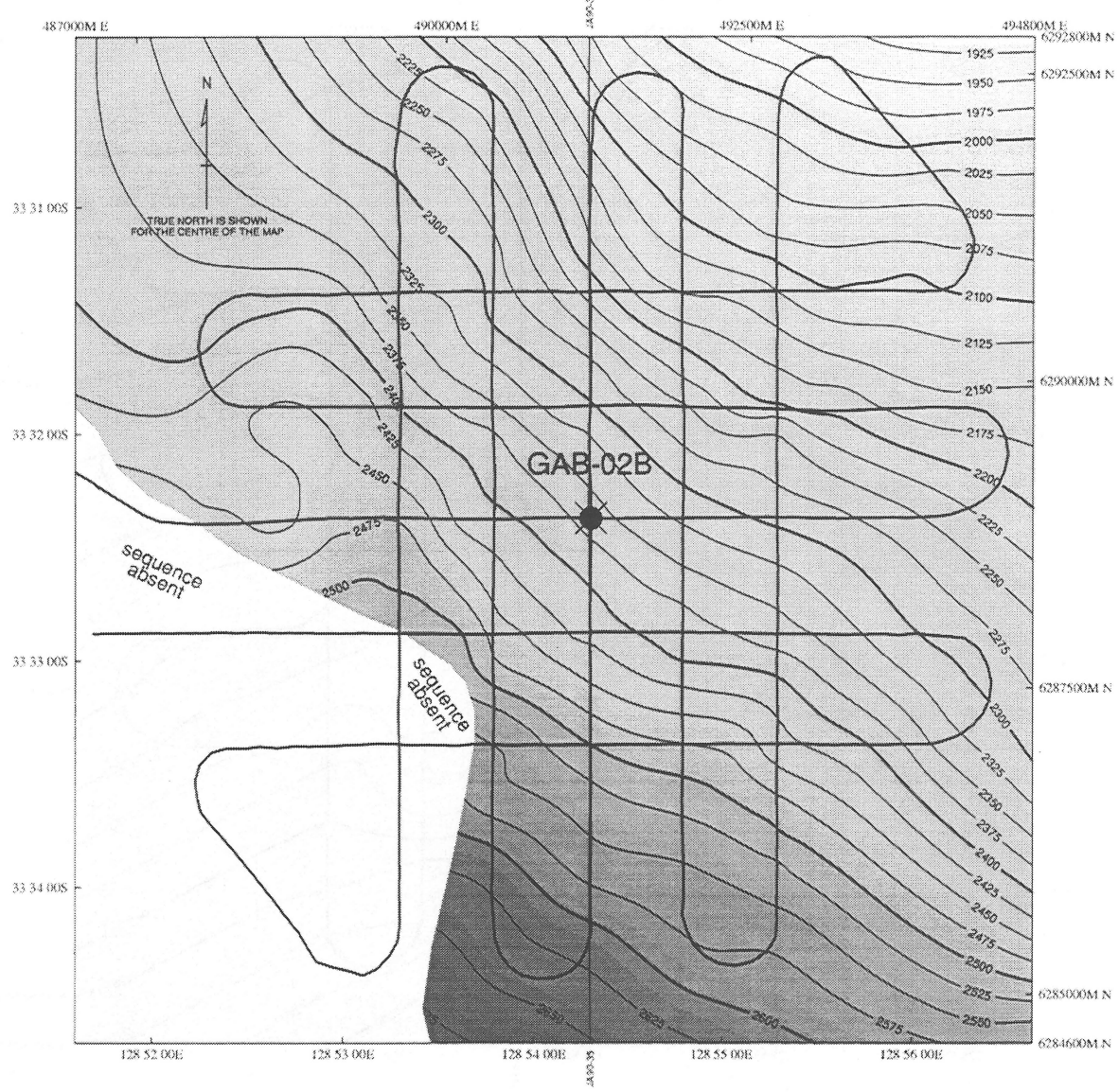
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO INTRA-SEQ. 4 Hor. C
(25 msec contour interval)

		David A. Feary

EUCLA BASIN: ODP Site GAB-02B



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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

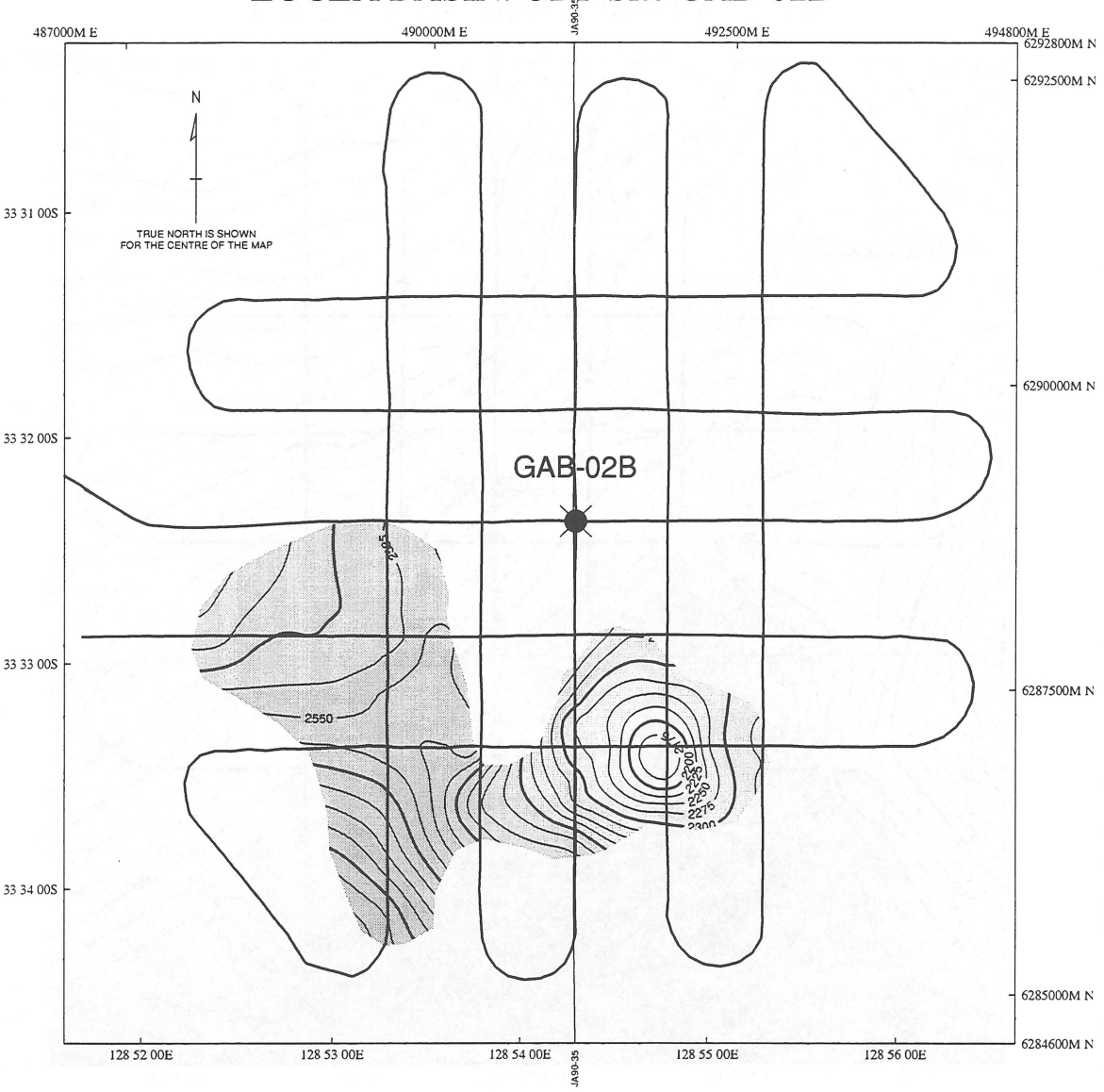
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO TOP SEQUENCE 7
(25 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-02B



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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

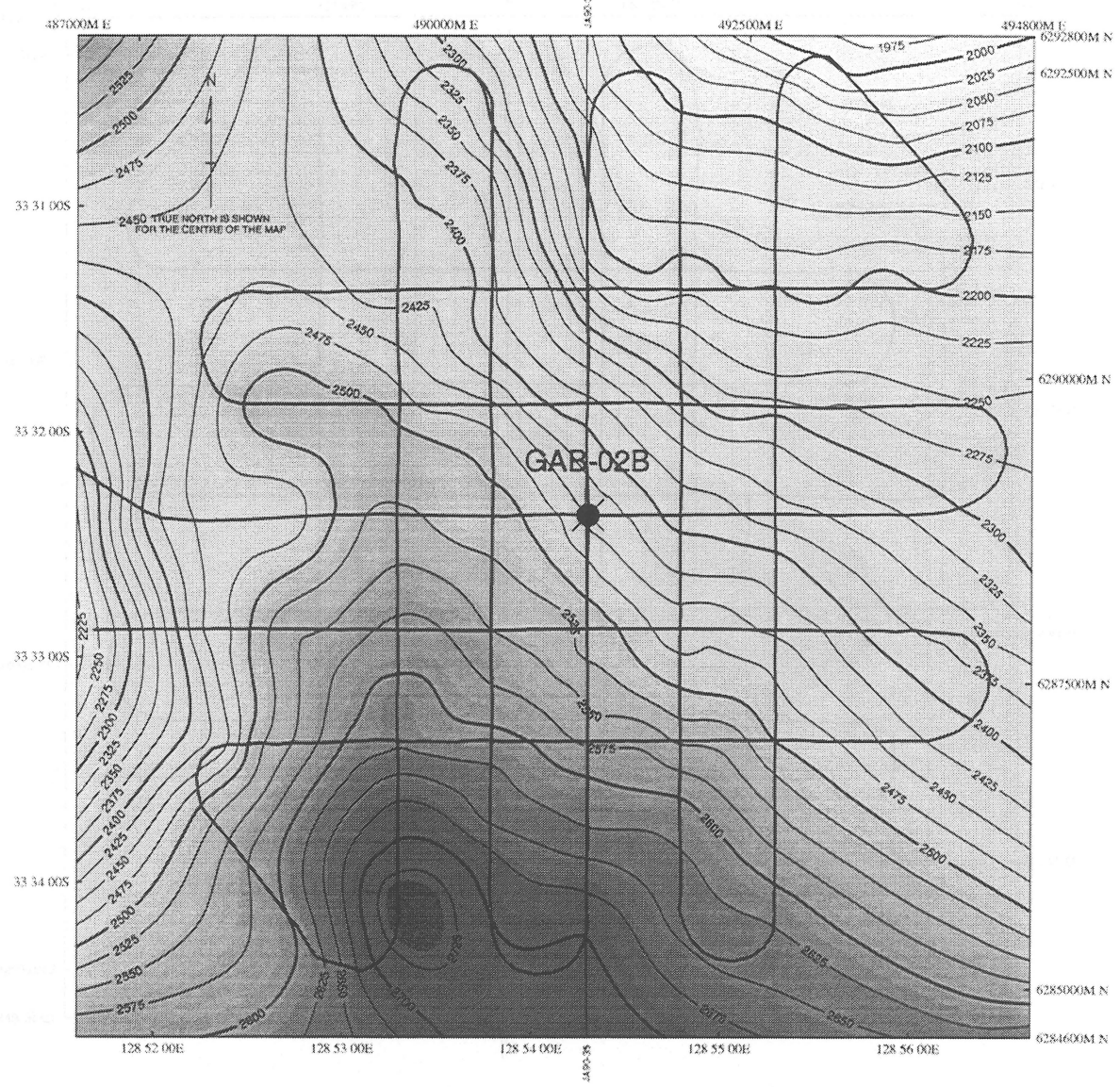
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO TOP VOLCANICS
(25 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-02B



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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO ?BASE TERTIARY
(25 msec contour interval)

David A. Feary

9.2 SITES GAB-03B AND GAB-04B

Sites GAB-03B and GAB-04B are located to intersect the Eocene to early Middle Miocene section deposited in lobes on the upper slope, coeval with deposition of the extensive carbonate platform on the continental shelf. In addition, these sites will also intersect an early Neogene succession poorly sampled at other sites; a highly condensed late Neogene succession; and the upper part of the marine Cenomanian section at Site GAB-04B.

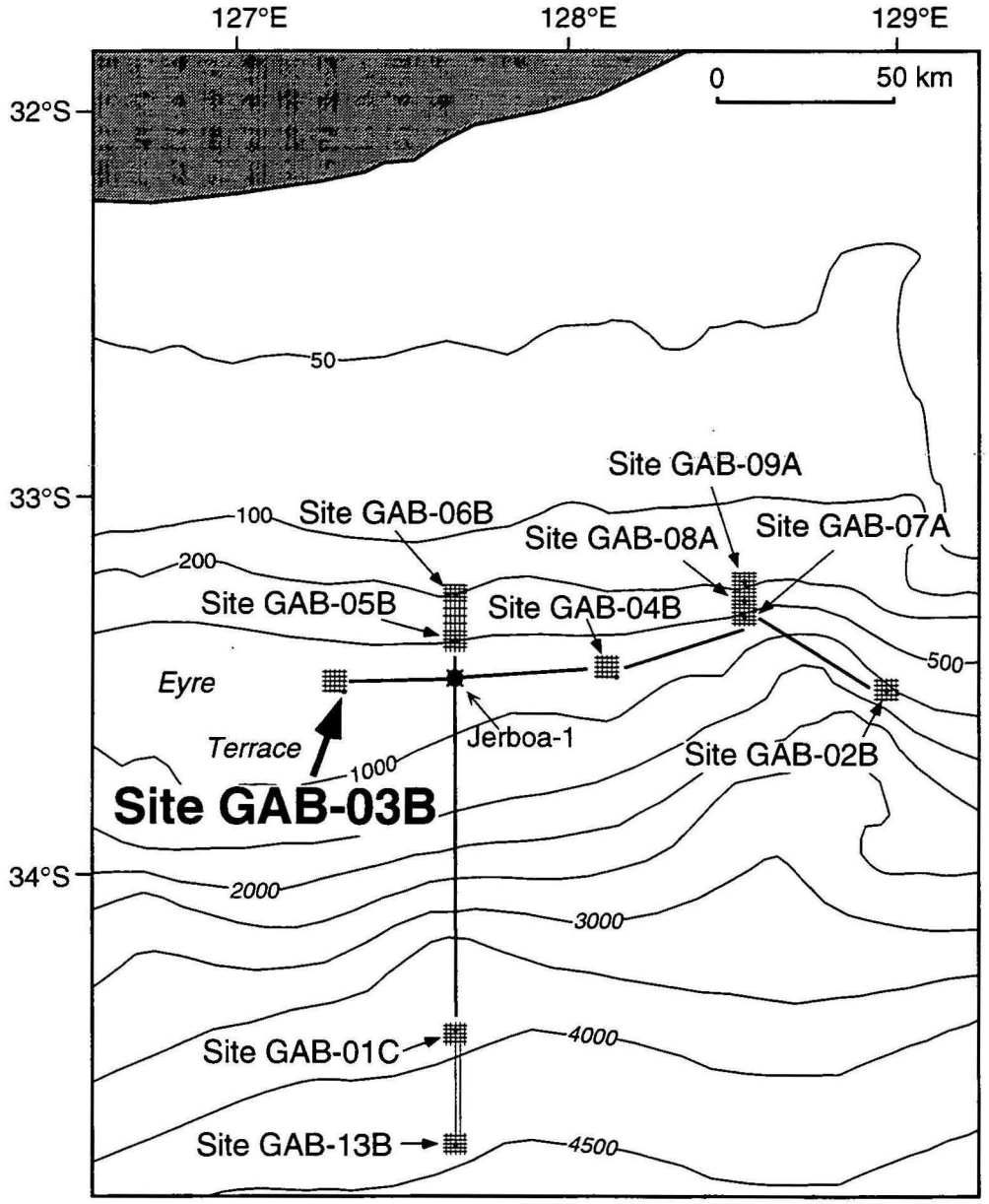
Principal Objectives:

- to collect a detailed record of Paleogene-early Neogene temperate to subtropical, mid-latitude sedimentation in an upper slope environment. Low sea-level hiatuses within the carbonate platform sequence further inshore should be represented by thin sequences on the upper slope. For portions of the succession occurring at both locations, direct comparison of shelf and off-shelf depositional facies will be possible.
- to recover a record of marine flooding of the evolving rift basin in the Cenomanian (Site GAB-04B).

Additional Objectives:

- to determine the characteristics of upper slope, cool-water carbonate facies within the Neogene succession (Sequences 2 and 4).
- to determine paleoceanographic parameters within an upper slope setting in Sequences 2 and 4, to complement other components of the shelf-to-basin transect.
- to evaluate sea-level control on Neogene facies within an upper slope setting; in particular, to evaluate stratigraphic response to eustatic oscillations by comparison with equivalent time intervals in shallow shelf and deep oceanic situations.
- to evaluate the diagenetic history and processes within Neogene facies in an upper slope setting.

SITE GAB-03B


127°E
128°E
129°E
0
50 km
32°S
33°S
34°S
50
100
200
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2000
3000
4000
4500
Site GAB-09A
Site GAB-06B
Site GAB-08A
Site GAB-07A
Site GAB-05B
Site GAB-04B
Eyre
Terrace
Jerboa-1
Site GAB-02B
Site GAB-03B
Site GAB-01C
Site GAB-13B

Revised October 1992

SAFETY CHECK SHEET
JOIDES POLLUTION PREVENTION AND SAFETY PANEL

1) Basic site information.

Leg: **182**	*Site designation:* **GAB-03B**	*Latitude:* **33°31.7255'S**	*Longitude:* **127°15.8565'E**
Water Depth: **704 m**	*Distance from land:* **75.3 n. mi.**	*Jurisdiction:* **Australia**	
General location or geomorphic province: **Eucla Basin; western Great Australian Bight**			
Probable thickness of sediments: **≈2830 m**	*Proposed total penetration:* **510 m**		

2) Upon what geophysical and/or geological data was this site selection made?

Multichannel Seismic lines: **AGSO (1996) 169/01E (SP 1668.59) and 169/01O (SP 4696.26)**
Single Channel Seismic lines: **Nil**
DSDP/ODP holes: **Nil**
Piston cores: **Gravity cores 173/GC02 (5.59 m) and 173/GC03 (5.35 m)**
Other:

3) What is your proposed drilling program?

Double APC; XCB; possible RCB; no re-entry system required.

4) What is your proposed logging program?

Triple Combo; FMS/Sonic; WST.

5) From previous DSDP/ODP drilling in this area, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock:

No relevant DSDP/ODP drilling in the area.

6) From available information, list all commercial drilling in this area that produced or yielded significant shows. Give depths and ages of hydrocarbon-bearing deposits:

Only relevant commercial drilling in the area is Jerboa-1, 17 n mi. to the east, which targetted the Mesozoic section in the Eyre Sub-basin. Jerboa-1 encountered no significant shows, with vitrinite reflectance indicating an immature to marginally mature Mesozoic section to TD.

7) Is there any indication of gas hydrates at this location?

No indication of gas hydrates; no BSR present.

8) Is there any reason to expect any hydrocarbon accumulation at this site? Please comment.

No hydrocarbon accumulation expected.

9) What "special" precautions will be taken during drilling?

Standard hydrocarbon monitoring.

10) What abandonment procedures do you plan to follow?

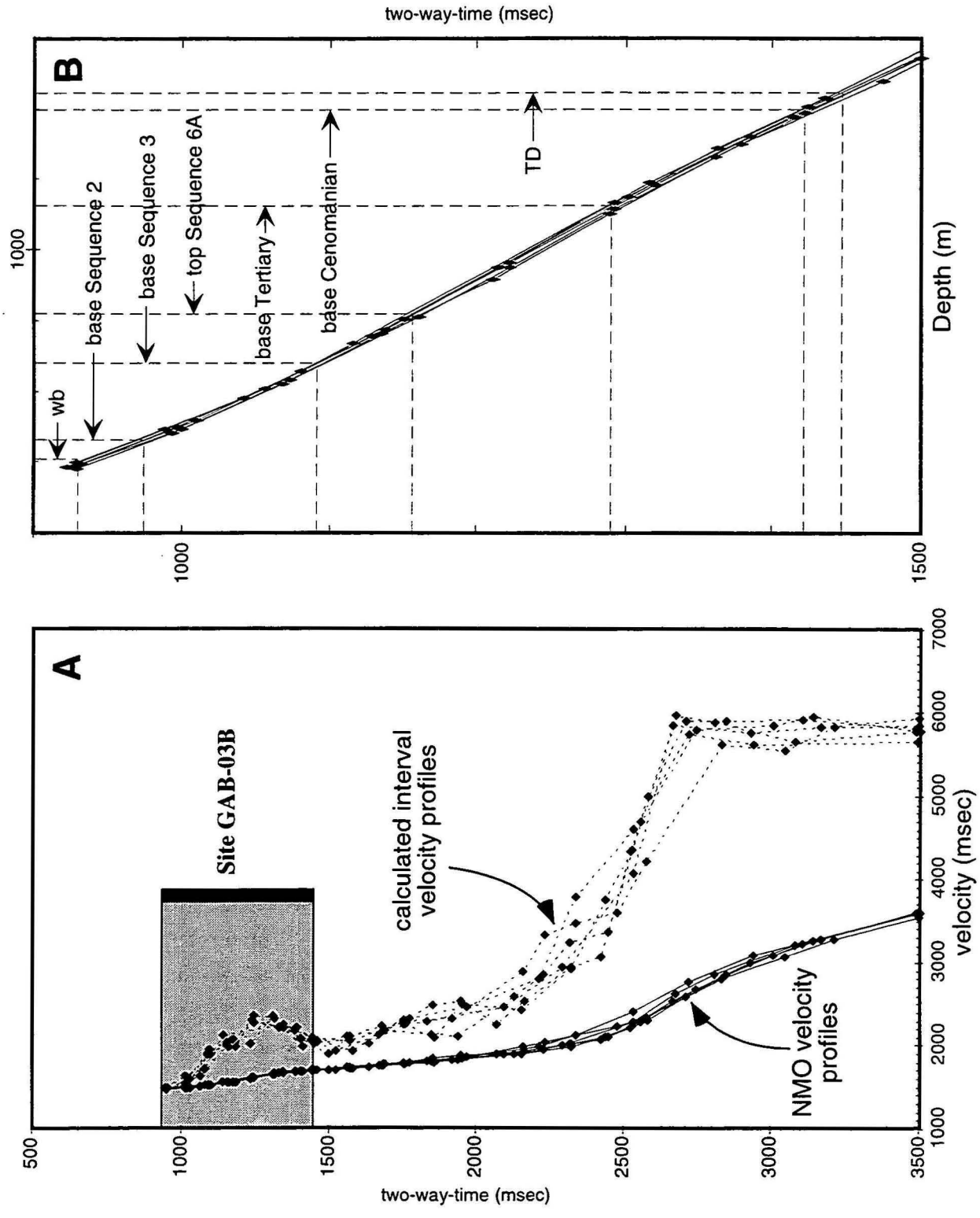
Standard abandonment procedures.

Summary: *What do you consider to be the major risks in drilling at this site?*

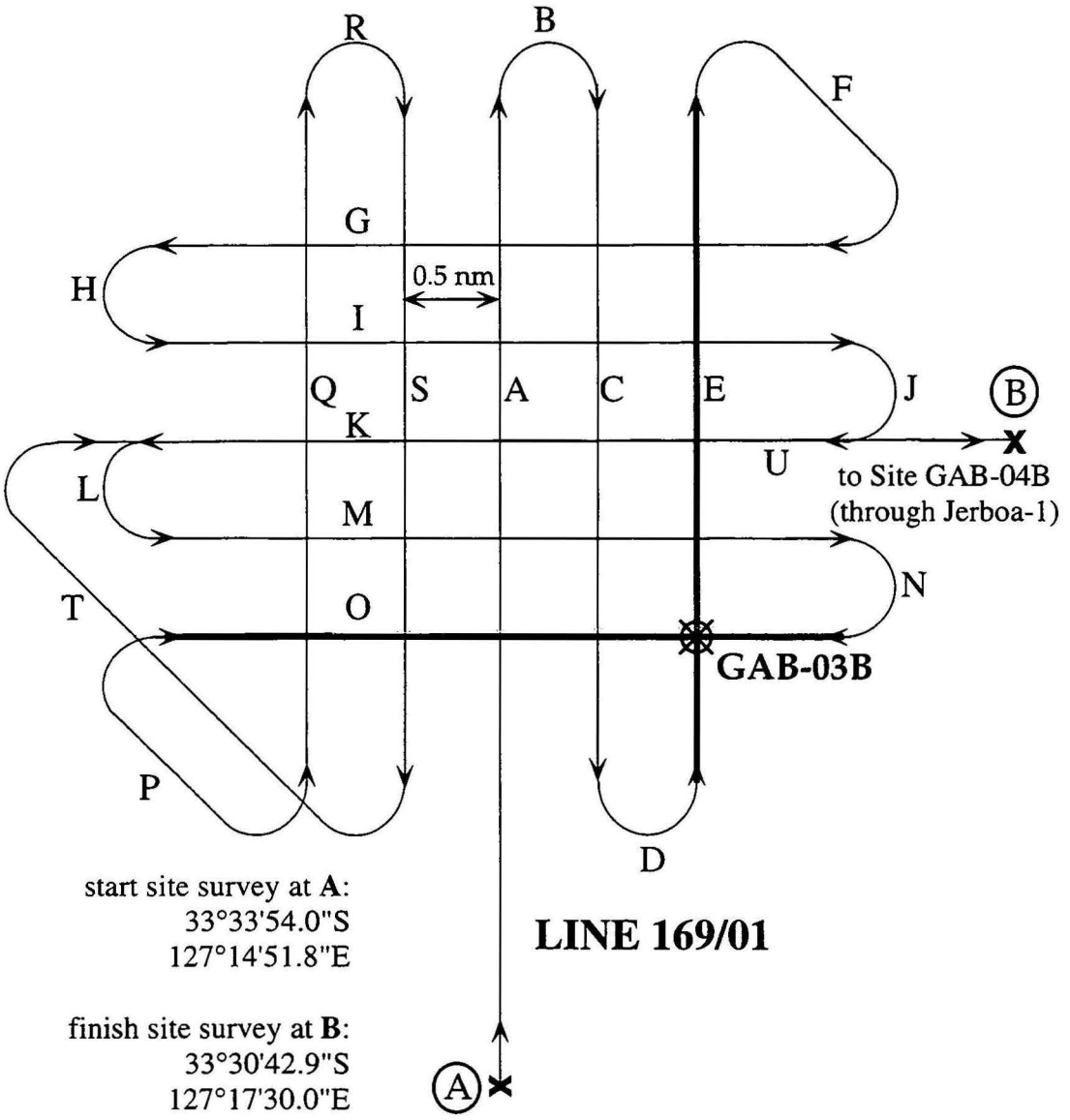
No significant drilling risks are anticipated at this site.

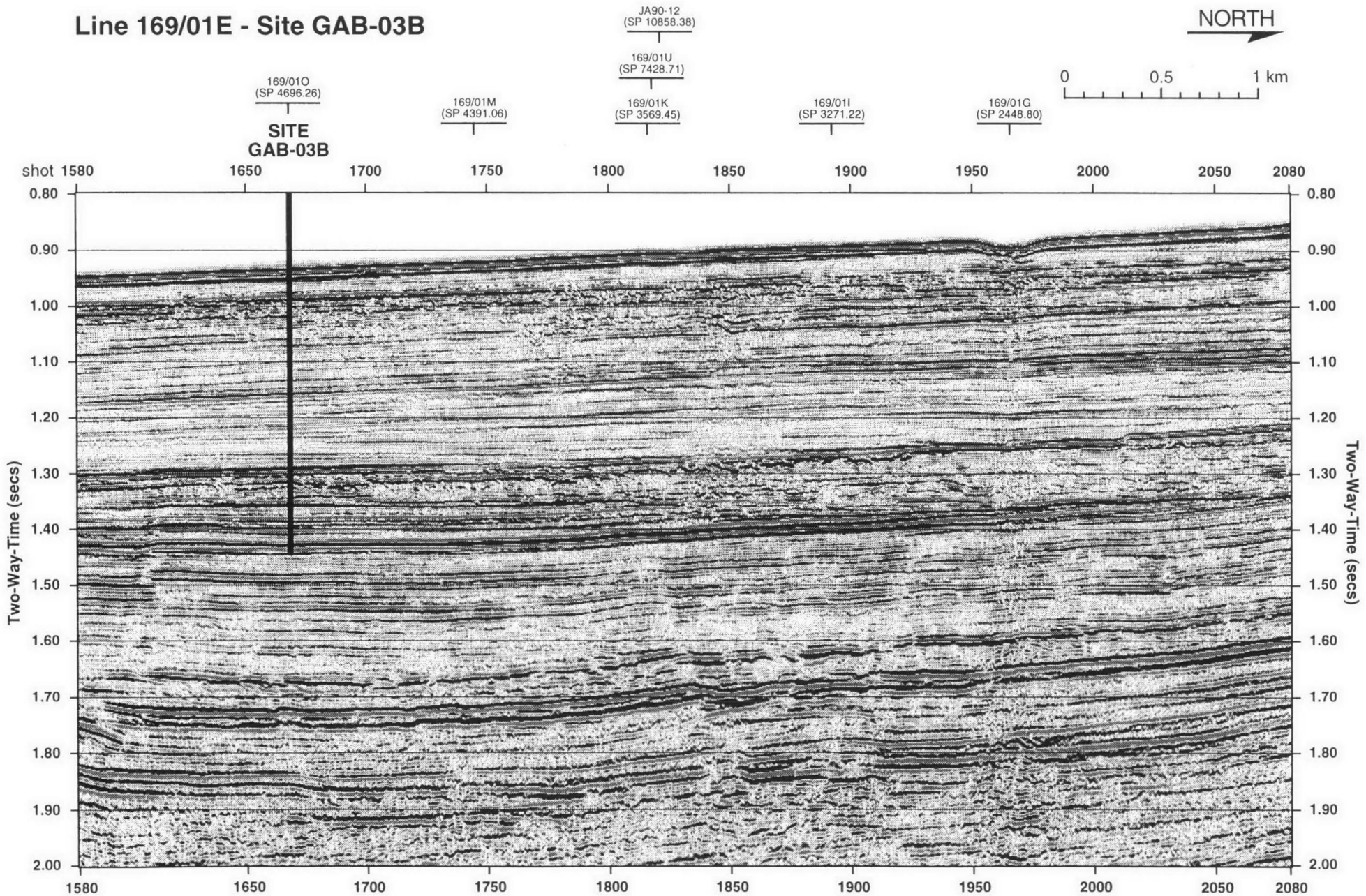
Velocity Calculations: Site GAB-03B

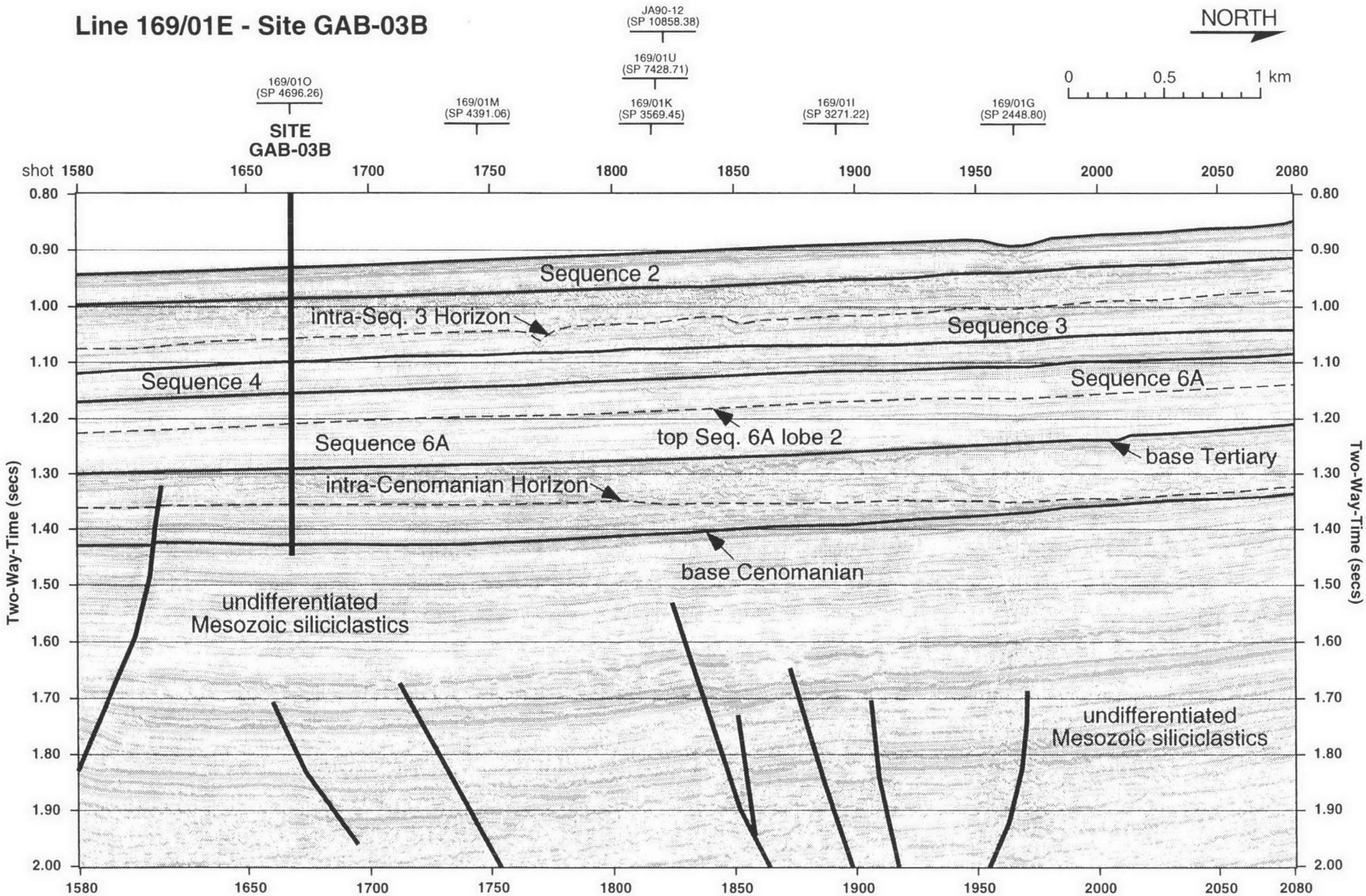
Velocity analysis for site GAB-03B, from seismic line 169/01. The six closest NMO (stacking) velocities to the site have been used to derive interval velocity profiles (A) and time-depth curves (B). Approximate depths to horizons shown on seismic sections presented on the following pages can then be derived from these time-depth curves.

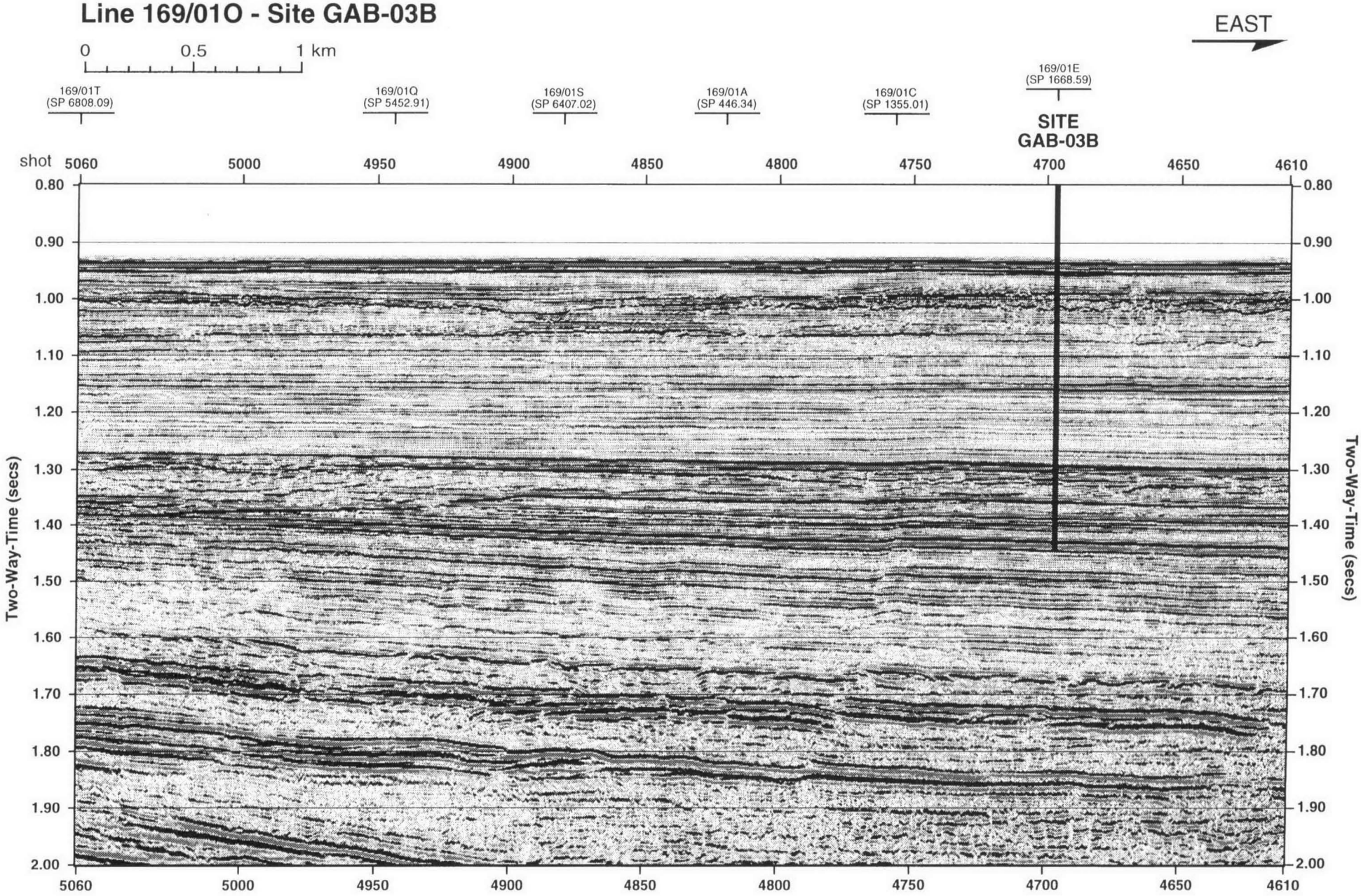


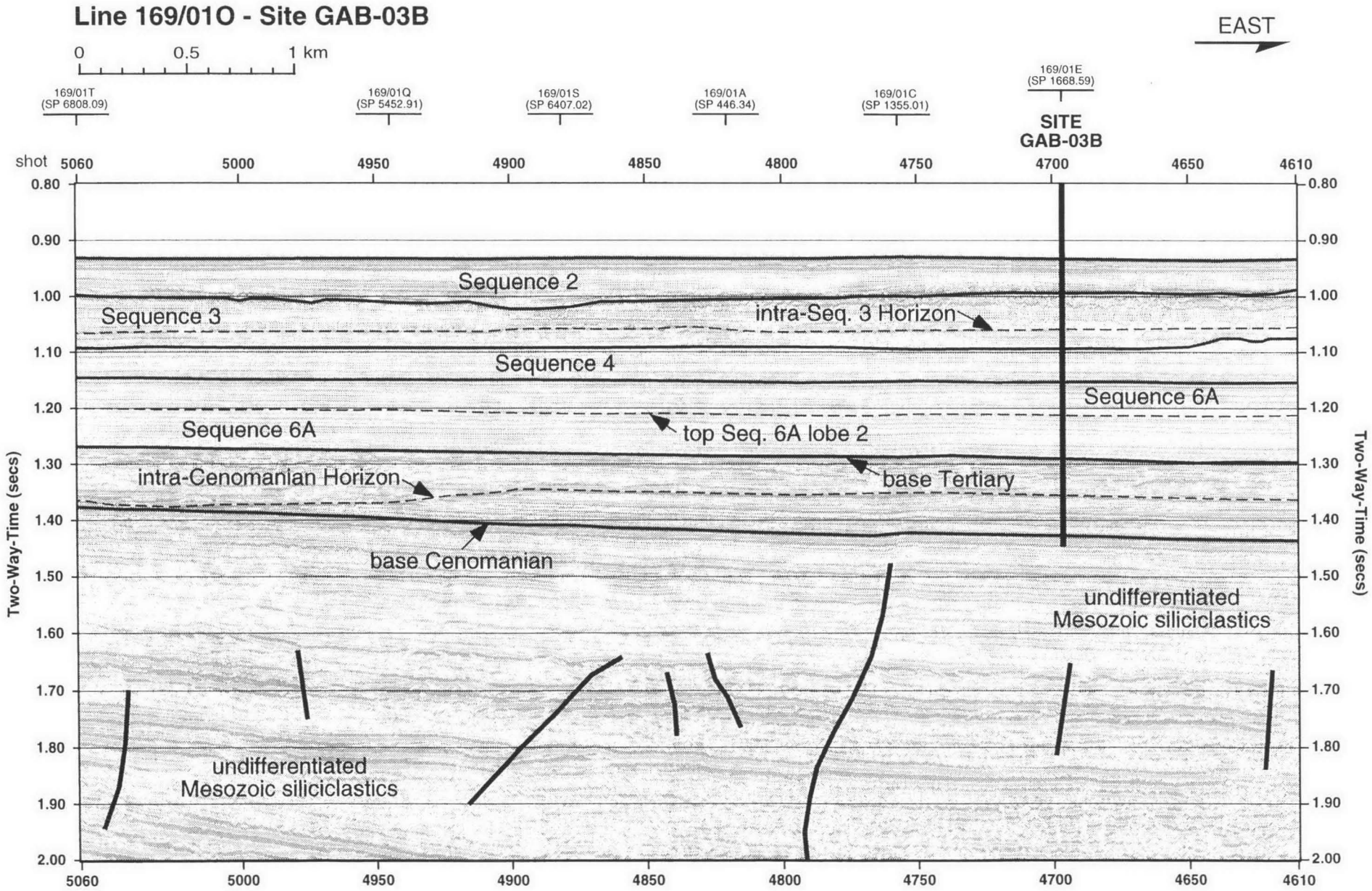
AGSO Survey 169 (February 1996) track map - Site GAB-03B



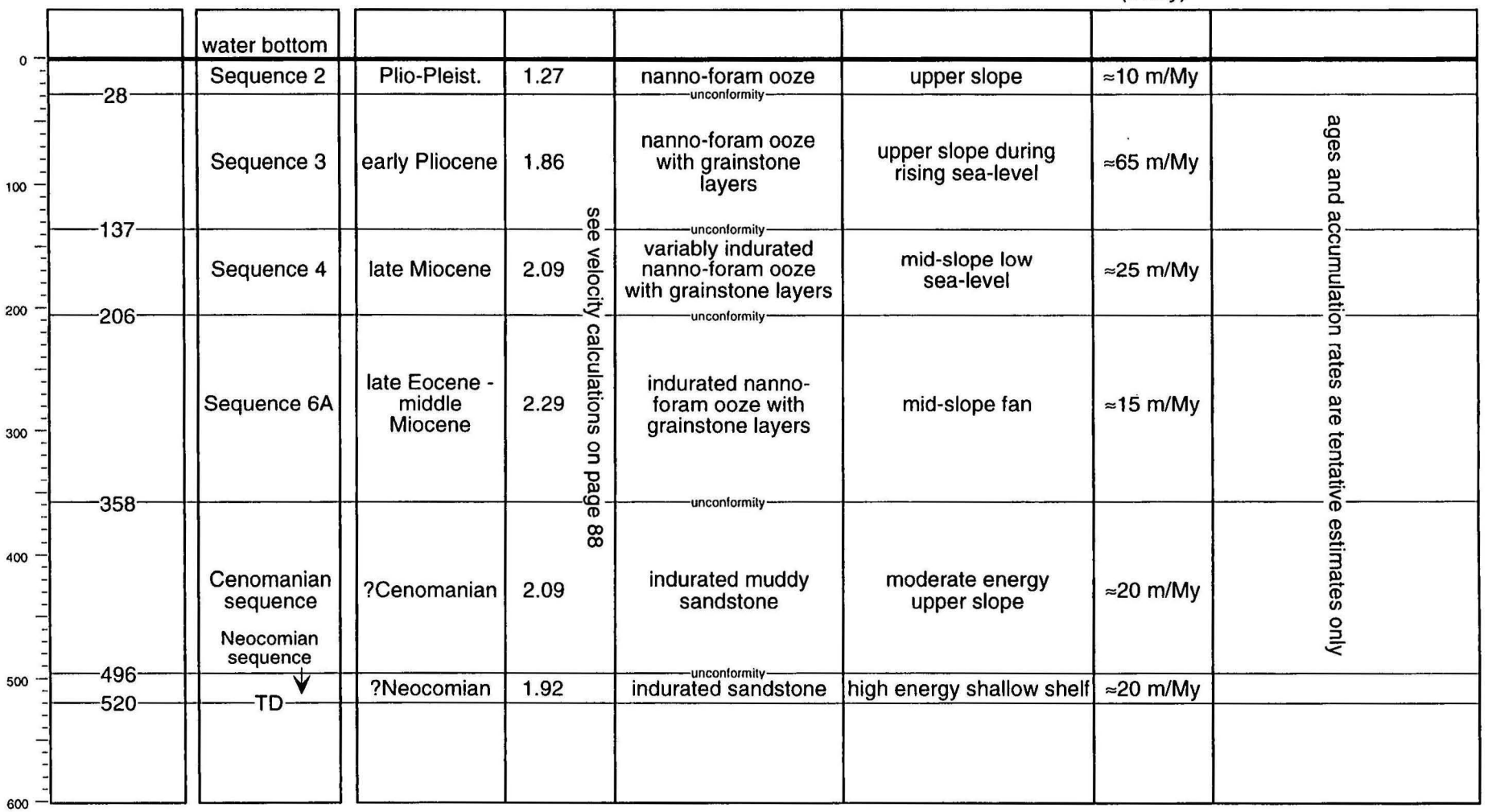

Line 169/01E - Site GAB-03B
JA90-12
(SP 10858.38)
169/01U
(SP 7428.71)
NORTH
0
0.5
1 km
169/01O
(SP 4696.26)
SITE
GAB-03B
169/01M
(SP 4391.06)
169/01K
(SP 3569.45)
169/01I
(SP 3271.22)
169/01G
(SP 2448.80)
shot 1580
1650
1700
1750
1800
1850
1900
1950
2000
2050
2080
0.80
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60
1.70
1.80
1.90
2.00
Two-Way-Time (secs)


Line 169/01E - Site GAB-03B
JA90-12
(SP 10858.38)
169/01U
(SP 7428.71)
NORTH
0
0.5
1 km
169/01O
(SP 4696.26)
SITE
GAB-03B
169/01M
(SP 4391.06)
169/01K
(SP 3569.45)
169/01I
(SP 3271.22)
169/01G
(SP 2448.80)
shot 1580
1650
1700
1750
1800
1850
1900
1950
2000
2050
2080
Sequence 2
intra-Seq. 3 Horizon
Sequence 3
Sequence 4
Sequence 6A
top Seq. 6A lobe 2
Sequence 6A
base Tertiary
intra-Cenomanian Horizon
base Cenomanian
undifferentiated
Mesozoic siliciclastics
undifferentiated
Mesozoic siliciclastics
Two-Way-Time (secs)
0.80
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60
1.70
1.80
1.90
2.00

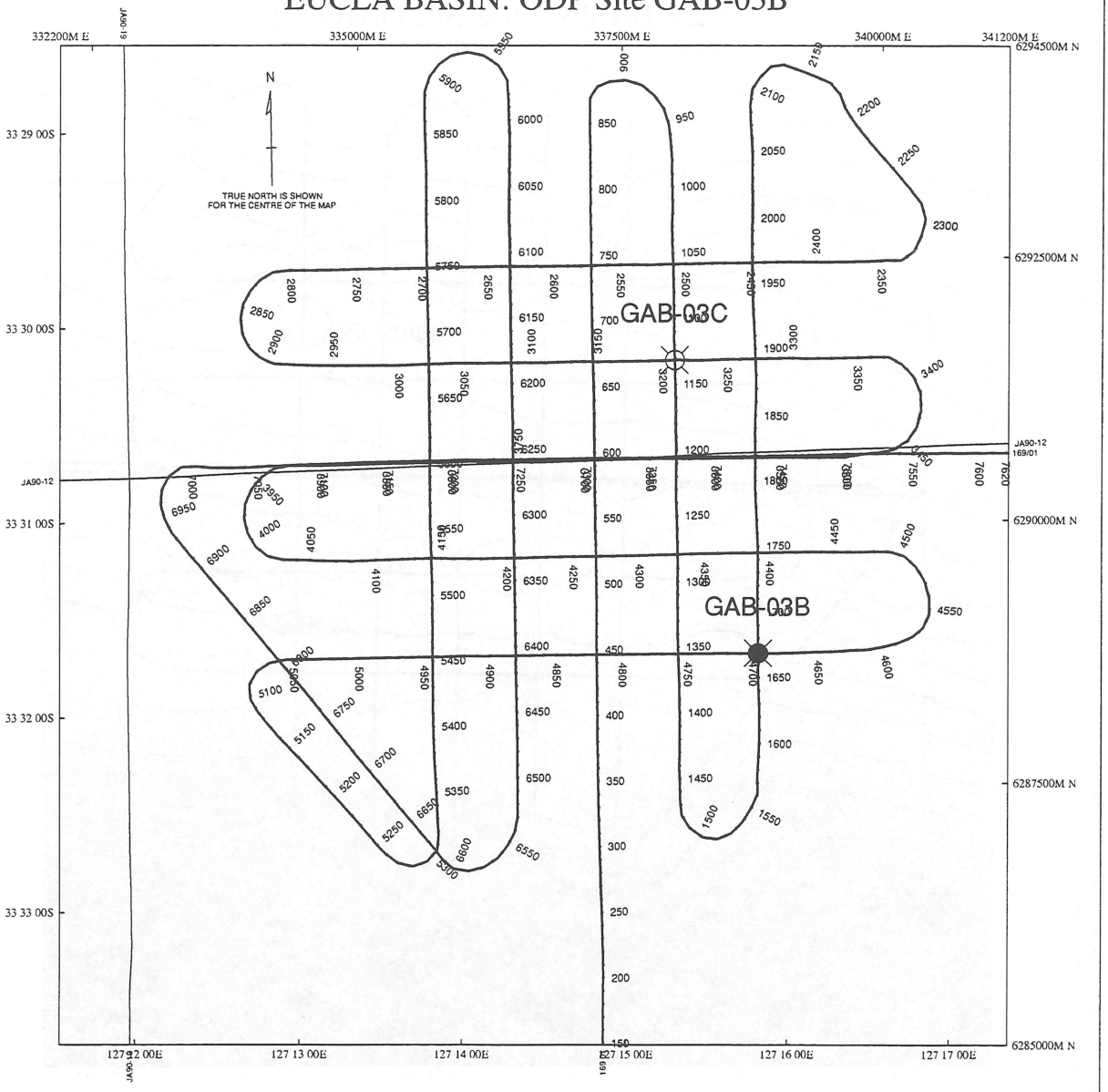

Line 169/01O - Site GAB-03B
0
0.5
1 km
EAST
169/01T
(SP 6808.09)
169/01Q
(SP 5452.91)
169/01S
(SP 6407.02)
169/01A
(SP 446.34)
169/01C
(SP 1355.01)
169/01E
(SP 1668.59)
SITE
GAB-03B
shot
5060
5000
4950
4900
4850
4800
4750
4700
4650
4610
0.80
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60
1.70
1.80
1.90
2.00
Two-Way-Time (secs)


Line 169/01O - Site GAB-03B
EAST
0
0.5
1 km
169/01T (SP 6808.09)
169/01Q (SP 5452.91)
169/01S (SP 6407.02)
169/01A (SP 446.34)
169/01C (SP 1355.01)
169/01E (SP 1668.59)
SITE GAB-03B
shot
5060
5000
4950
4900
4850
4800
4750
4700
4650
4610
0.80
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60
1.70
1.80
1.90
2.00
Two-Way-Time (secs)
Sequence 2
Sequence 3
intra-Seq. 3 Horizon
Sequence 4
Sequence 6A
Sequence 6A
top Seq. 6A lobe 2
intra-Cenomanian Horizon
base Tertiary
base Cenomanian
undifferentiated Mesozoic siliciclastics
undifferentiated Mesozoic siliciclastics

GRAPHIC SUMMARY, SITE GAB-03B



EUCLA BASIN: ODP Site GAB-03B



AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Petroleum and Marine Division

AUSTRALIA

1:30000

0 3
KILOMETRES

0 1.00
MILES

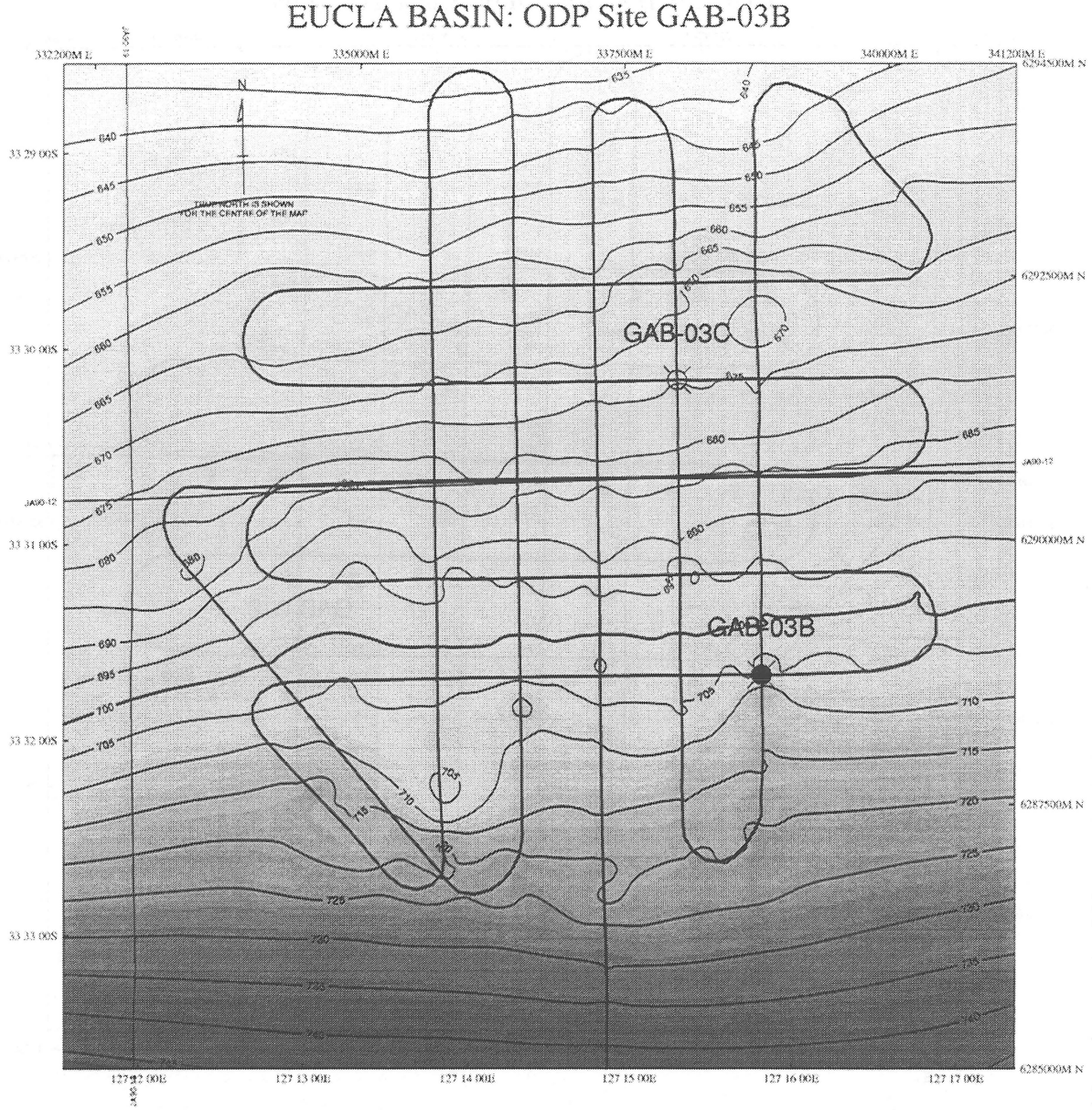
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

SHOT POINT MAP

David A. Feary



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AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Petroleum and Marine Division

AUSTRALIA

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KILOMETRES

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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

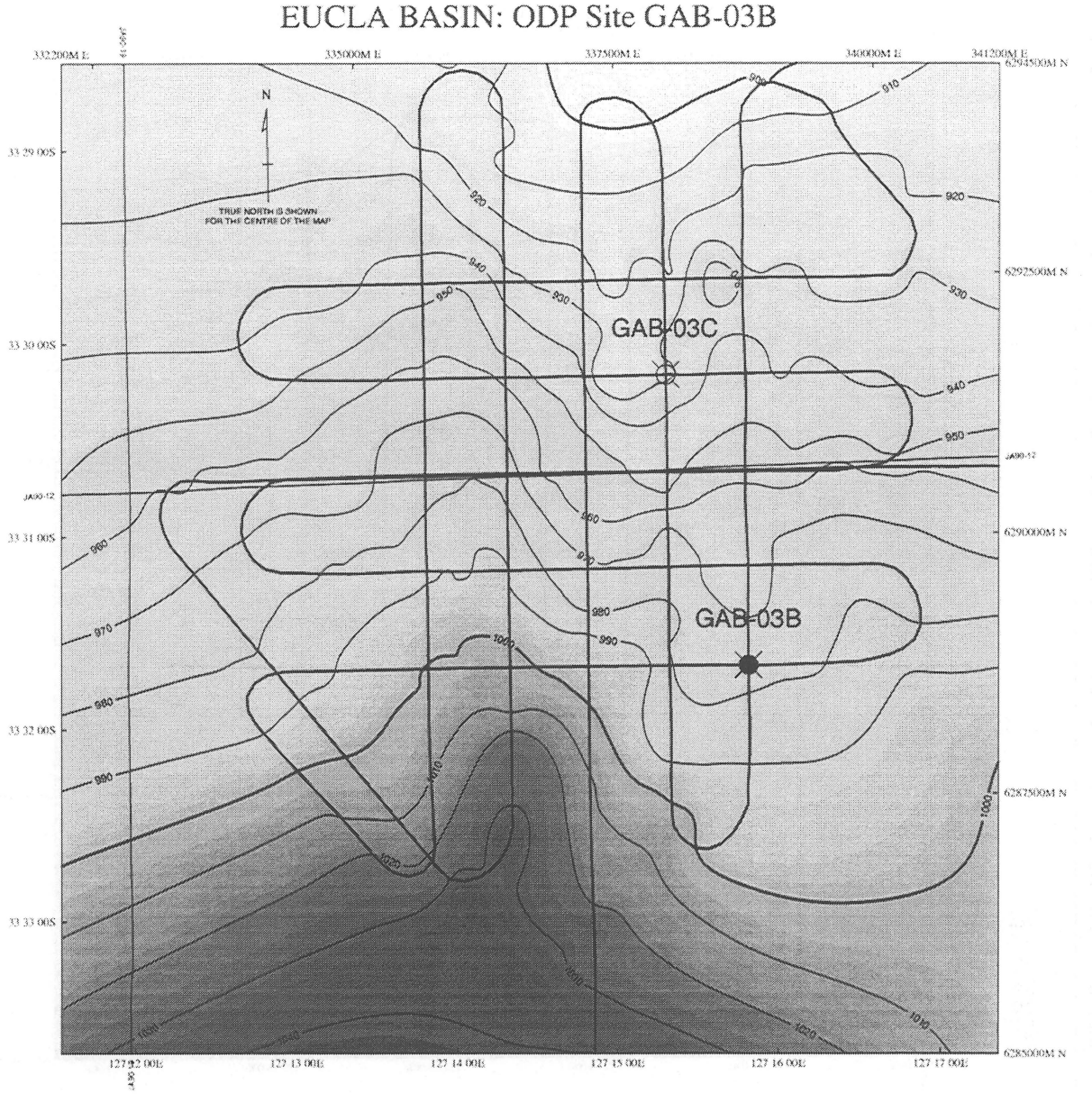
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

BATHYMETRY
(5 m contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-03B



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AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Petroleum and Marine Division

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KILOMETRES

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MILES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

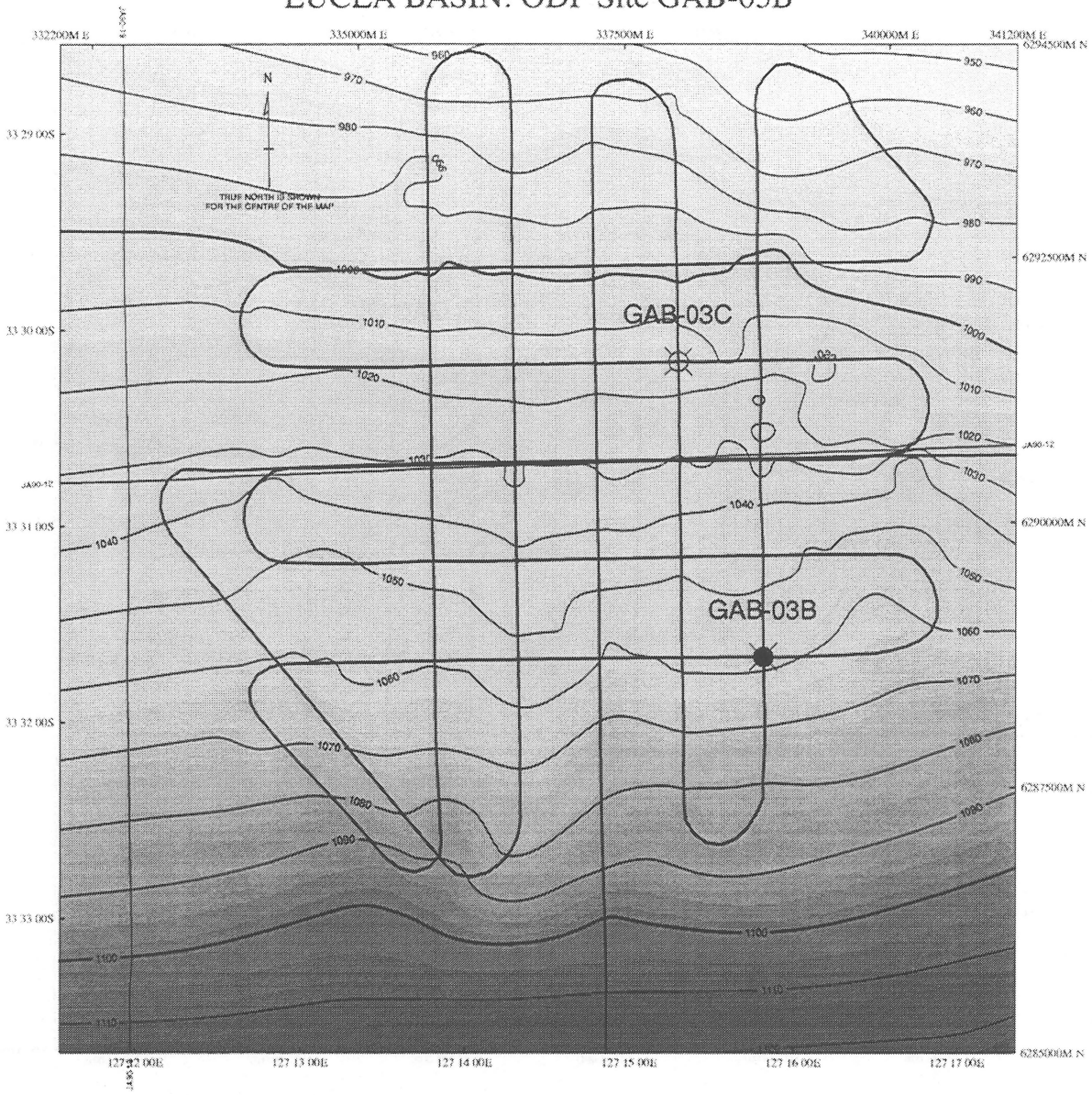
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO BASE SEQUENCE 2
(10 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-03B



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AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Petroleum and Marine Division

AUSTRALIA

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KILOMETRES

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MILES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

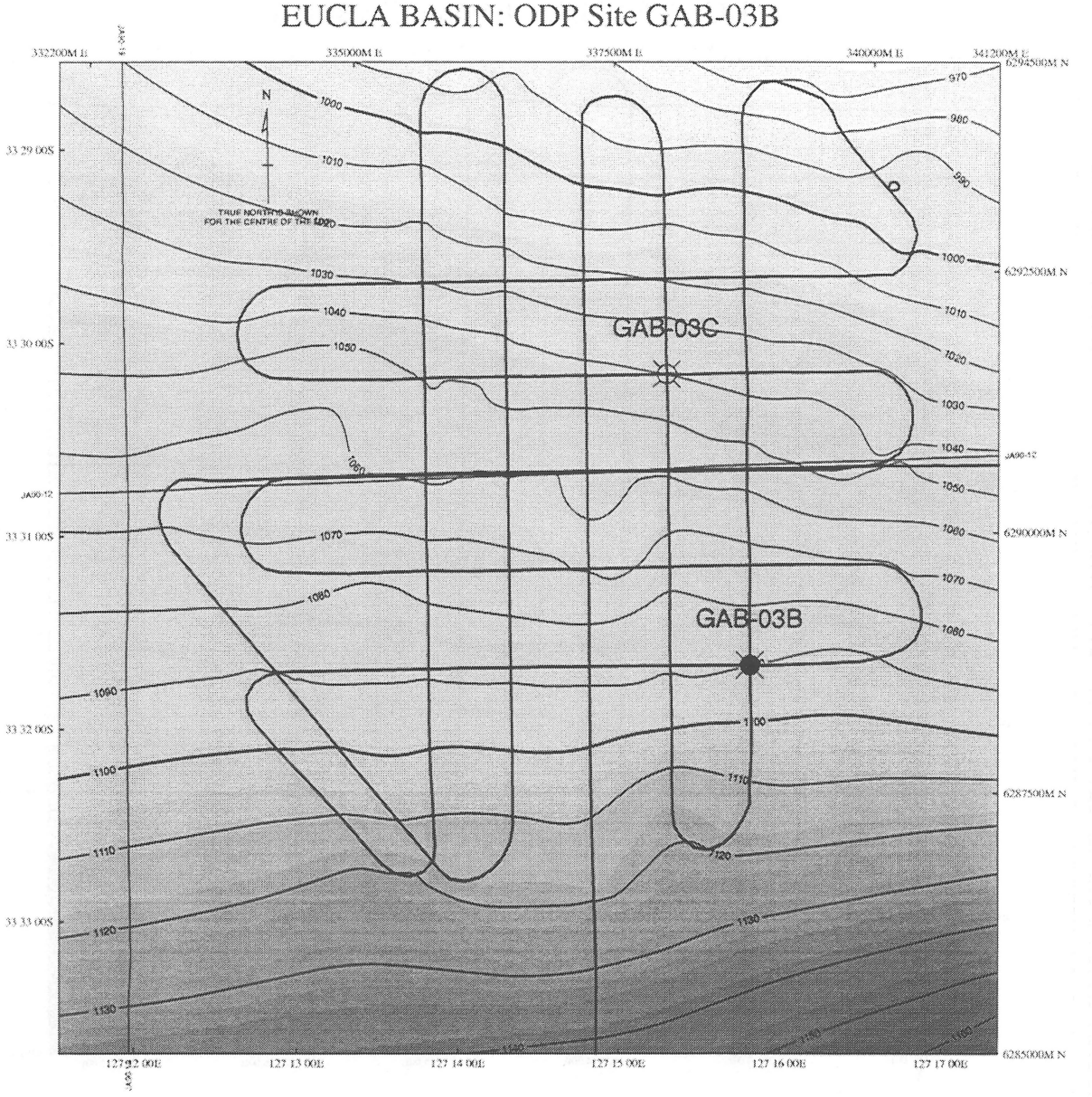
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO INTRA-SEQ. 3
(10 msec contour interval)

		David A. Feary

EUCLA BASIN: ODP Site GAB-03B



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AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Petroleum and Marine Division

AUSTRALIA

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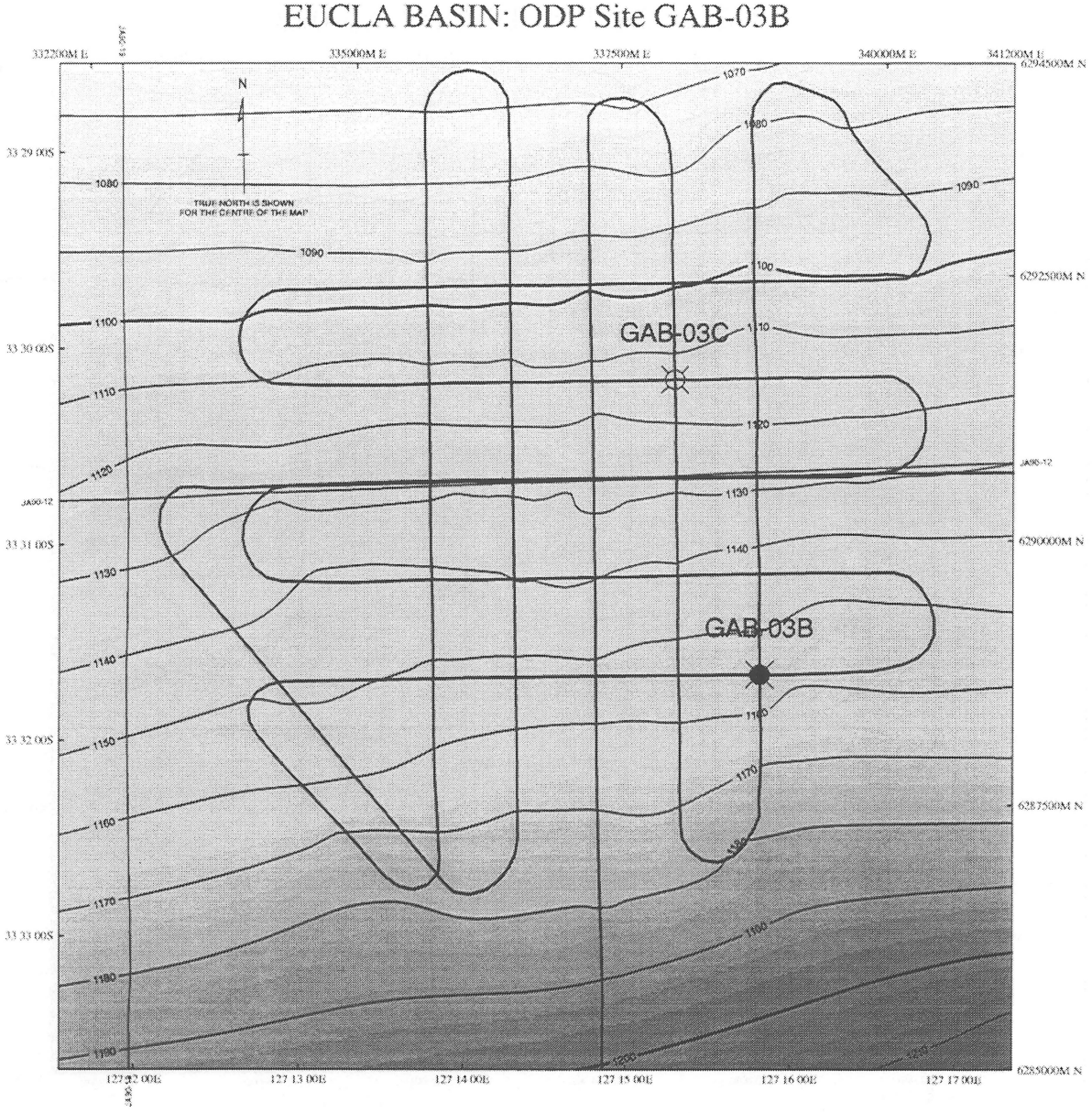
0 3
KILOMETRES

0 1.00
MILES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182		
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)		
TWT TO BASE SEQUENCE 3 (10 msec contour interval)		
		David A. Feary

EUCLA BASIN: ODP Site GAB-03B



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KILOMETRES

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MILES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

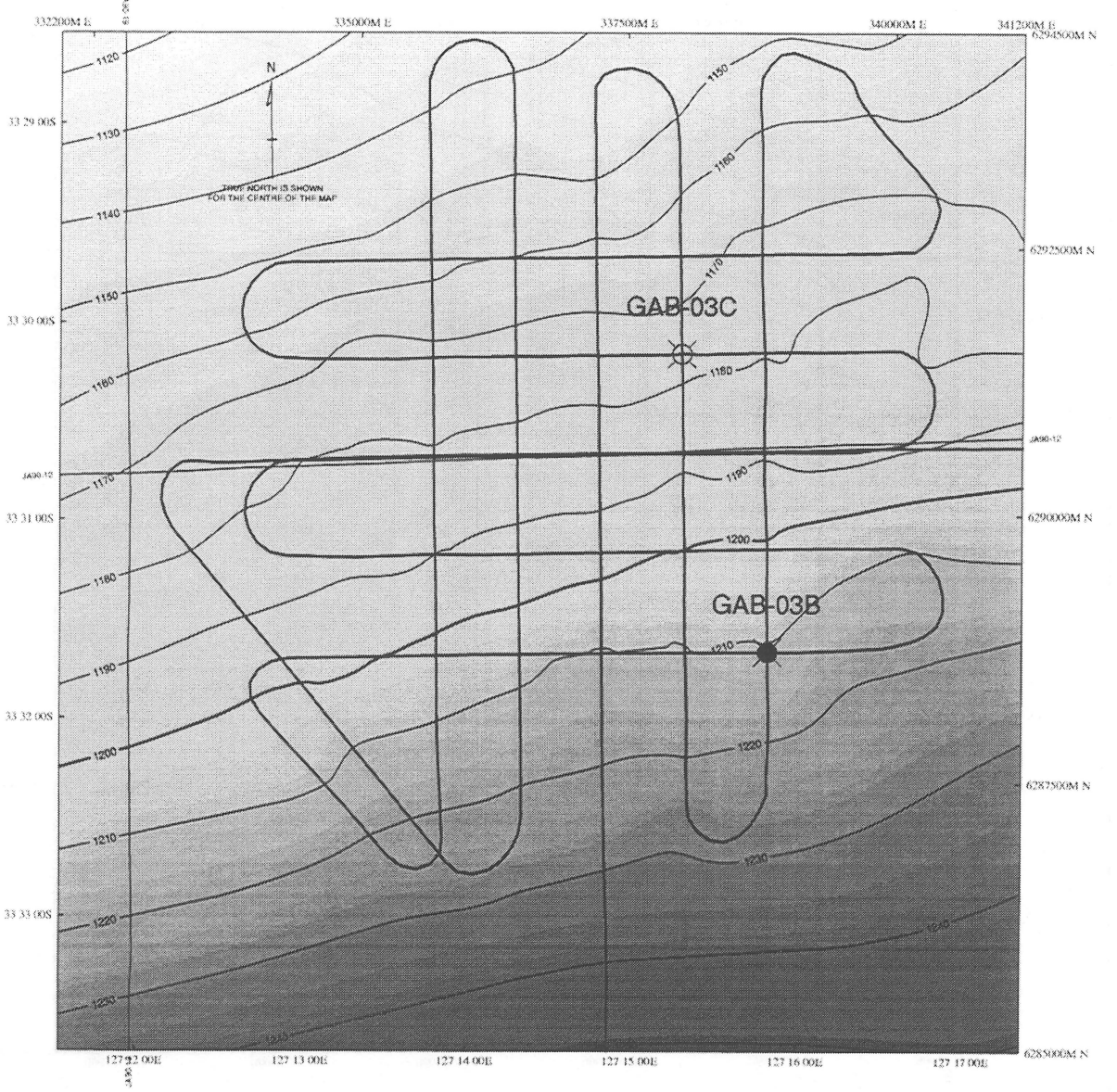
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO TOP SEQ. 6A
(10 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-03B



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Petroleum and Marine Division

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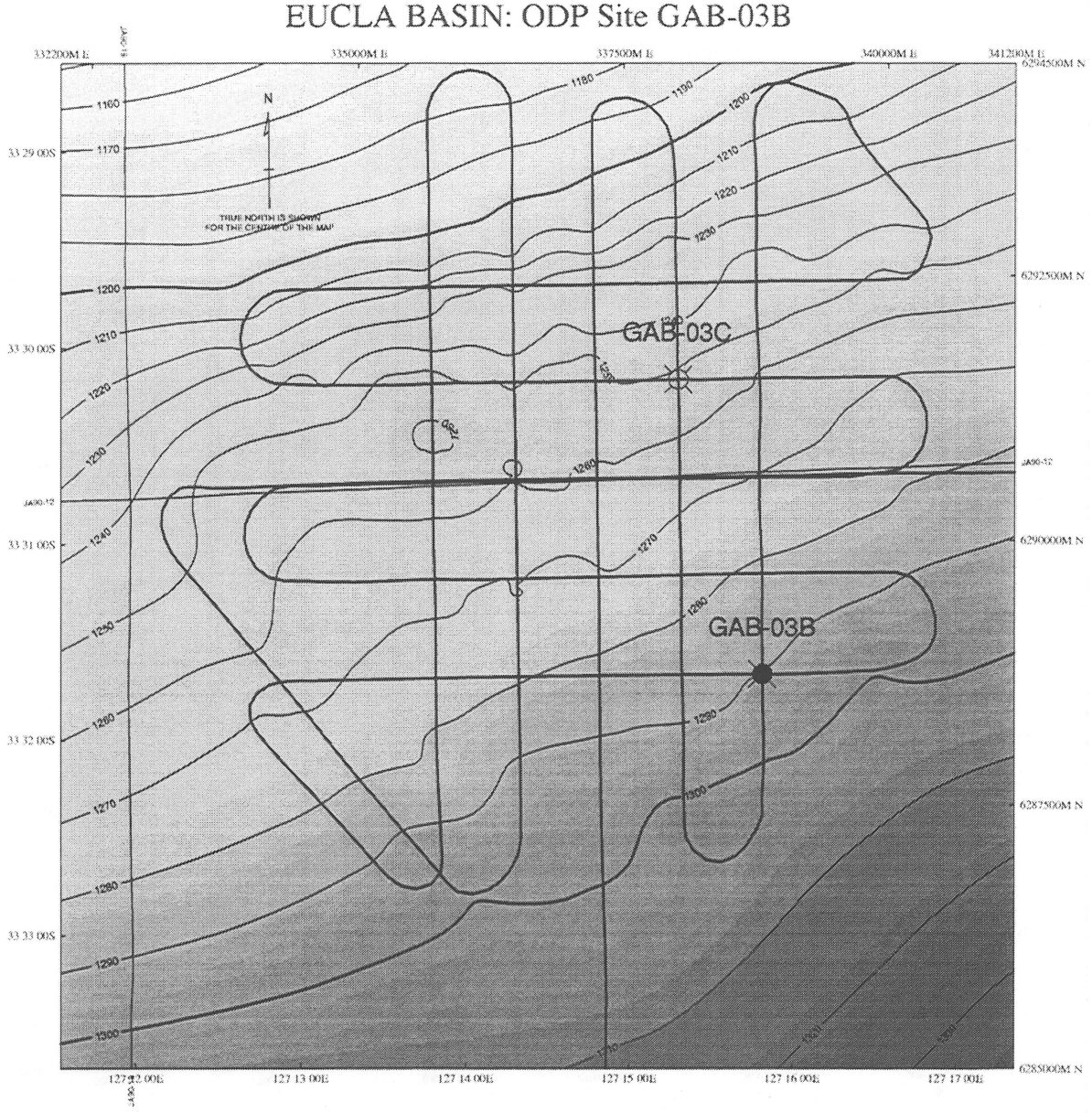
KILOMETRES

0 1.00
MILES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182		
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)		
TWT TO TOP SEQ. 6A LOBE 2 (10 msec contour interval)		
		David A. Feary

EUCLA BASIN: ODP Site GAB-03B



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AUSTRALIA

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KILOMETRES

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MILES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

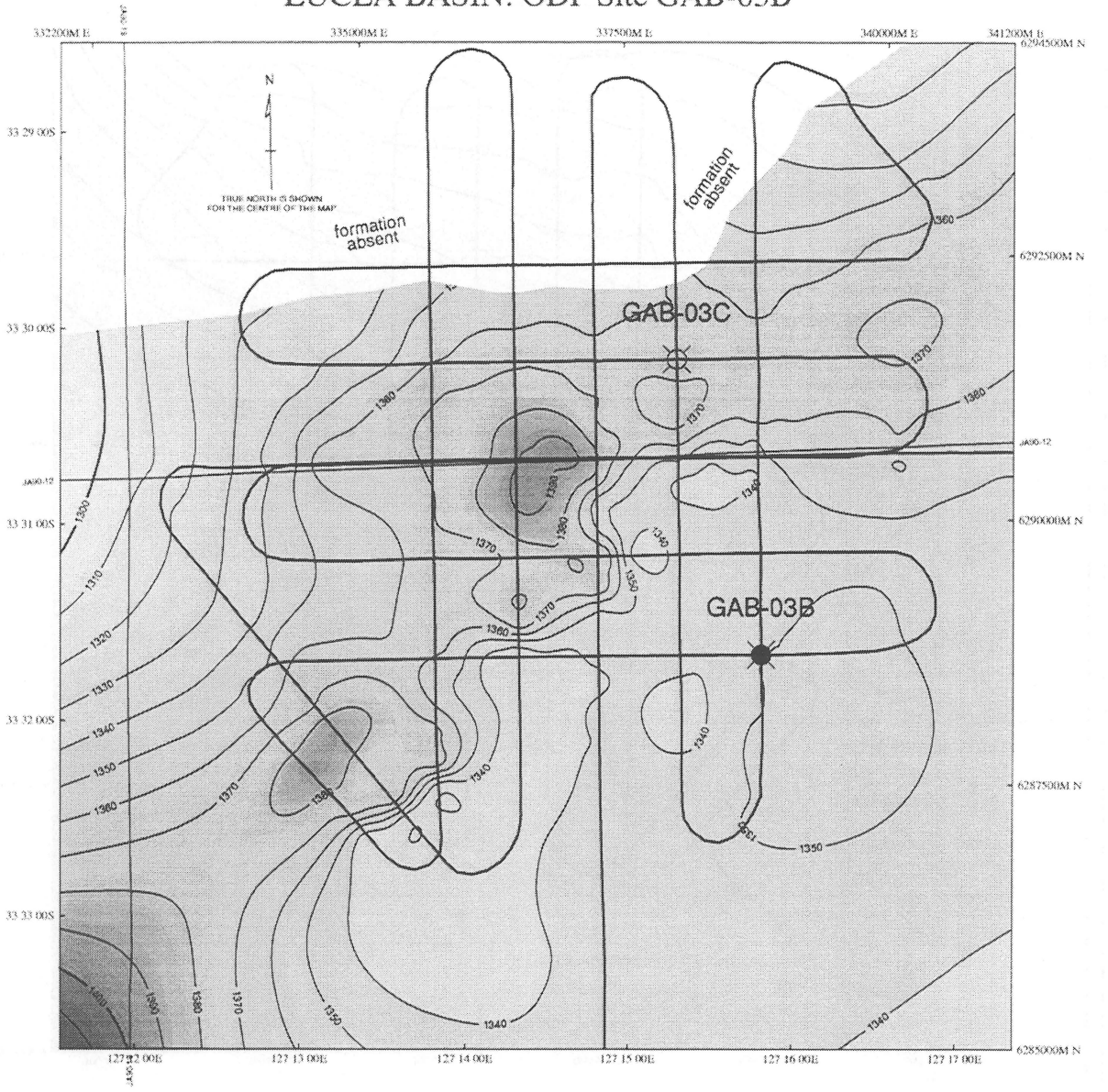
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO ?BASE TERTIARY
(10 msec contour interval)

		David A. Feary

EUCLA BASIN: ODP Site GAB-03B



AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Petroleum and Marine Division

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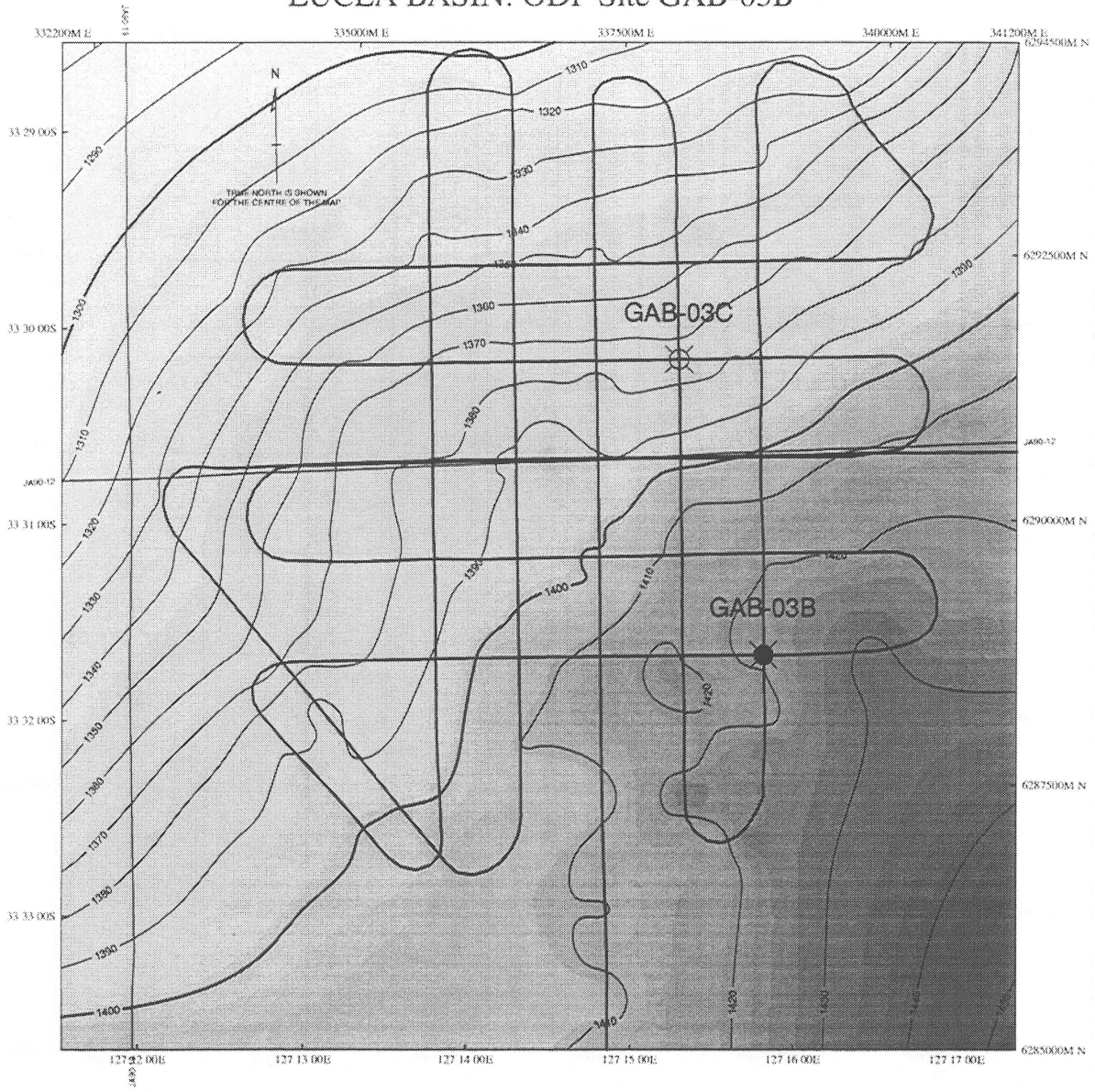
KILOMETRES

0 1.00
MILES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182		
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)		
TWT TO INTRA-CENOMANIAN (10 msec contour interval)		
		David A. Feary

EUCLA BASIN: ODP Site GAB-03B



AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Petroleum and Marine Division

AUSTRALIA

1:30000

0 3
KILOMETRES

0 1.00
MILES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

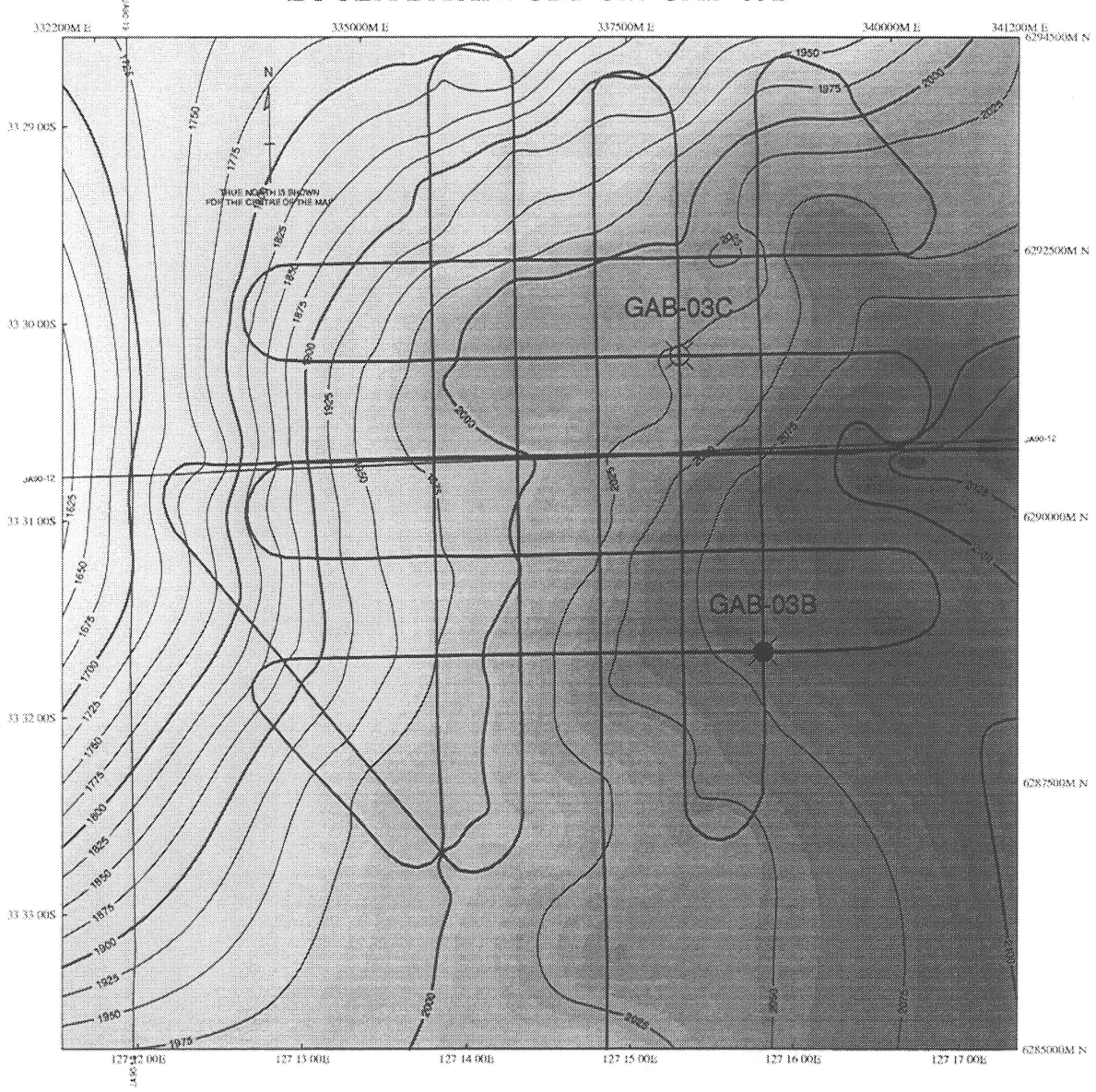
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO ?BASE CENOMANIAN
(10 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-03B



AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Petroleum and Marine Division

1:30000

0 3
KILOMETRES

0 1.00
MILES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

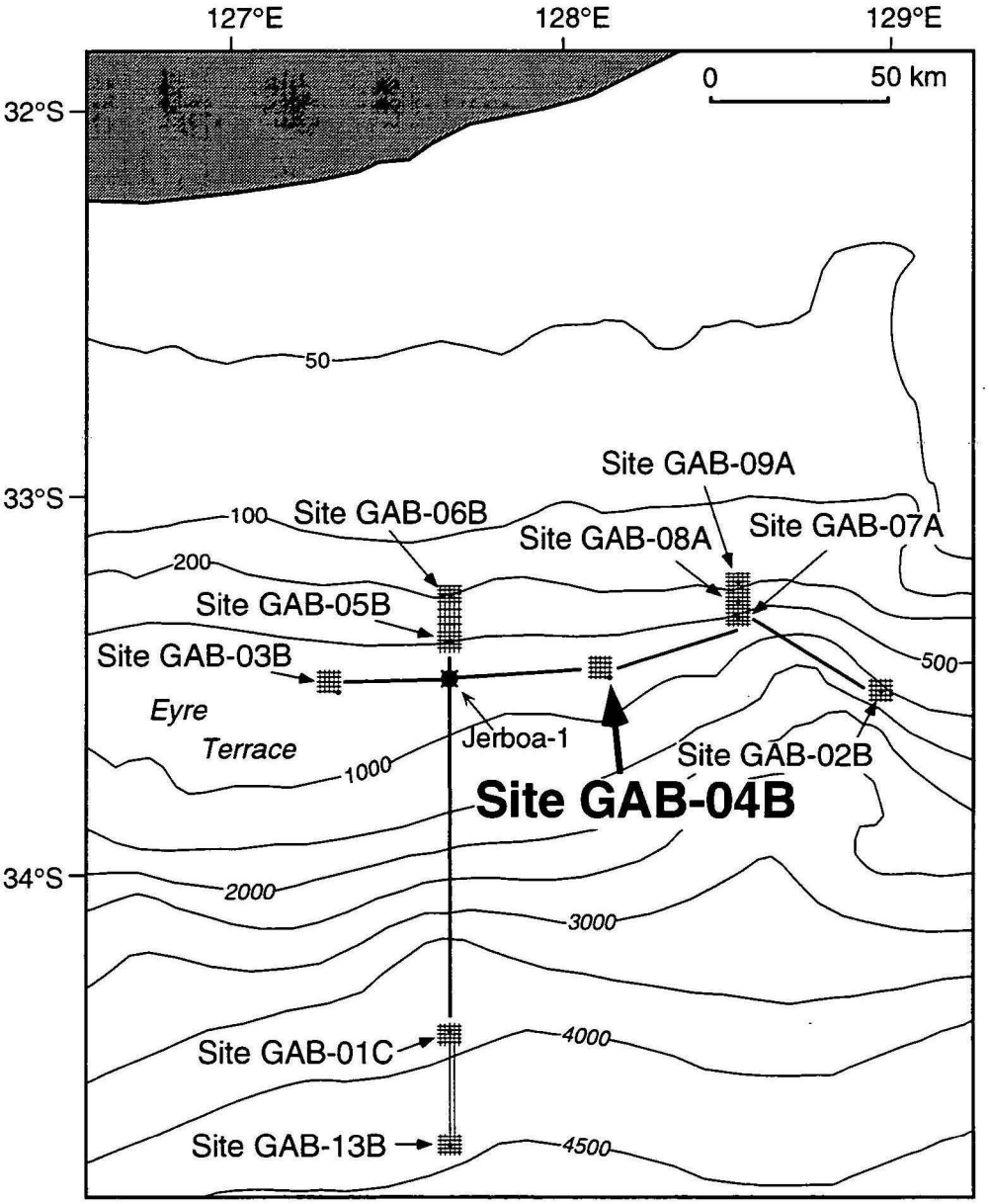
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO ?TOP NEOCOMIAN
(25 msec contour interval)

David A. Feary

SITE GAB-04B


127°E
128°E
129°E
0
50 km
32°S
33°S
34°S
50
100
200
500
1000
2000
3000
4000
4500
Site GAB-09A
Site GAB-06B
Site GAB-08A
Site GAB-07A
Site GAB-05B
Site GAB-03B
Eyre
Terrace
Jerboa-1
Site GAB-02B
Site GAB-04B
Site GAB-01C
Site GAB-13B

Revised October 1992

SAFETY CHECK SHEET
JOIDES POLLUTION PREVENTION AND SAFETY PANEL

1) Basic site information.

Leg: **182**	*Site designation:* **GAB-04B**	*Latitude:* **33°30.5568'S**	*Longitude:* **128°03.9950'E**
Water Depth: **790 m**	*Distance from land:* **82.8 n. mi.**	*Jurisdiction:* **Australia**	
General location or geomorphic province: **Eucla Basin; western Great Australian Bight**			
Probable thickness of sediments: **≈950 m**		*Proposed total penetration:* **540 m**	

2) Upon what geophysical and/or geological data was this site selection made?

Multichannel Seismic lines: **AGSO (1996) 169/03G (SP 2576.21) and 169/03Q (SP 5822.49)**
Single Channel Seismic lines: **Nil**
DSDP/ODP holes: **Nil**
Piston cores: **Gravity cores 173/GC07 (8.09 m) and 173/GC08 (8.05 m)**
Other:

3) What is your proposed drilling program?

Double APC; XCB; possible RCB; no re-entry system required.

4) What is your proposed logging program?

Triple Combo; FMS/Sonic; WST.

5) From previous DSDP/ODP drilling in this area, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock:

No relevant DSDP/ODP drilling in the area.

6) From available information, list all commercial drilling in this area that produced or yielded significant shows. Give depths and ages of hydrocarbon-bearing deposits:

Only relevant commercial drilling in the area is Jerboa-1, 23.4 n mi. to the west, which targetted the Mesozoic section in the Eyre Sub-basin. Jerboa-1 encountered no significant shows, with vitrinite reflectance indicating an immature to marginally mature Mesozoic section to TD.

7) Is there any indication of gas hydrates at this location?

No indication of gas hydrates; no BSR present.

8) Is there any reason to expect any hydrocarbon accumulation at this site? Please comment.

No hydrocarbon accumulation expected.

9) What "special" precautions will be taken during drilling?

Standard hydrocarbon monitoring.

10) What abandonment procedures do you plan to follow?

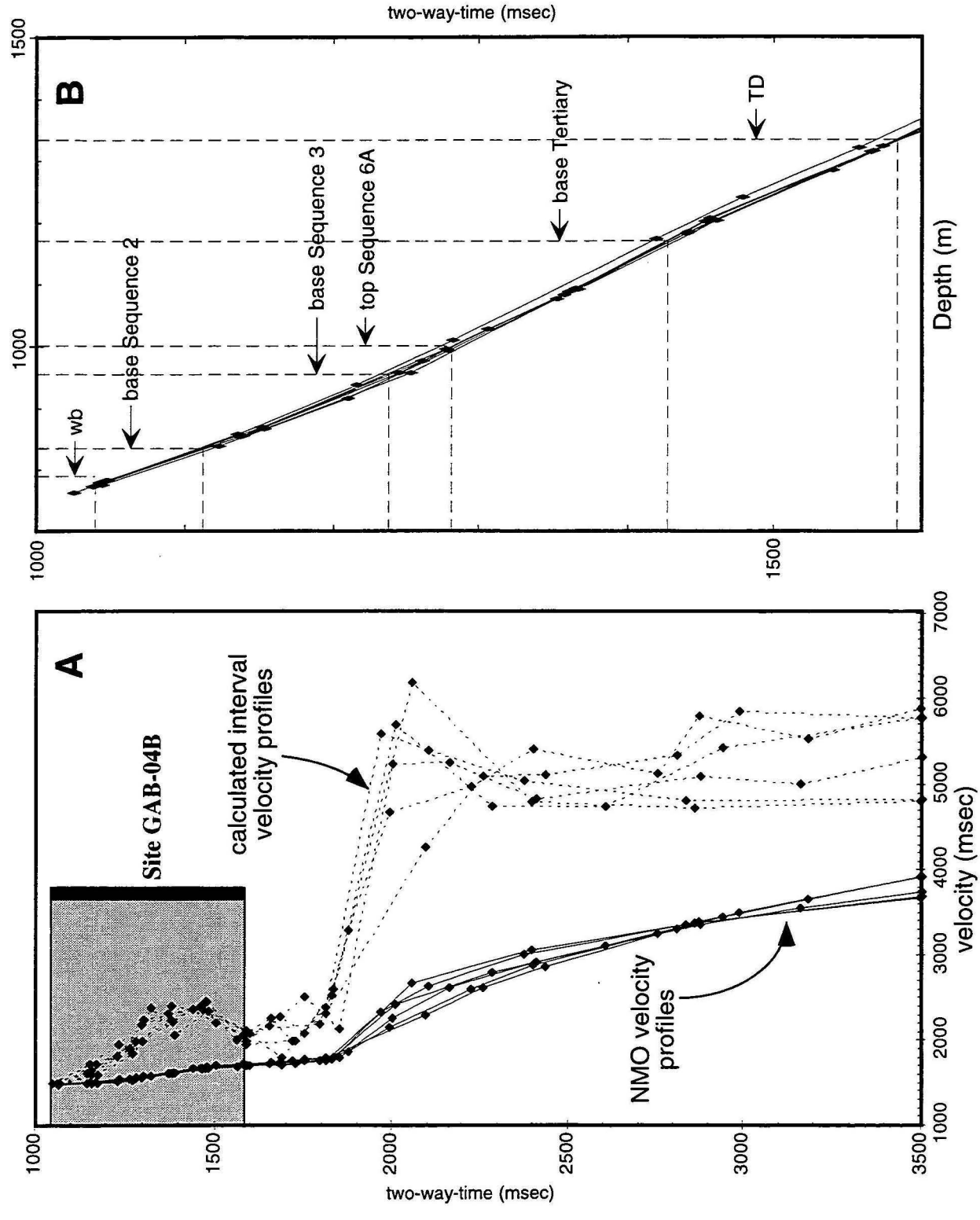
Standard abandonment procedures.

Summary: *What do you consider to be the major risks in drilling at this site?*

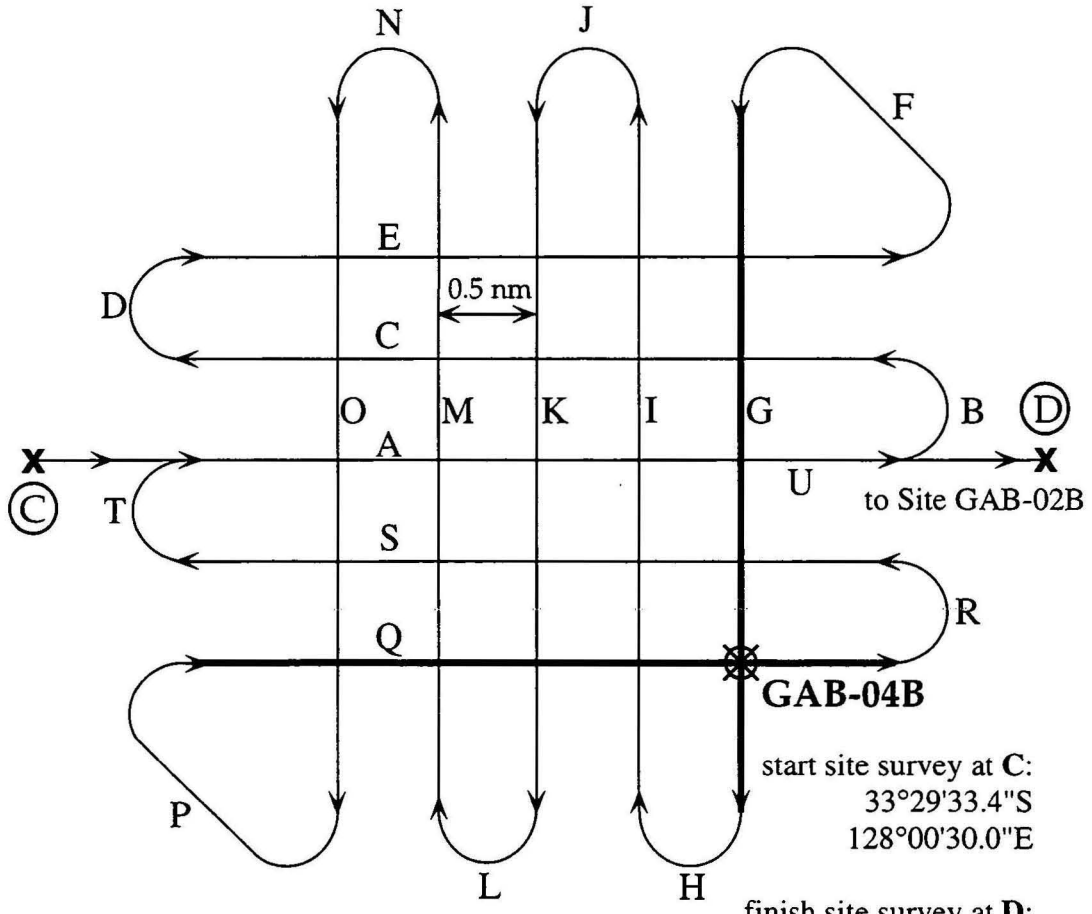
No significant drilling risks are anticipated at this site.

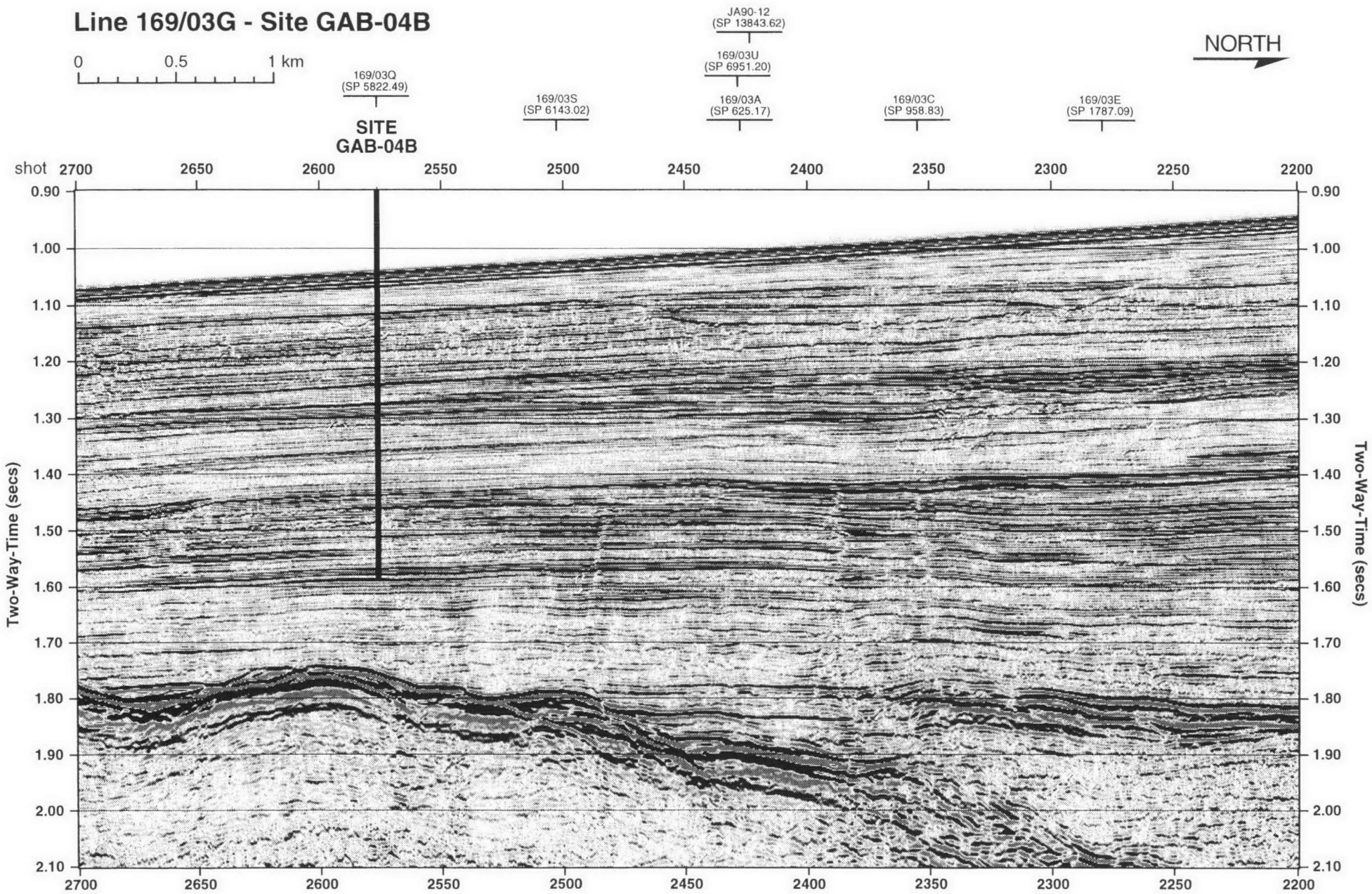
Velocity Calculations: Site GAB-04B

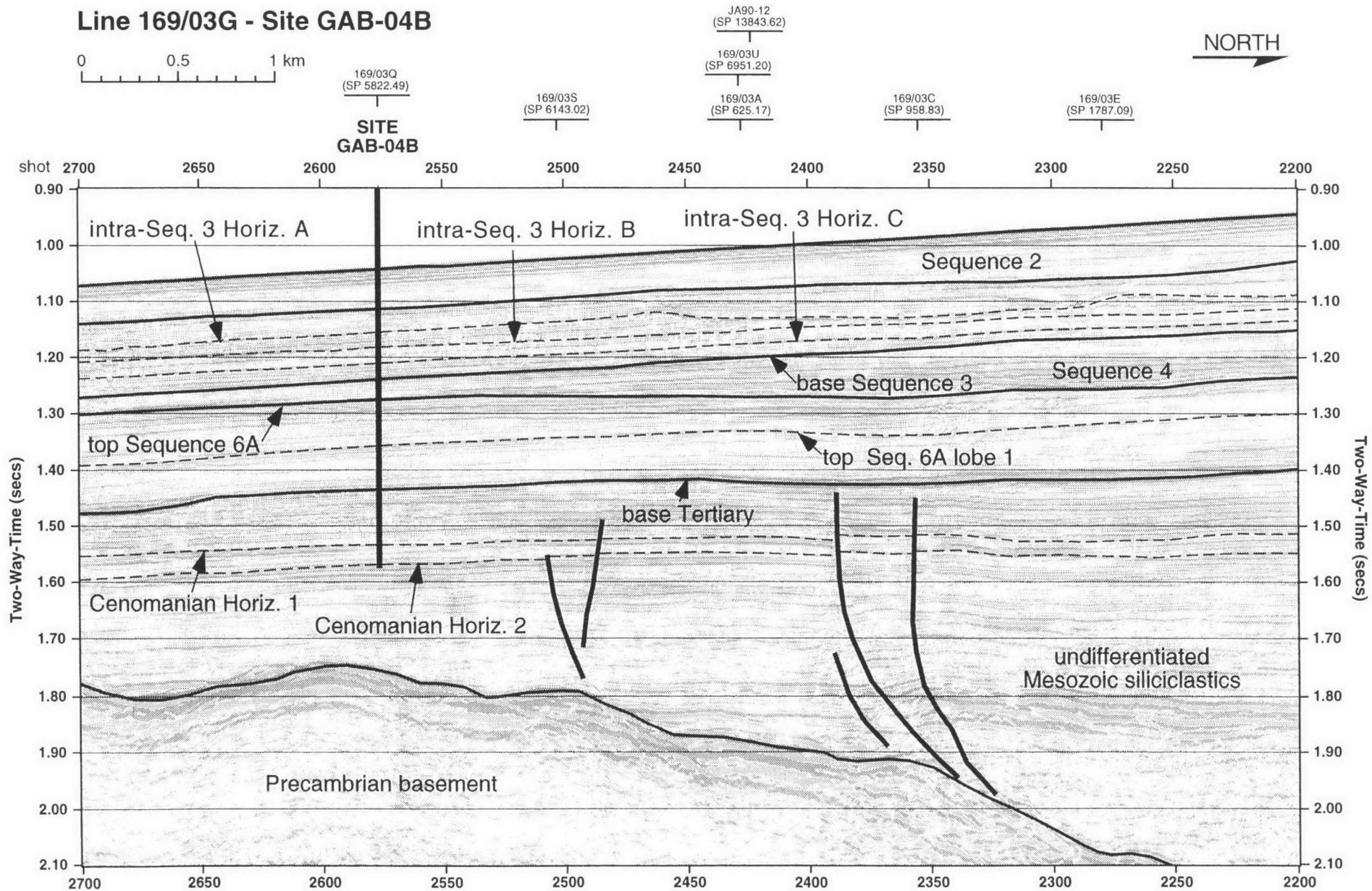
Velocity analysis for site GAB-04B, from seismic line 169/03. The six closest NMO (stacking) velocities to the site have been used to derive interval velocity profiles (A) and time-depth curves (B). Approximate depths to horizons shown on seismic sections presented on the following pages can then be derived from these time-depth curves.



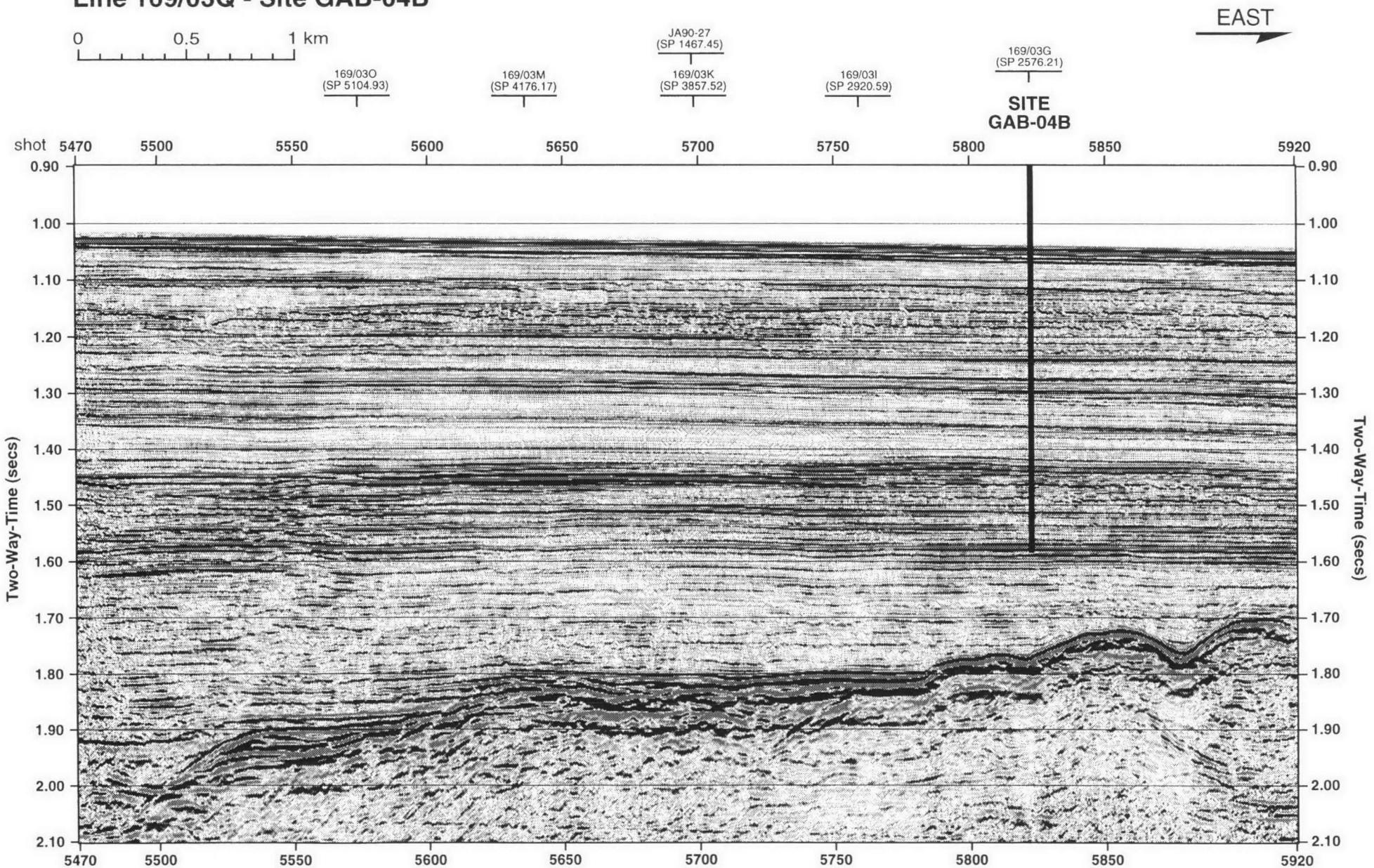
AGSO Survey 169 (February 1996) track map - Site GAB-04B



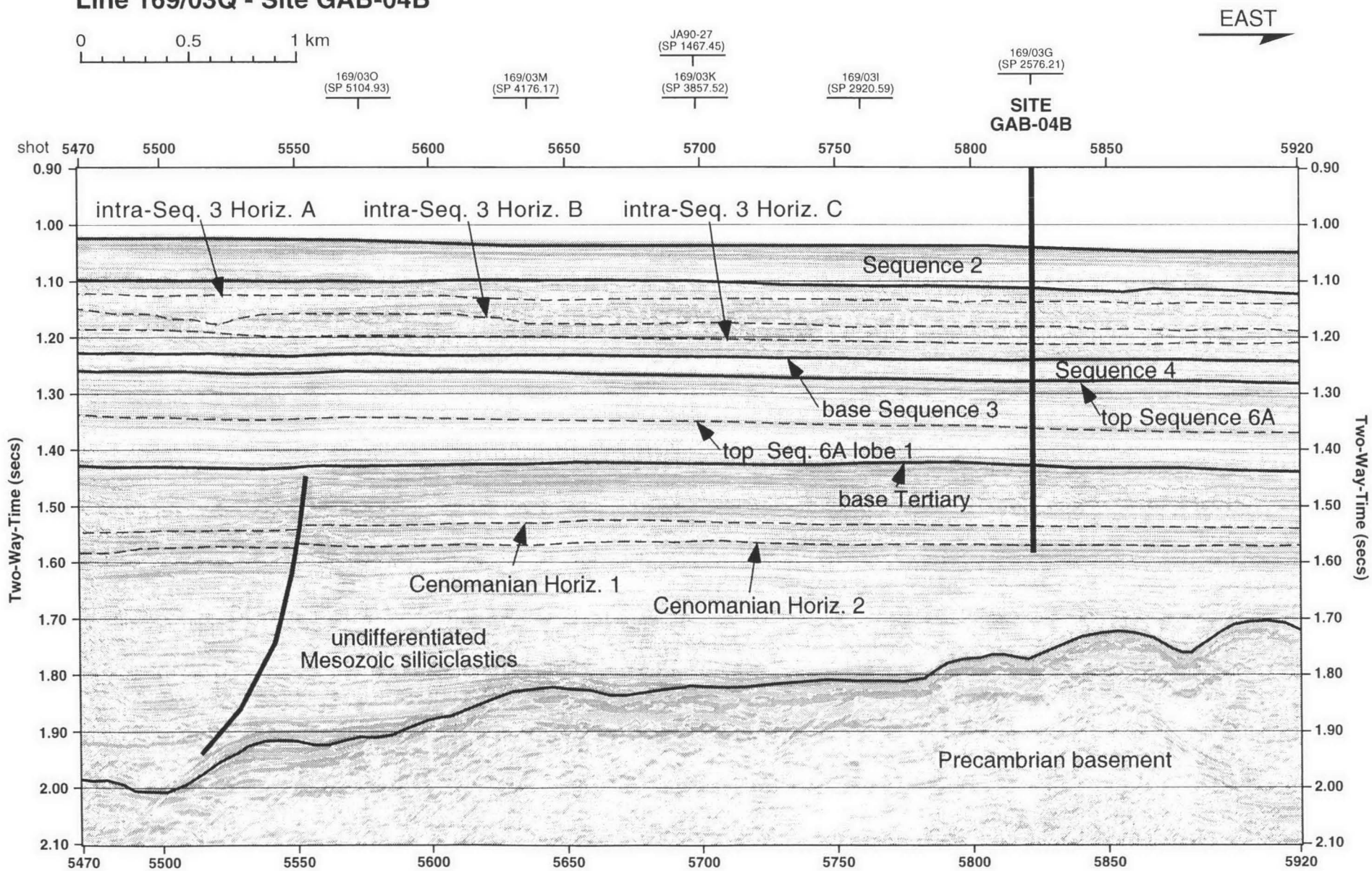

Line 169/03G - Site GAB-04B
0
0.5
1 km
NORTH
JA90-12
(SP 13843.62)
169/03U
(SP 6951.20)
169/03Q
(SP 5822.49)
SITE
GAB-04B
169/03S
(SP 6143.02)
169/03A
(SP 625.17)
169/03C
(SP 958.83)
169/03E
(SP 1787.09)
shot
2700
2650
2600
2550
2500
2450
2400
2350
2300
2250
2200
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60
1.70
1.80
1.90
2.00
2.10
Two-Way-Time (secs)


Line 169/03G - Site GAB-04B
0
0.5
1 km
NORTH
JA90-12
(SP 13843.62)
169/03U
(SP 6951.20)
169/03Q
(SP 5822.49)
SITE
GAB-04B
169/03S
(SP 6143.02)
169/03A
(SP 625.17)
169/03C
(SP 958.83)
169/03E
(SP 1787.09)
shot
2700
2650
2600
2550
2500
2450
2400
2350
2300
2250
2200
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60
1.70
1.80
1.90
2.00
2.10
Two-Way-Time (secs)
intra-Seq. 3 Horiz. A
intra-Seq. 3 Horiz. B
intra-Seq. 3 Horiz. C
Sequence 2
base Sequence 3
Sequence 4
top Sequence 6A
top Seq. 6A lobe 1
base Tertiary
Cenomanian Horiz. 1
Cenomanian Horiz. 2
undifferentiated
Mesozoic siliciclastics
Precambrian basement

Line 169/03Q - Site GAB-04B



Line 169/03Q - Site GAB-04B



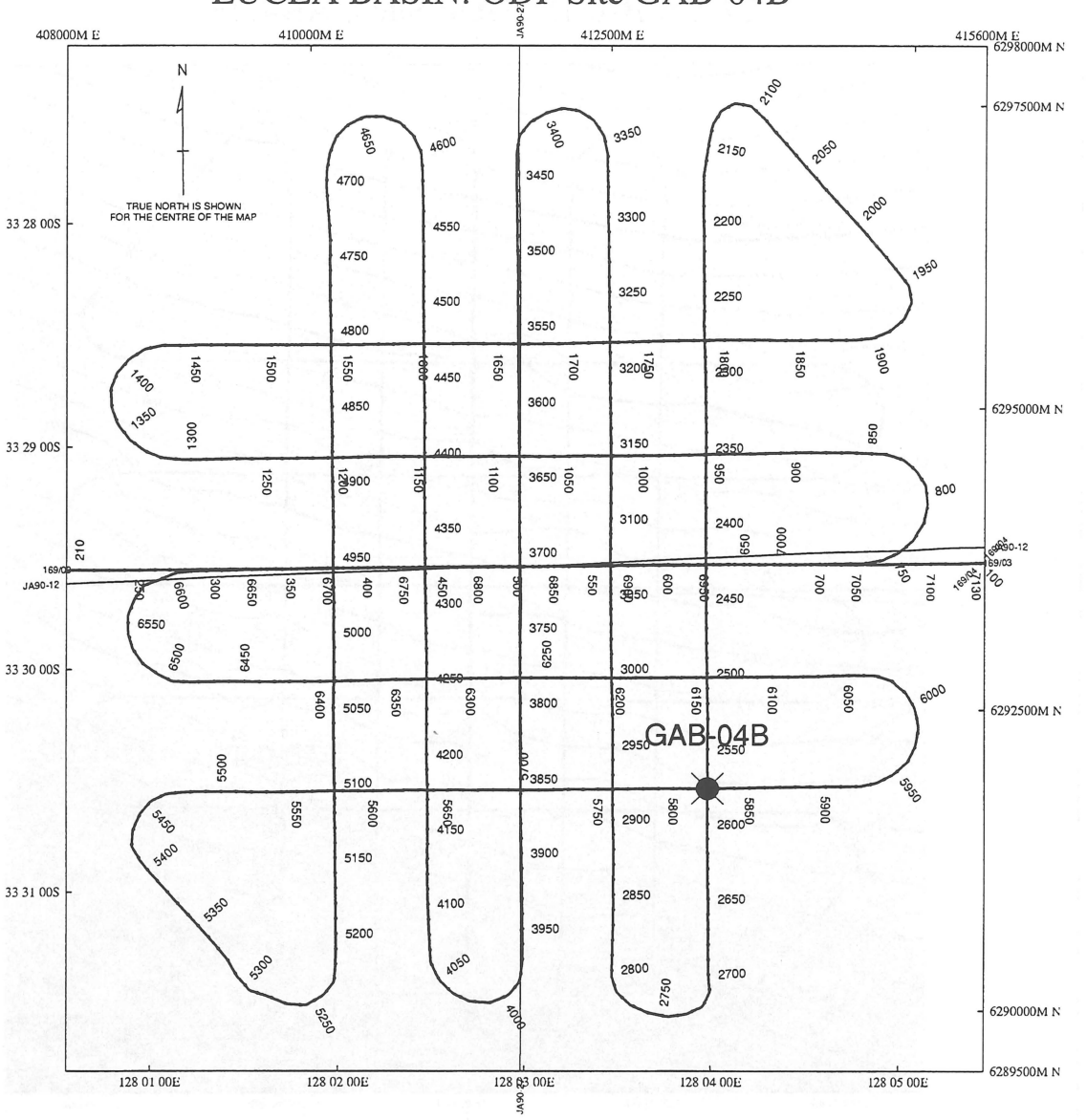
GRAPHIC SUMMARY, SITE GAB-04B

Sub-bottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Av. rate of sediment accumulation (m/My)	Comments
	water bottom						
0	Sequence 2	Plio-Pleist.	1.28	nanno-foram ooze	upper slope	≈15 m/My	
46	unconformity						
100	Sequence 3	early Pliocene	1.90	nanno-foram ooze with grainstone layers	upper slope during rising sea-level	≈70 m/My	
166	unconformity						
200	Sequence 4	late Miocene	2.14	variably indurated nanno-foram ooze with grainstone layers	mid-slope low sea-level	≈25 m/My	
212	unconformity						
300	Sequence 6A	late Eocene - middle Miocene	2.32	indurated nanno-foram ooze with grainstone layers	mid-slope fan	≈15 m/My	
381	unconformity						
400	Cenomanian sequence	?Cenomanian	2.08	indurated muddy sandstone	moderate energy upper slope	≈20 m/My	
500							
544	TD						
600							

see velocity calculations on page 110

ages and accumulation rates are tentative estimates only

EUCLA BASIN: ODP Site GAB-04B



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Petroleum and Marine Division

AUSTRALIA

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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

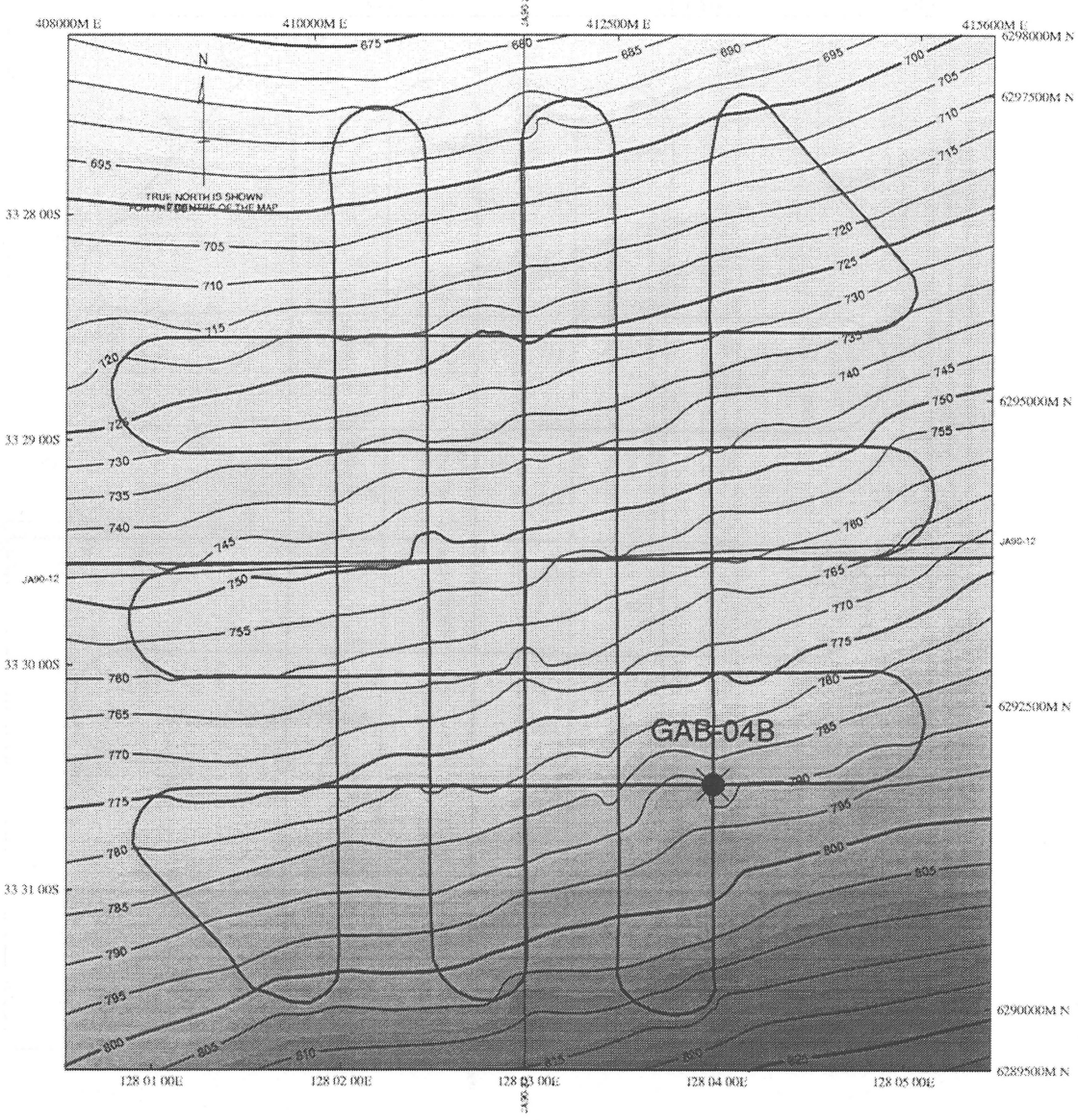
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

SHOT POINT MAP

David A. Feary

EUCLA BASIN: ODP Site GAB-04B



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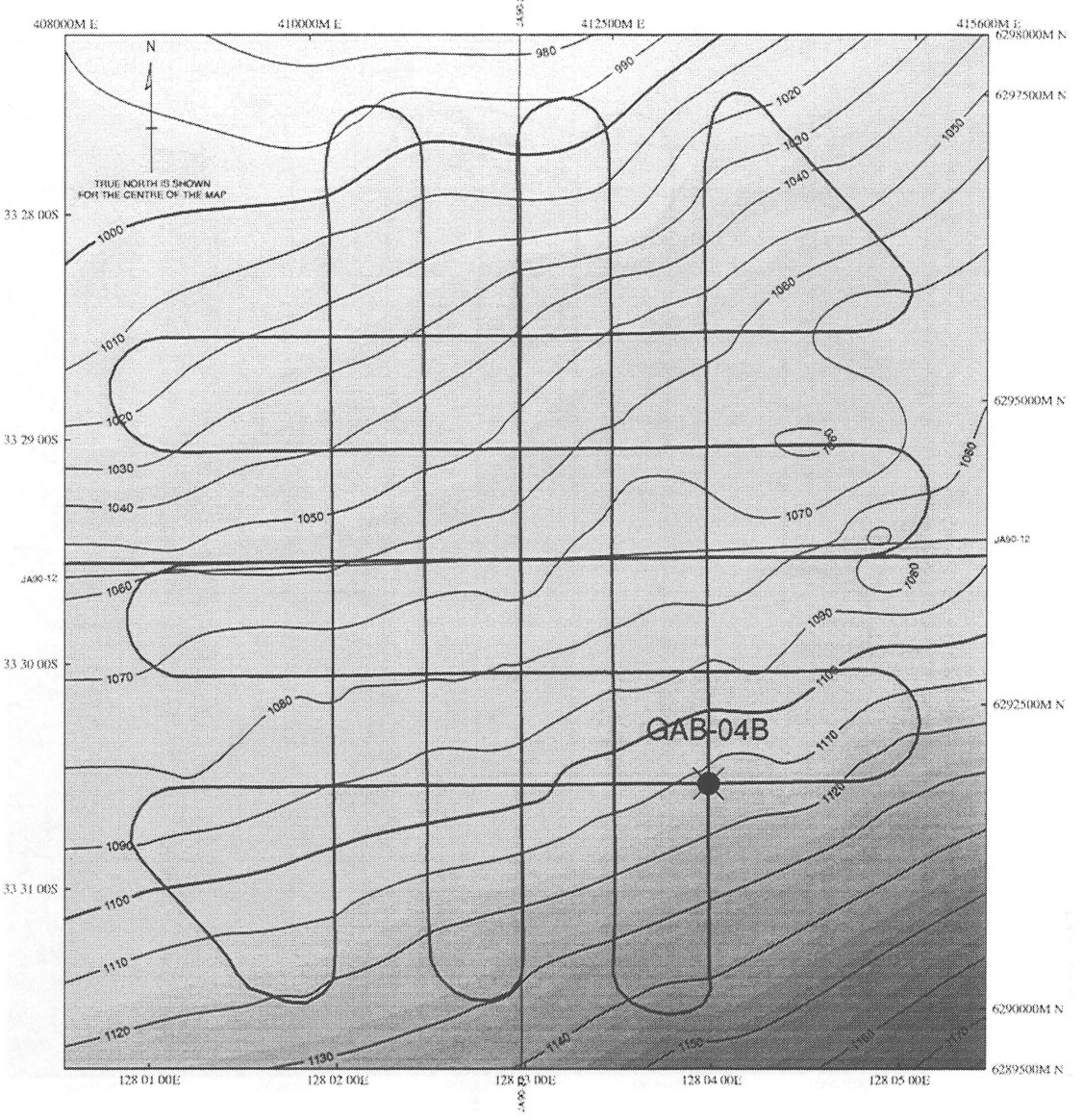
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

BATHYMETRY
(5 m contour interval)

		David A. Feary

EUCLA BASIN: ODP Site GAB-04B



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

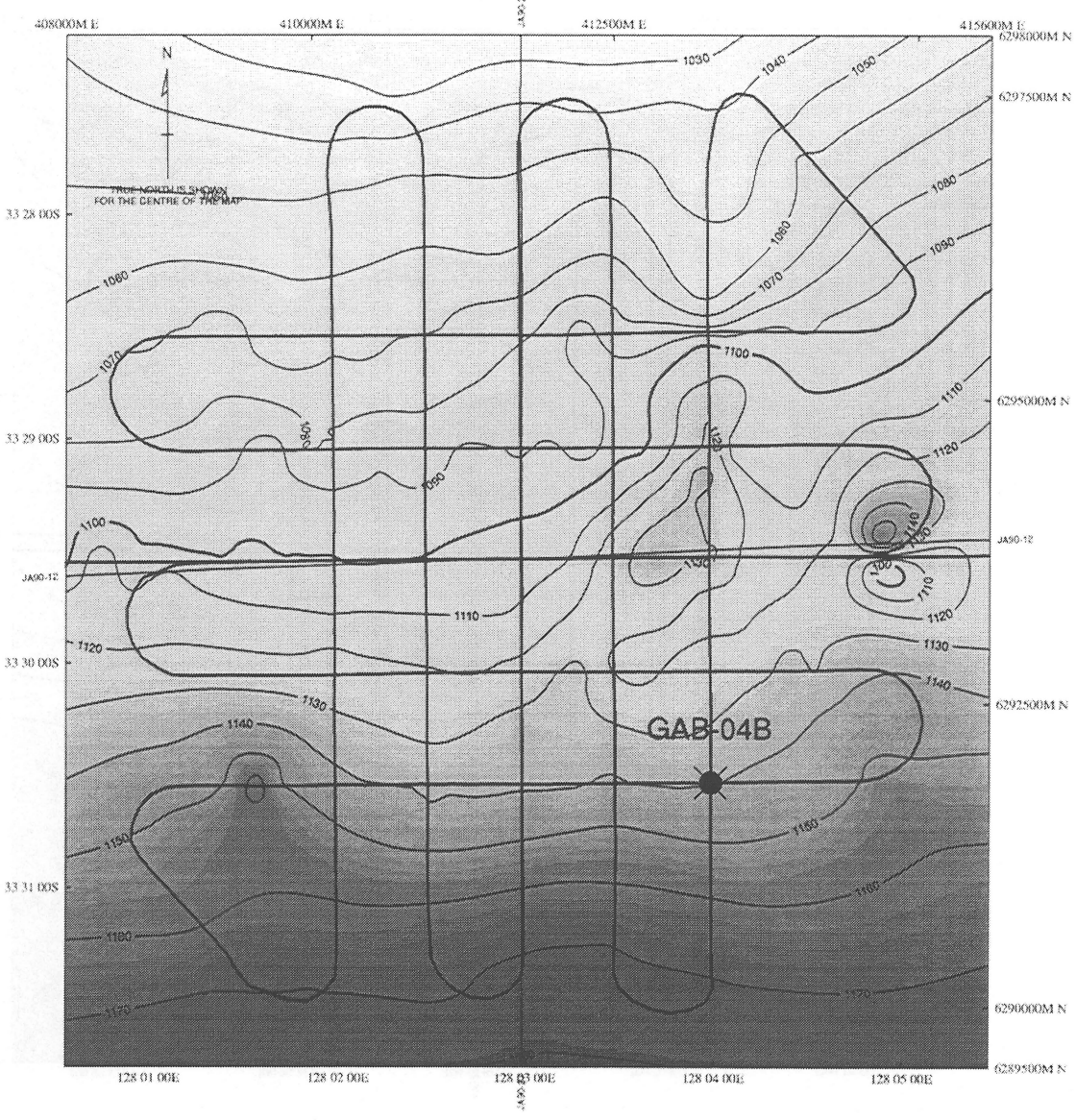
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO BASE SEQUENCE 2
(10 msec contour interval)

		David A. Feary

EUCLA BASIN: ODP Site GAB-04B



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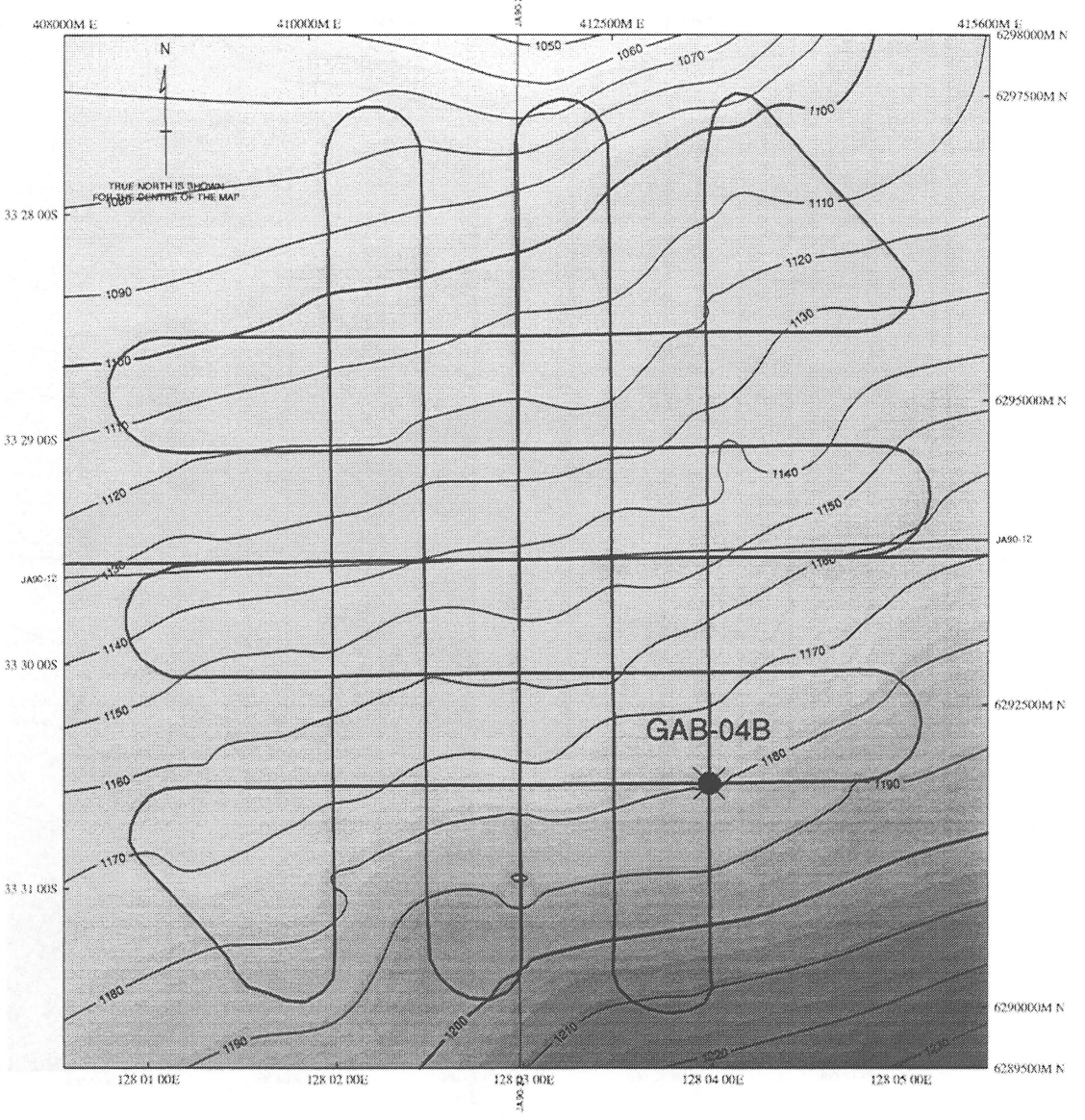
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)
TWT TO INTRA SEQ. 3 HORIZON A (10 msec contour interval)
David A. Feary

EUCLA BASIN: ODP Site GAB-04B



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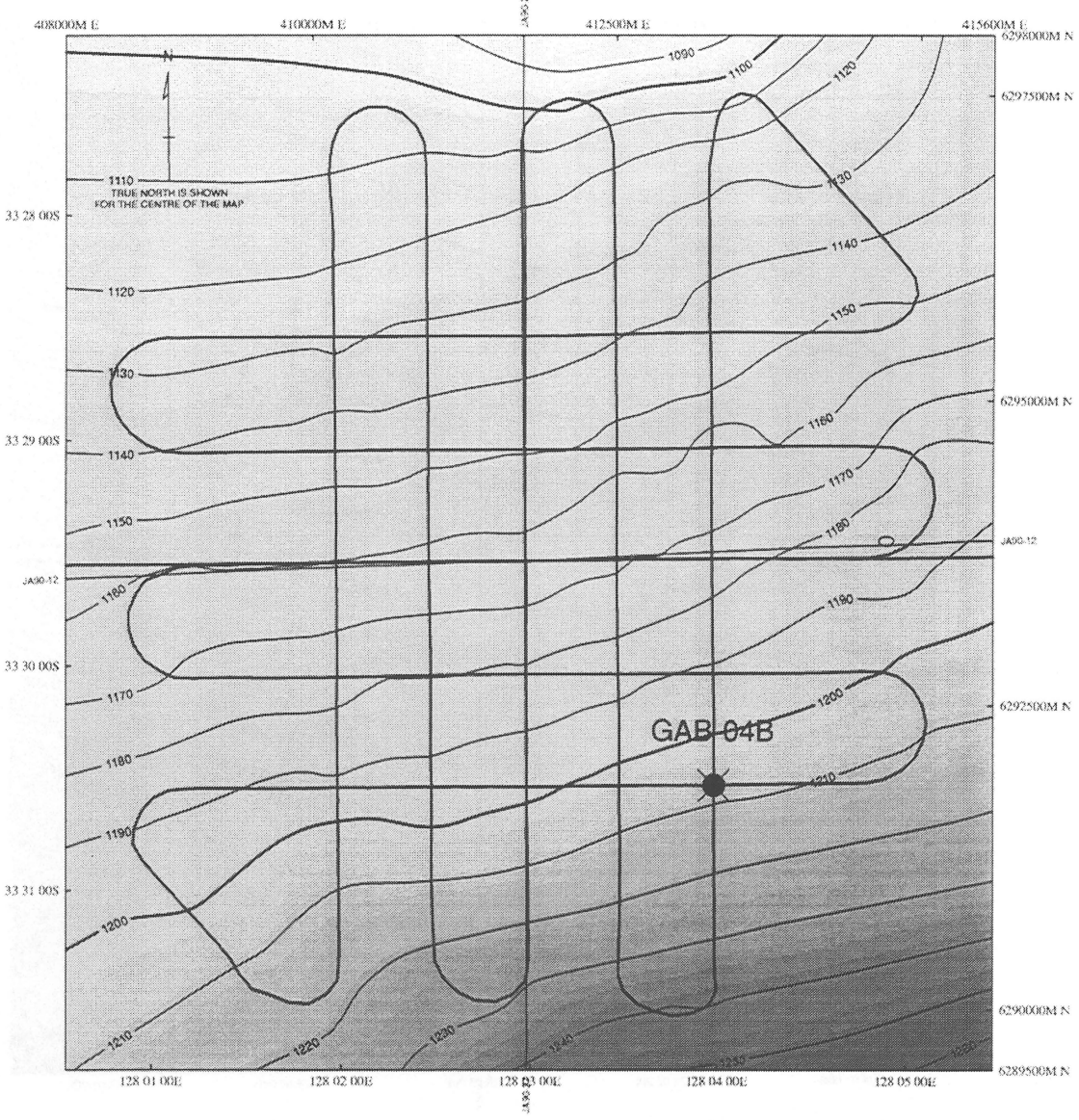
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182		
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)		
TWT TO INTRA SEQ. 3 HORIZON B (10 msec contour interval)		
		David A. Feary

EUCLA BASIN: ODP Site GAB-04B



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

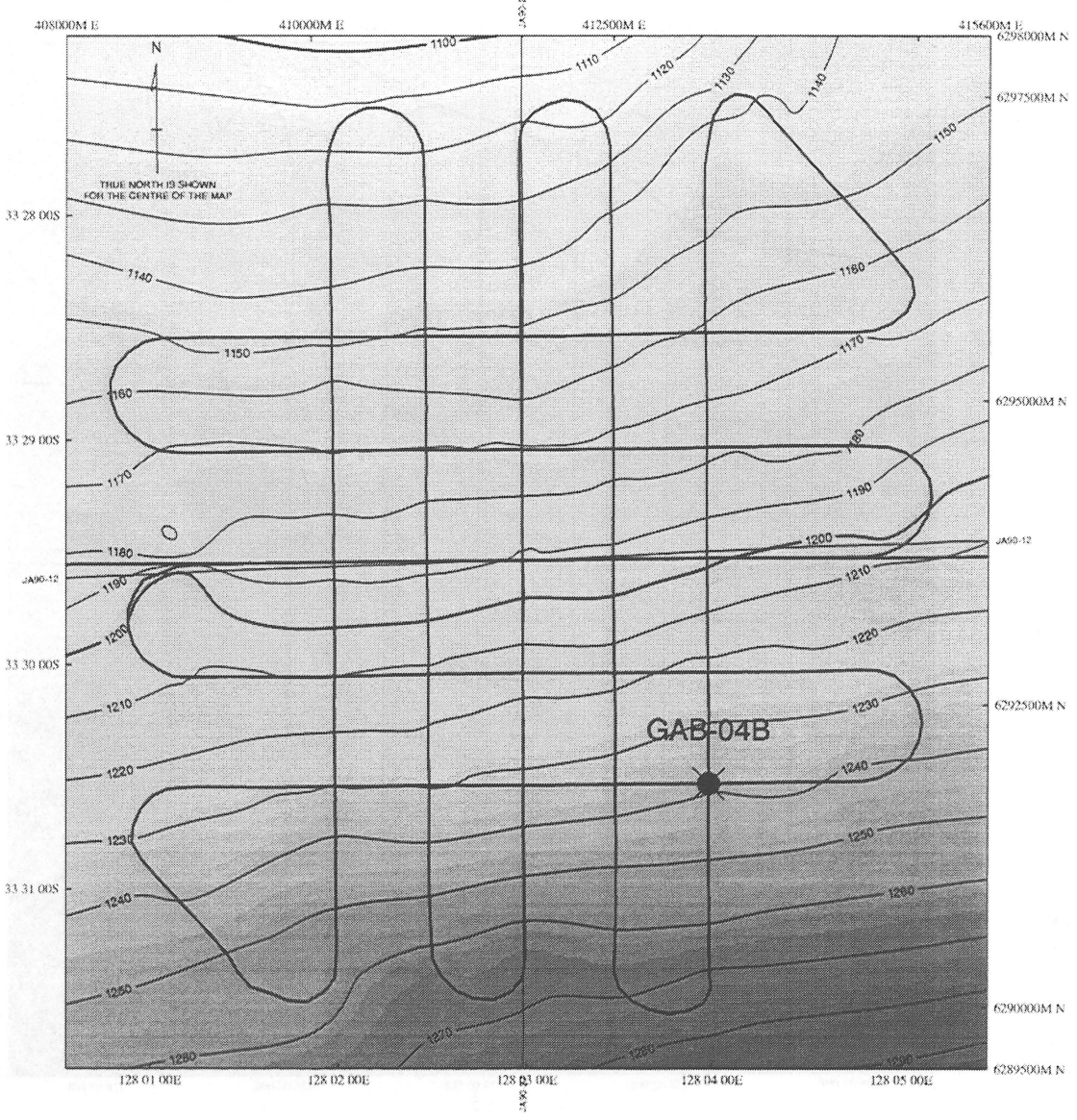
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO INTRA SEQ. 3 HORIZON C
(10 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-04B



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CENTRAL MERIDIAN 129 00 00E

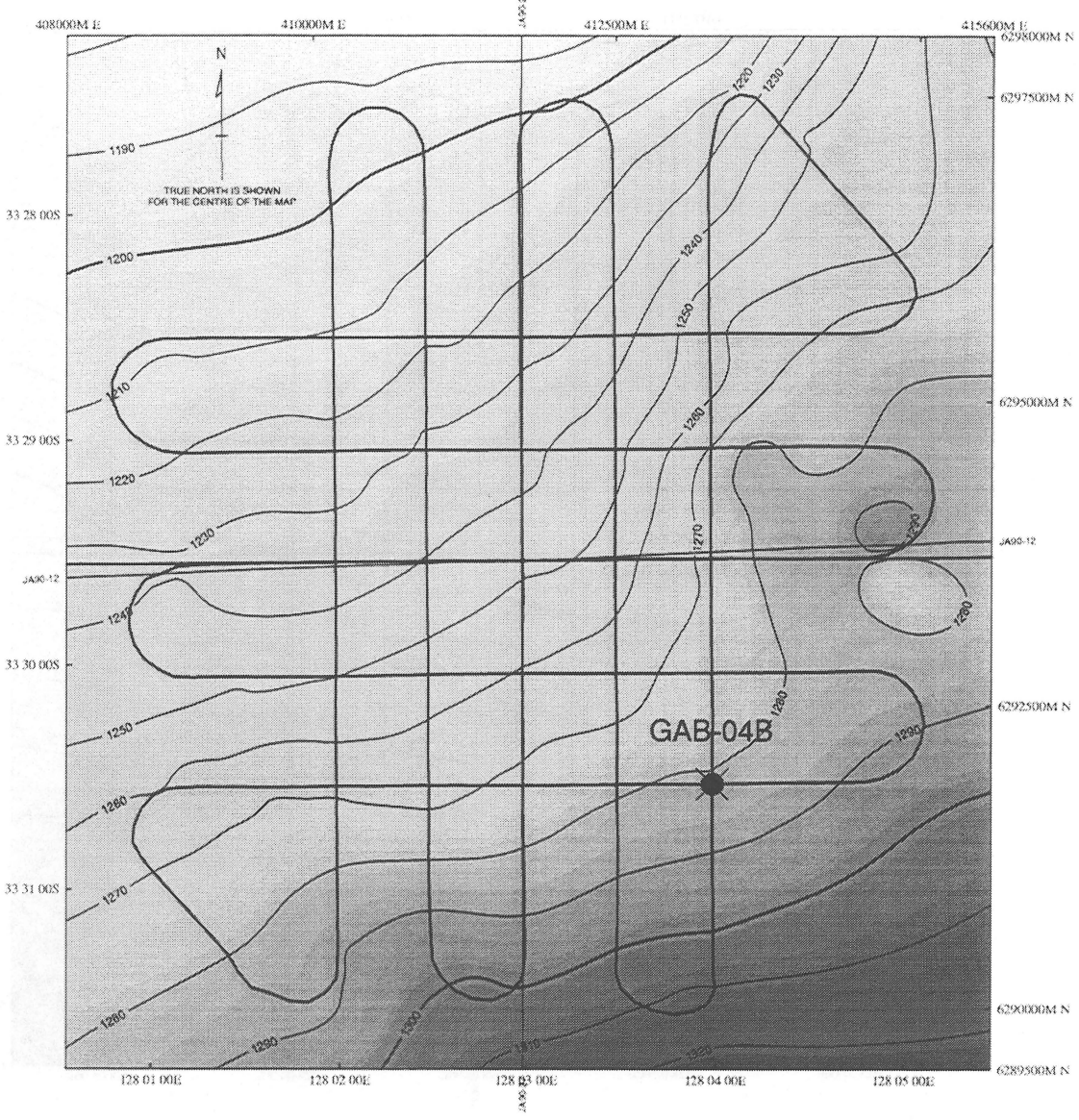
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO BASE SEQUENCE 3
(10 msec contour interval)

		David A. Feary

EUCLA BASIN: ODP Site GAB-04B



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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
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CENTRAL MERIDIAN 129 00 00E

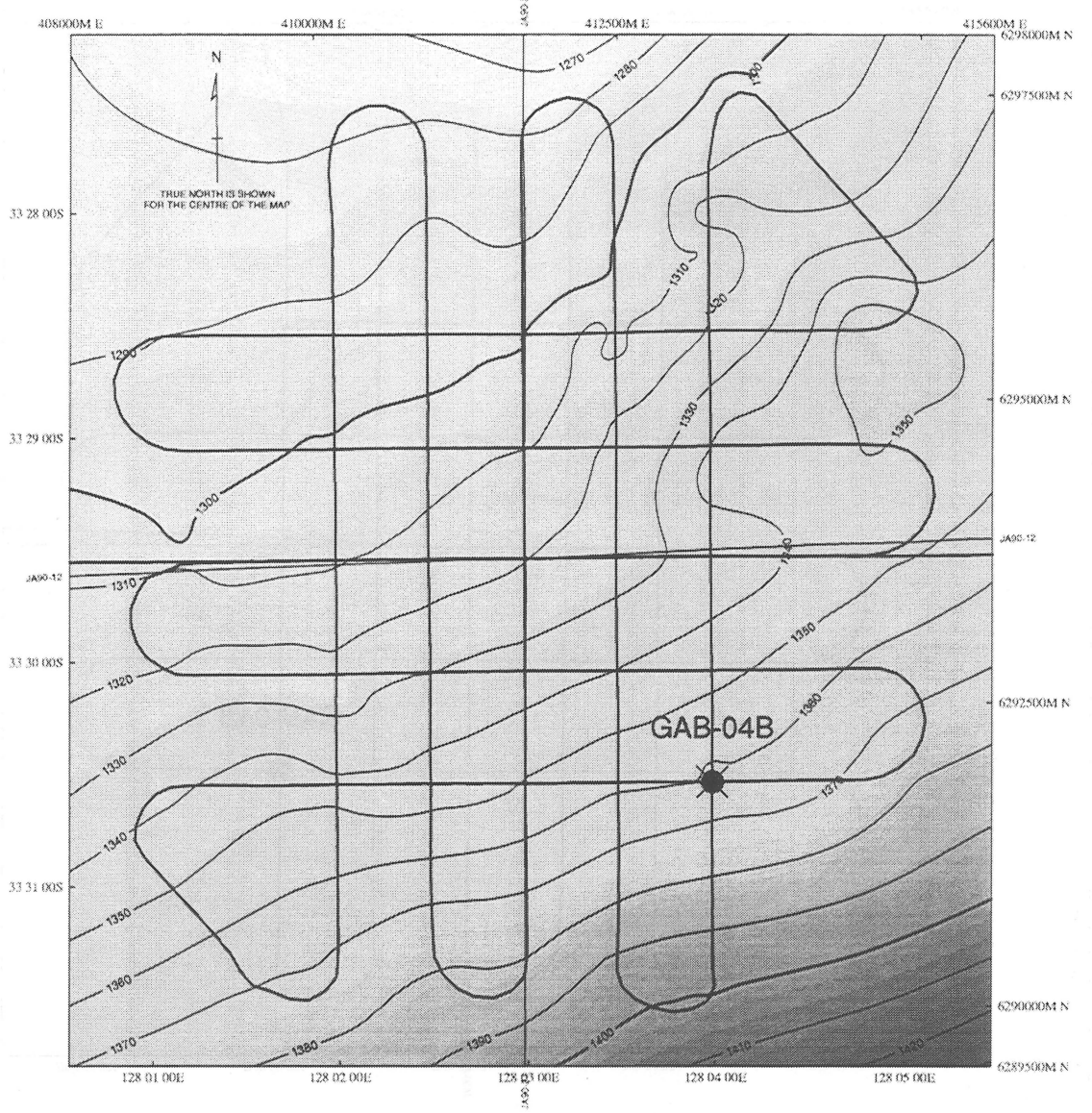
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO TOP SEQUENCE 6A
(10 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-04B



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

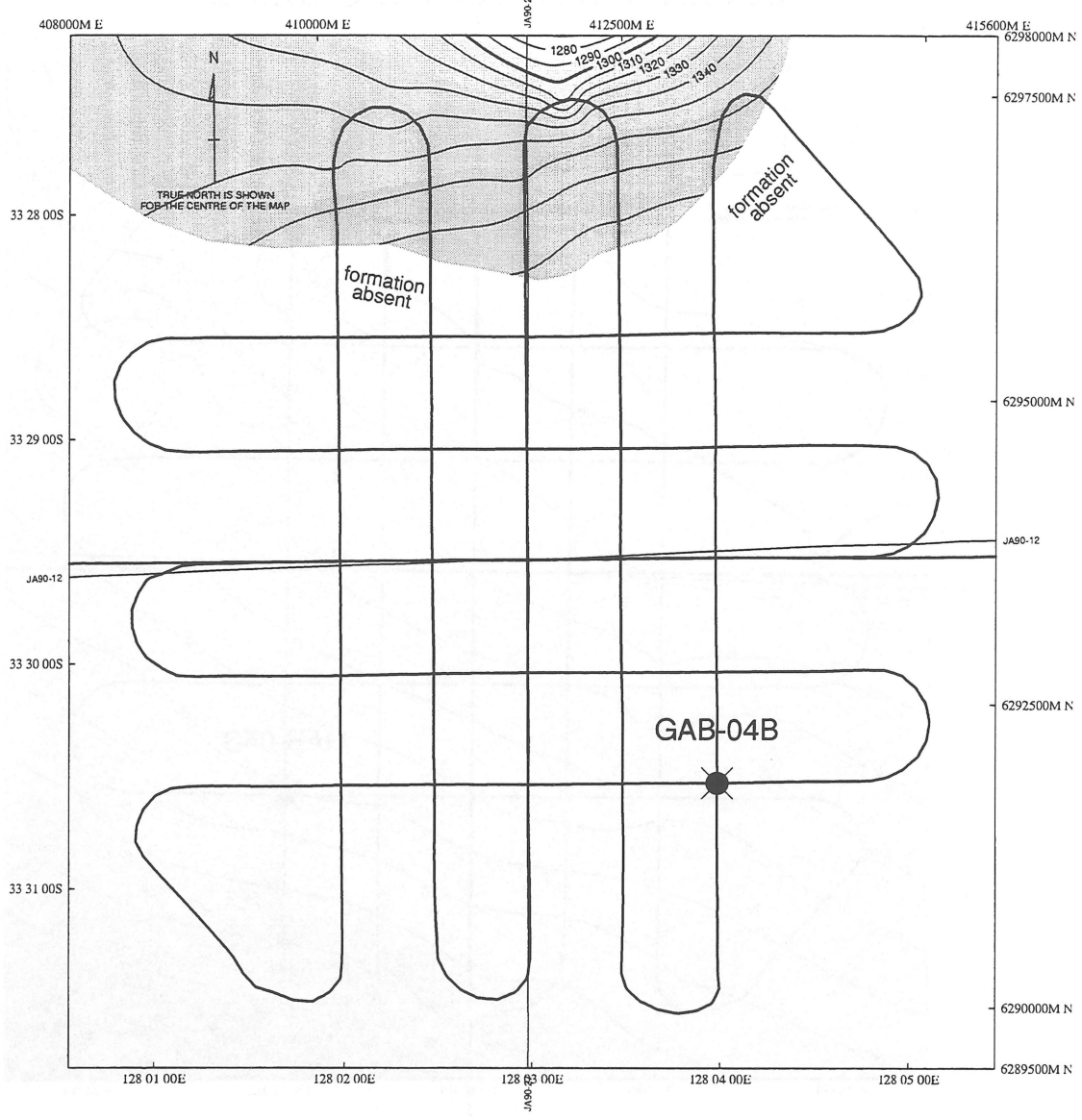
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO TOP SEQ. 6A LOBE 1
(10 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-04B



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AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

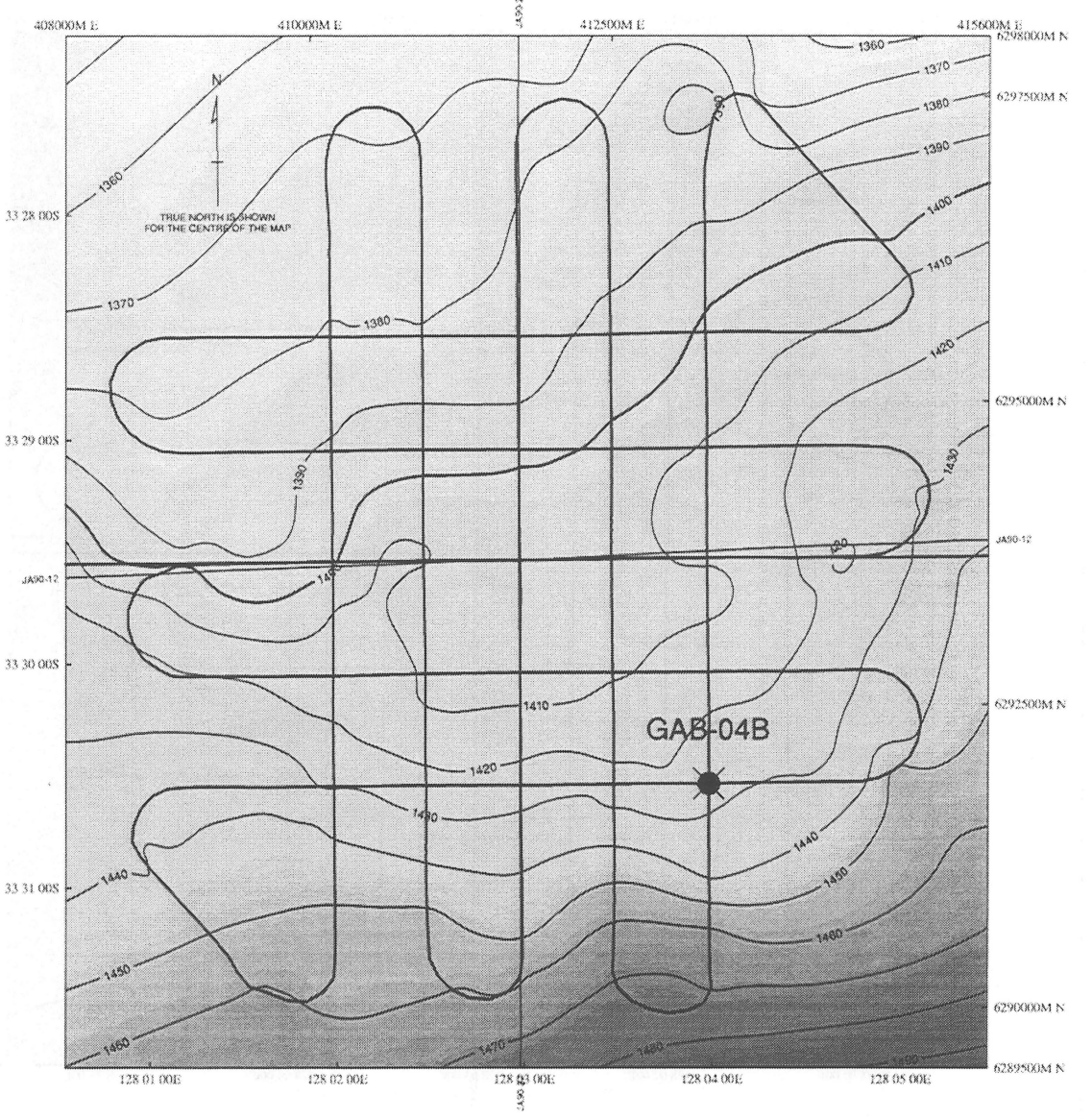
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO TOP VOLCANICS
(10 msec contour interval)

David A. Feary

EUCLA BASIN: ODP Site GAB-04B



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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
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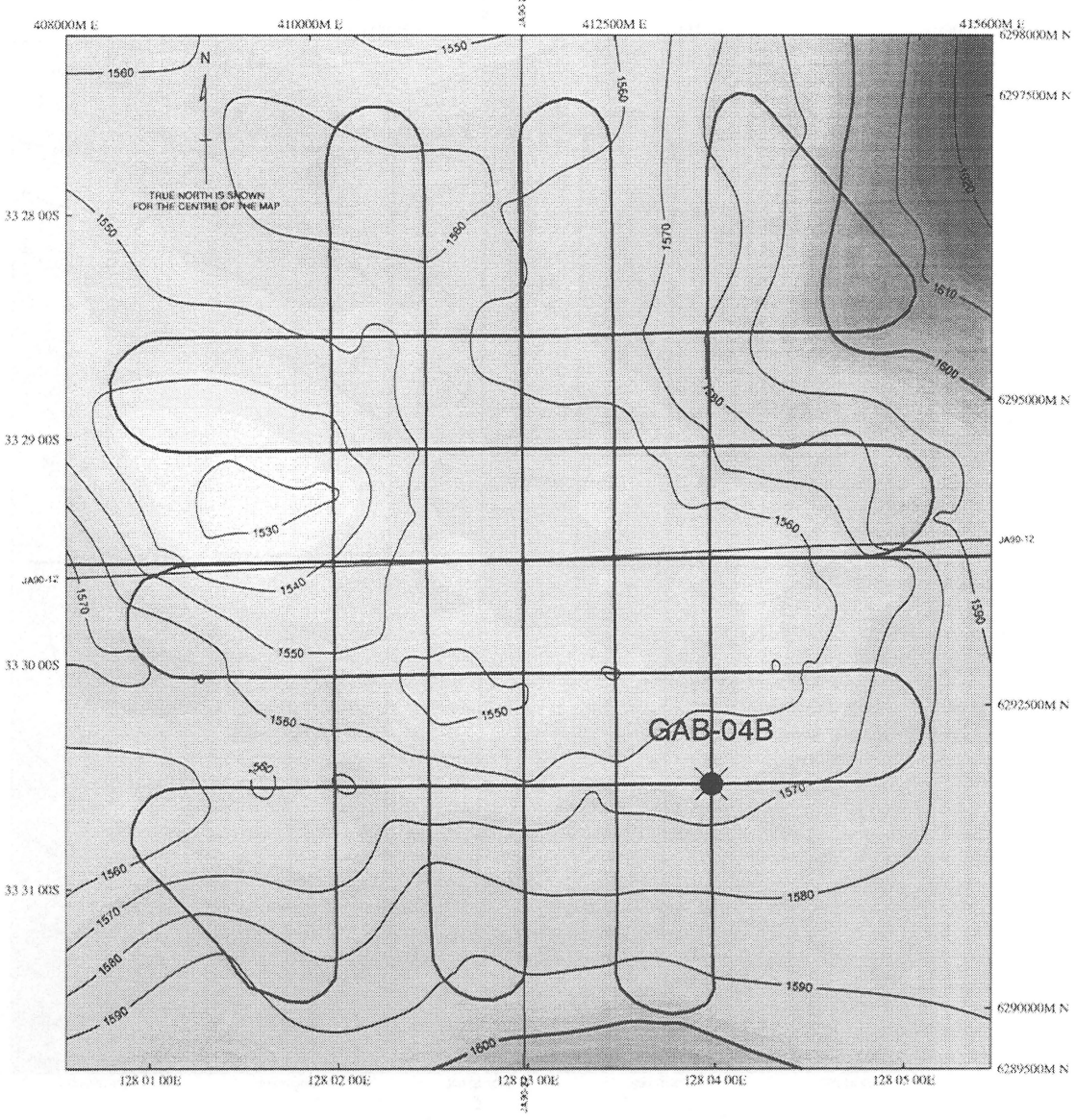
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)
TWT TO BASE TERTIARY (10 msec contour interval)
David A. Feary

EUCLA BASIN: ODP Site GAB-04B



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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
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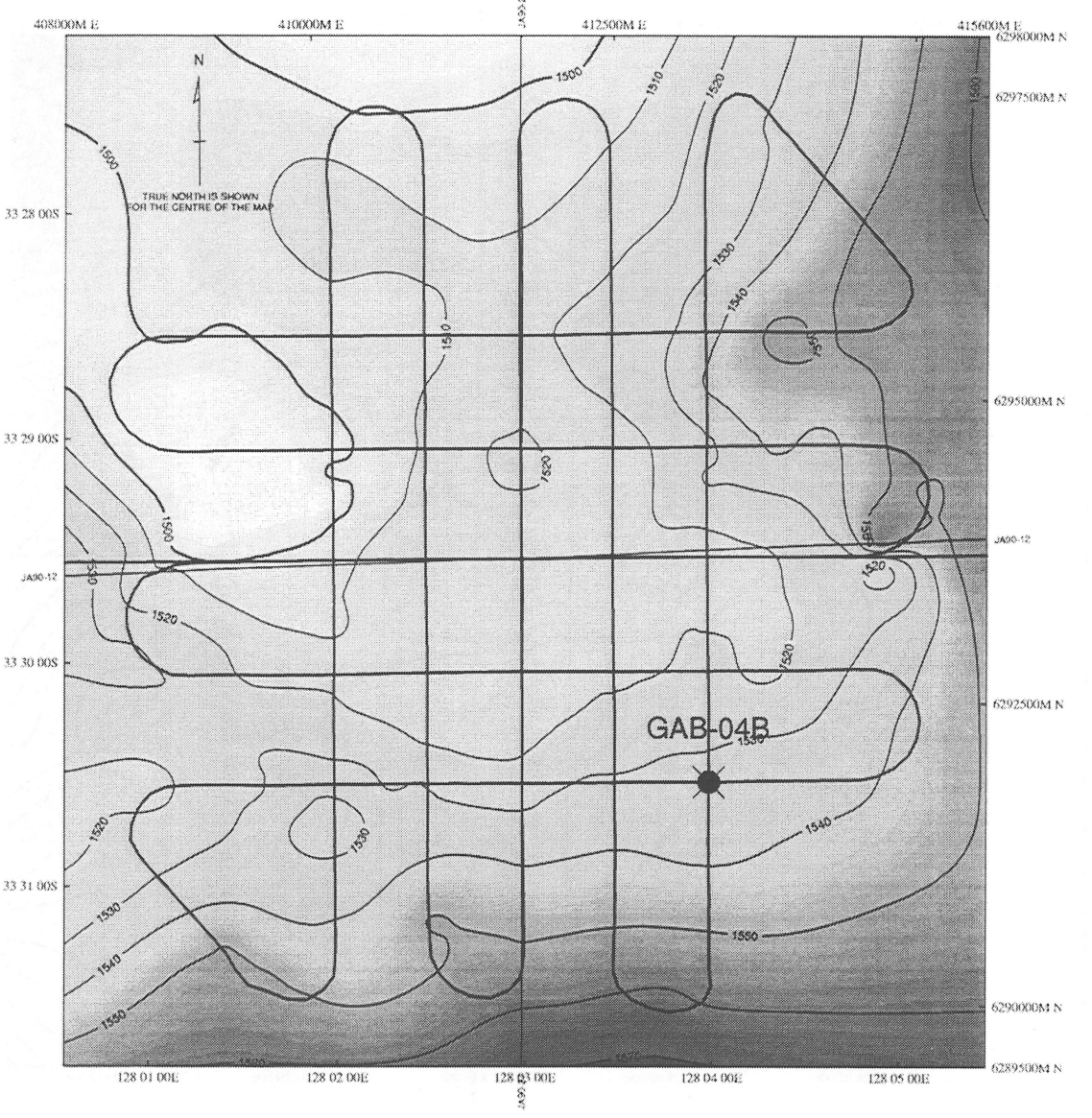
Eucla Basin - ODP Leg 182		
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)		
TWT TO CENOMANIAN HORIZ. 1 (10 msec contour interval)		
		David A. Feary

EUCLA BASIN: ODP Site GAB-04B



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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
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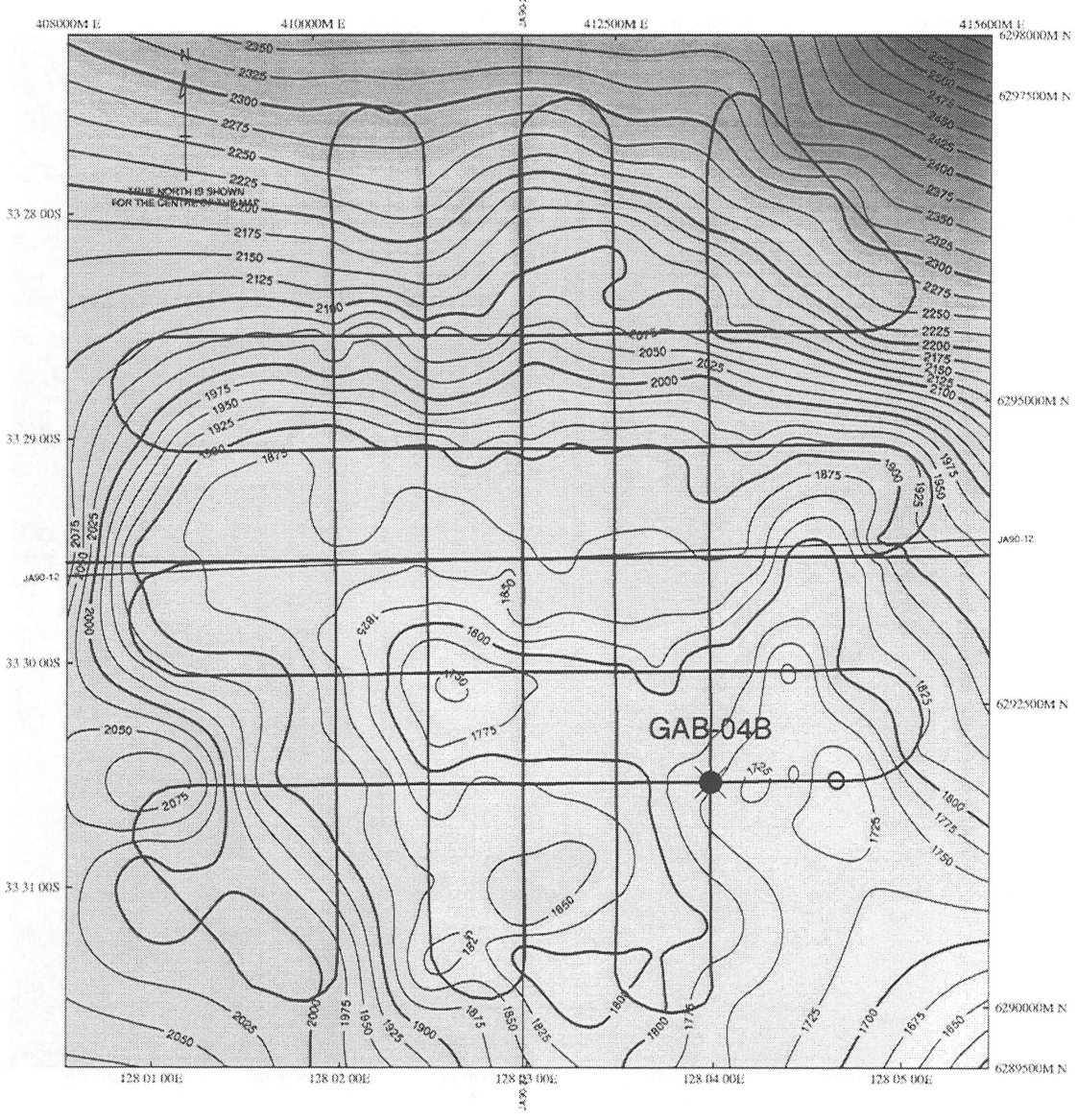
Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169 ODP Site Surveys (February 1996)
TWT TO CENOMANIAN HORIZ. 2 (10 msec contour interval)
		David A. Feary

EUCLA BASIN: ODP Site GAB-04B



AGSO

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Petroleum and Marine Division

AUSTRALIA

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UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 129 00 00E

Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO TOP BASEMENT
(25 msec contour interval)

David A. Feary

9.3 SITES GAB-05B AND GAB-06B

Sites GAB-05B and GAB-06B are located to intersect distal (GAB-05B) and proximal (GAB-06B) parts of the Paleocene to middle Eocene progradational siliciclastic wedge. In addition, these sites will intersect a major portion of the overlying Neogene succession (seismic sequences 2 and 4). These sites were re-located following the 1995 panel reviews, to remove the risk of fluid contamination from volcanic intrusions, and also to intersect a substantial distal section through Sequence 3.

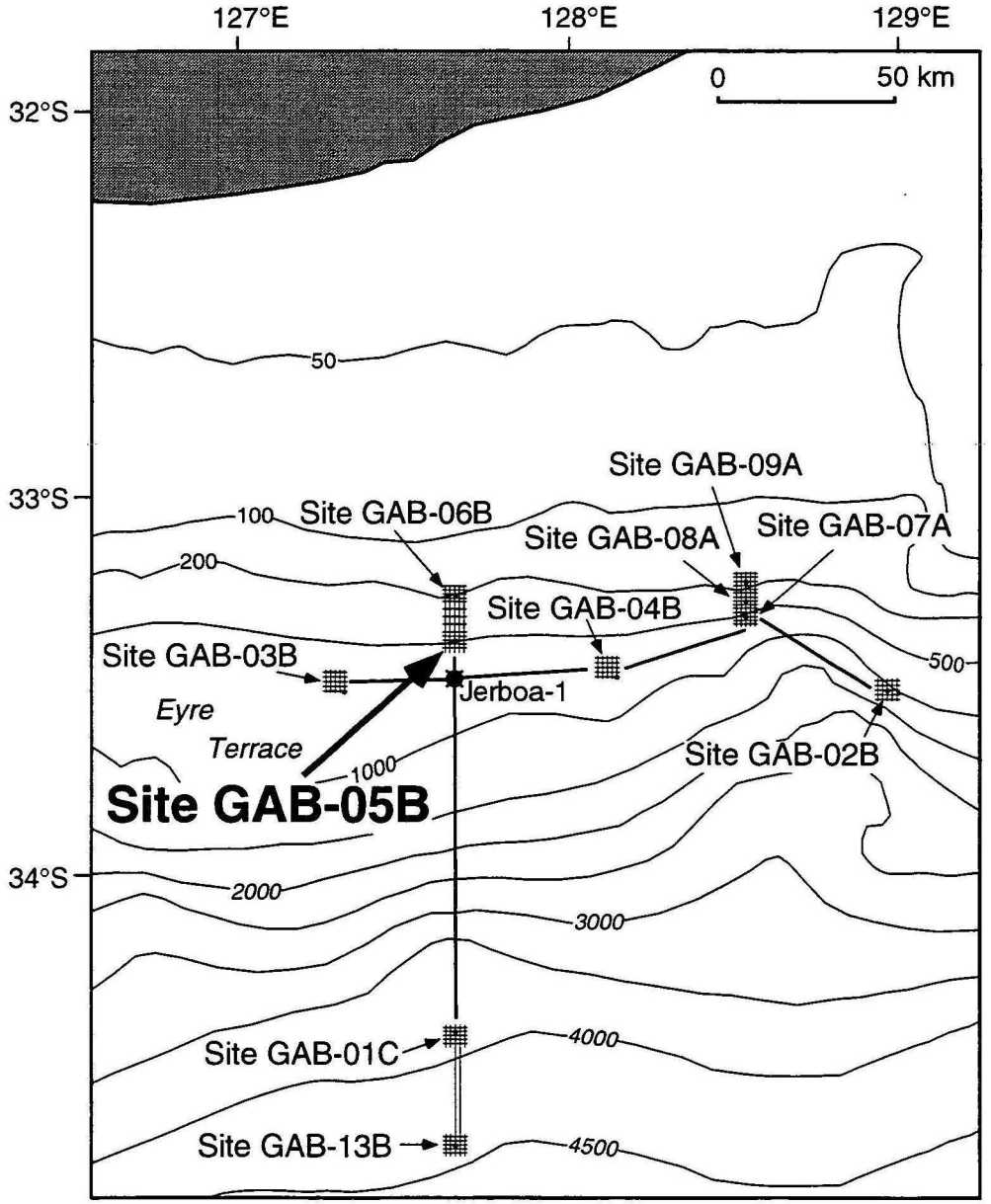
Principal Objective:

- to recover a detailed record of shelf-edge siliciclastic deposition to evaluate the sedimentary response to Paleogene sea-level fluctuations; and to evaluate the complex interaction between sea-level variation, accommodation space, and subsidence evident in stratal patterns.

Additional Objectives:

- to determine the characteristics of cool-water carbonate facies within the Neogene succession (Sequences 2 to 4).
- to determine paleoceanographic parameters within a shelf-edge setting in Sequences 2 to 4, to complement other components of the shelf-to-basin transect.
- to evaluate sea-level control on Neogene facies within an upper slope / shelf-edge setting (cf. Sites GAB-03B and GAB-04B).
- to evaluate the diagenetic history and processes within Neogene facies in an upper slope / shelf-edge setting.

SITE GAB-05B


127°E
128°E
129°E
0
50 km
32°S
33°S
34°S
50
100
200
500
1000
2000
3000
4000
4500
Site GAB-09A
Site GAB-06B
Site GAB-08A
Site GAB-07A
Site GAB-04B
Site GAB-03B
Jerboa-1
Eyre
Terrace
Site GAB-05B
Site GAB-02B
Site GAB-01C
Site GAB-13B

Revised October 1992

SAFETY CHECK SHEET
JOIDES POLLUTION PREVENTION AND SAFETY PANEL

1) Basic site information.

Leg: **182**	*Site designation:* **GAB-05B**	*Latitude:* **33°25.2122'S**	*Longitude:* **127°36.1382'E**
Water Depth: **488 m**	*Distance from land:* **71.7 n. mi.**	*Jurisdiction:* **Australia**	
General location or geomorphic province: **Eucla Basin; western Great Australian Bight**			
Probable thickness of sediments: **≈3910 m**		*Proposed total penetration:* **580 m**	

2) Upon what geophysical and/or geological data was this site selection made?

Multichannel Seismic lines: **AGSO (1996) 169/13A (SP 994.85) and 169/13AA (SP 13195.02)**
Single Channel Seismic lines: **Nil**
DSDP/ODP holes: **Nil**
Piston cores: **Gravity cores 173/GC05 (3.51 m) and 173/GC06 (3.60 m)**
Other: **Also on JNOC (1990) multichannel seismic line JA90-23 (SP 5189.38)**

3) What is your proposed drilling program?

Double APC; XCB; RCB; no re-entry system required.

4) What is your proposed logging program?

Triple Combo; FMS/Sonic; WST; GHMT, Geochem.

5) From previous DSDP/ODP drilling in this area, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock:

No relevant DSDP/ODP drilling in the area.

6) From available information, list all commercial drilling in this area that produced or yielded significant shows. Give depths and ages of hydrocarbon-bearing deposits:

Only relevant commercial drilling in the area is Jerboa-1, 5 n mi. to the south, which targetted the Mesozoic section in the Eyre Sub-basin. Jerboa-1 encountered no significant shows, with vitrinite reflectance indicating an immature to marginally mature Mesozoic section to TD.

7) Is there any indication of gas hydrates at this location?

No indication of gas hydrates; no BSR present.

8) Is there any reason to expect any hydrocarbon accumulation at this site? Please comment.

No hydrocarbon accumulation expected; however, the lower part of this hole (from 350 m to TD) is likely to intersect dipping interbedded calcareous mudstone and sandstone, overlain by a carbonate seal, and underlain by a considerable thickness of Mesozoic siliciclastic sediments. No DHI's are visible, but increased monitoring is recommended.

9) What "special" precautions will be taken during drilling?

Standard hydrocarbon monitoring, except for cores immediately preceding and coinciding with the sequence boundary at approx. 350 m, which should each be subject to gas analysis prior to further drilling.

10) What abandonment procedures do you plan to follow?

Standard abandonment procedures.

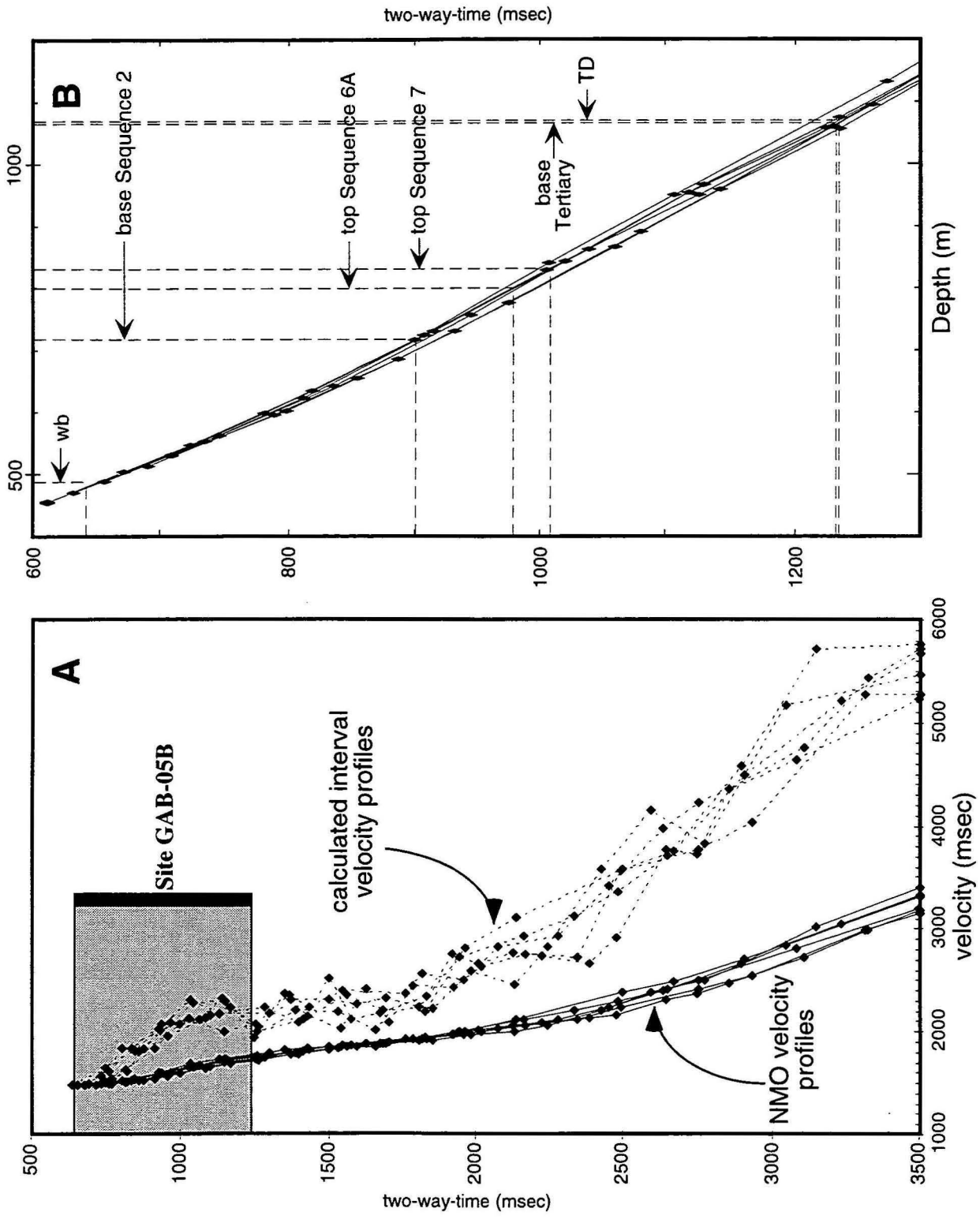
Summary: *What do you consider to be the major risks in drilling at this site?*

No significant drilling risks are anticipated at this site; however increased monitoring should be undertaken close to the sequence boundary at approx. 350 m. This site should be drilled AFTER Site GAB-06B, so that an indication of lithofacies within the ?siliciclastic wedge can be obtained, and accurate velocity data through overlying sequences can be used for more precise depth to sequence boundary calculations.

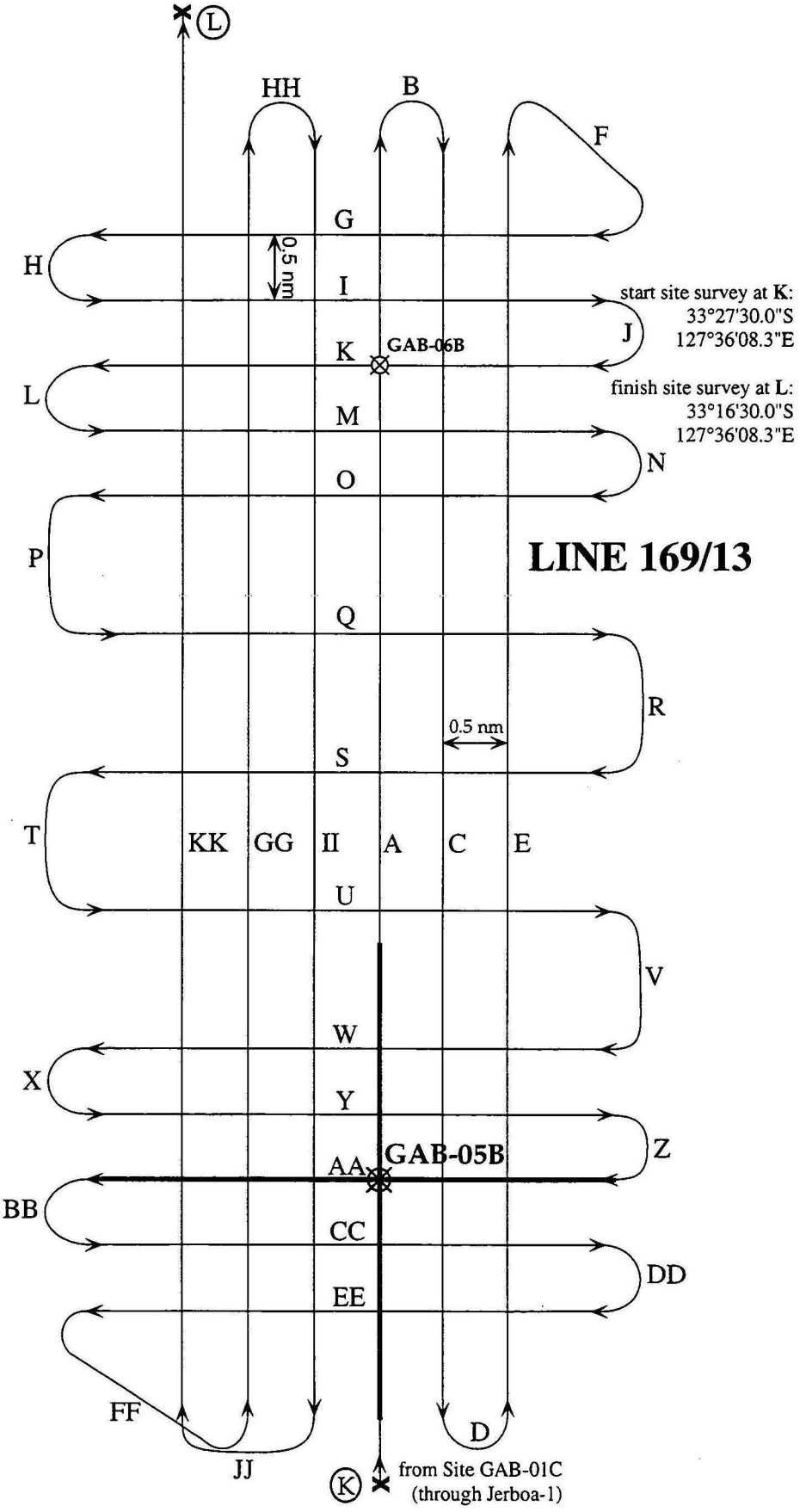
There is a risk that poor weather conditions may prevent drilling (>2.0 m heave compensator stroke), so a flexible drilling schedule will be necessary so that sites in shallower water can be drilled during calmer weather periods.

Velocity Calculations: Site GAB-05B

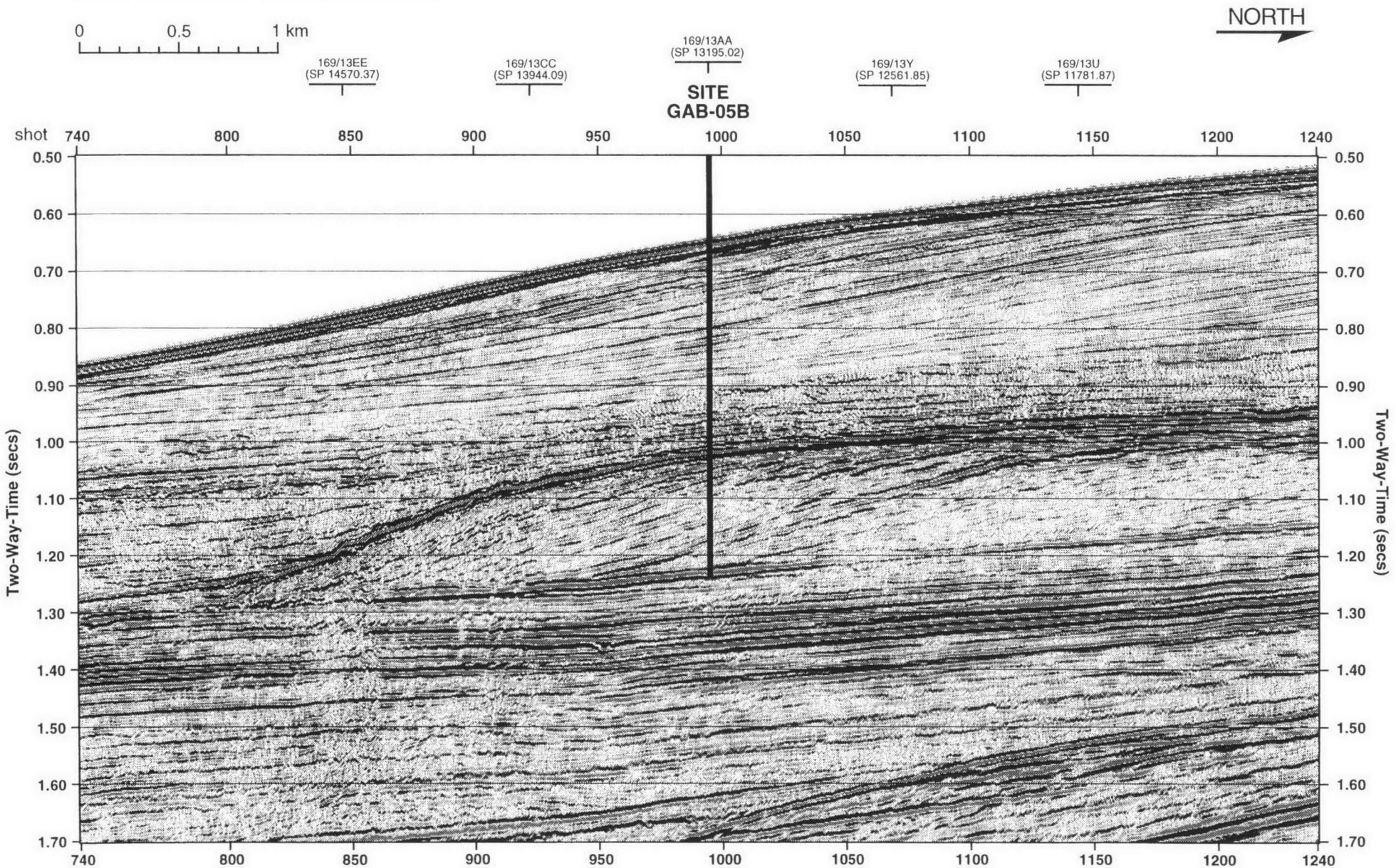
Velocity analysis for site GAB-05B, from seismic line 169/13. The six closest NMO (stacking) velocities to the site have been used to derive interval velocity profiles (A) and time-depth curves (B). Approximate depths to horizons shown on seismic sections presented on the following pages can then be derived from these time-depth curves.



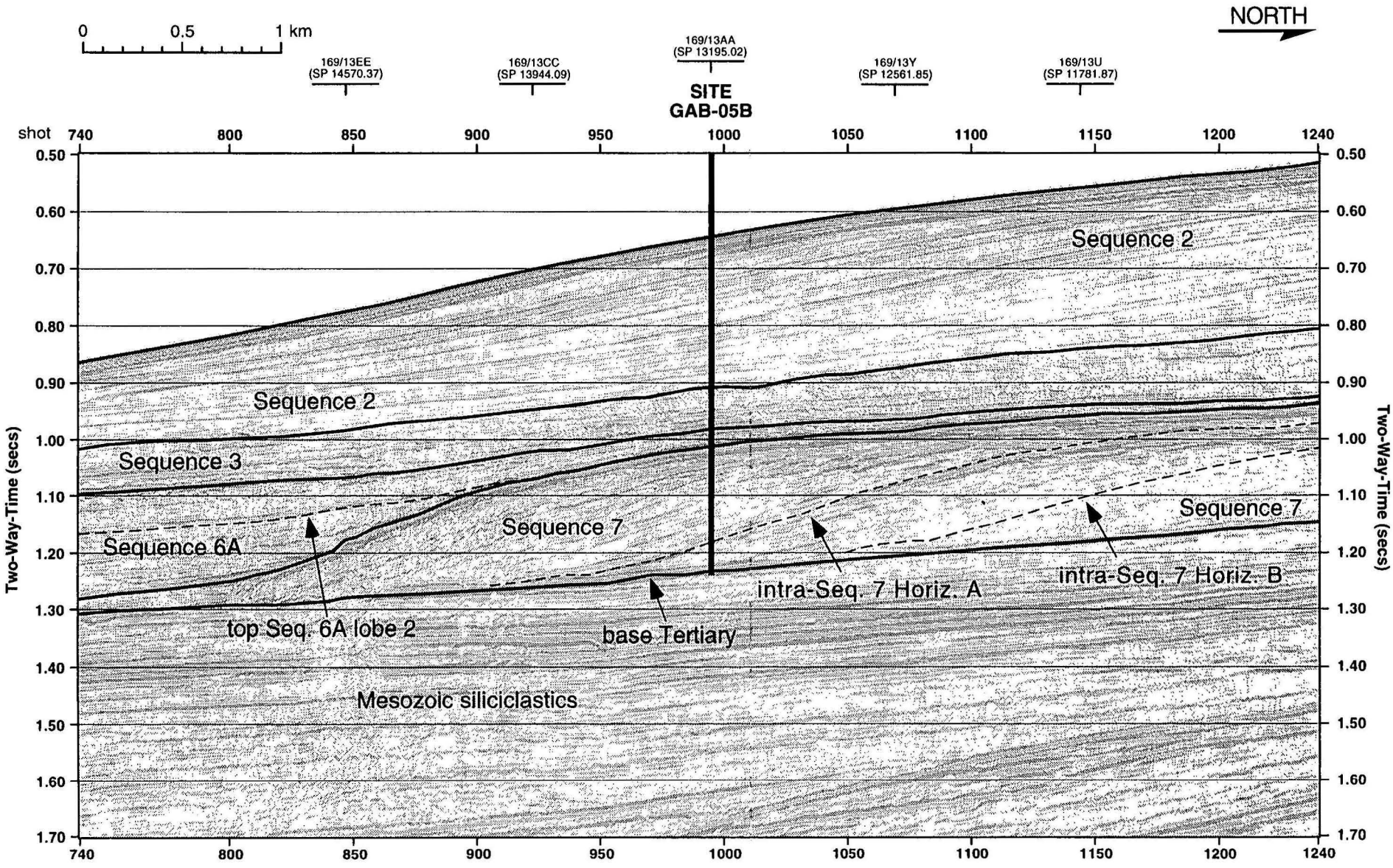
AGSO Survey 169 (February 1996) track map - Site GAB-05B

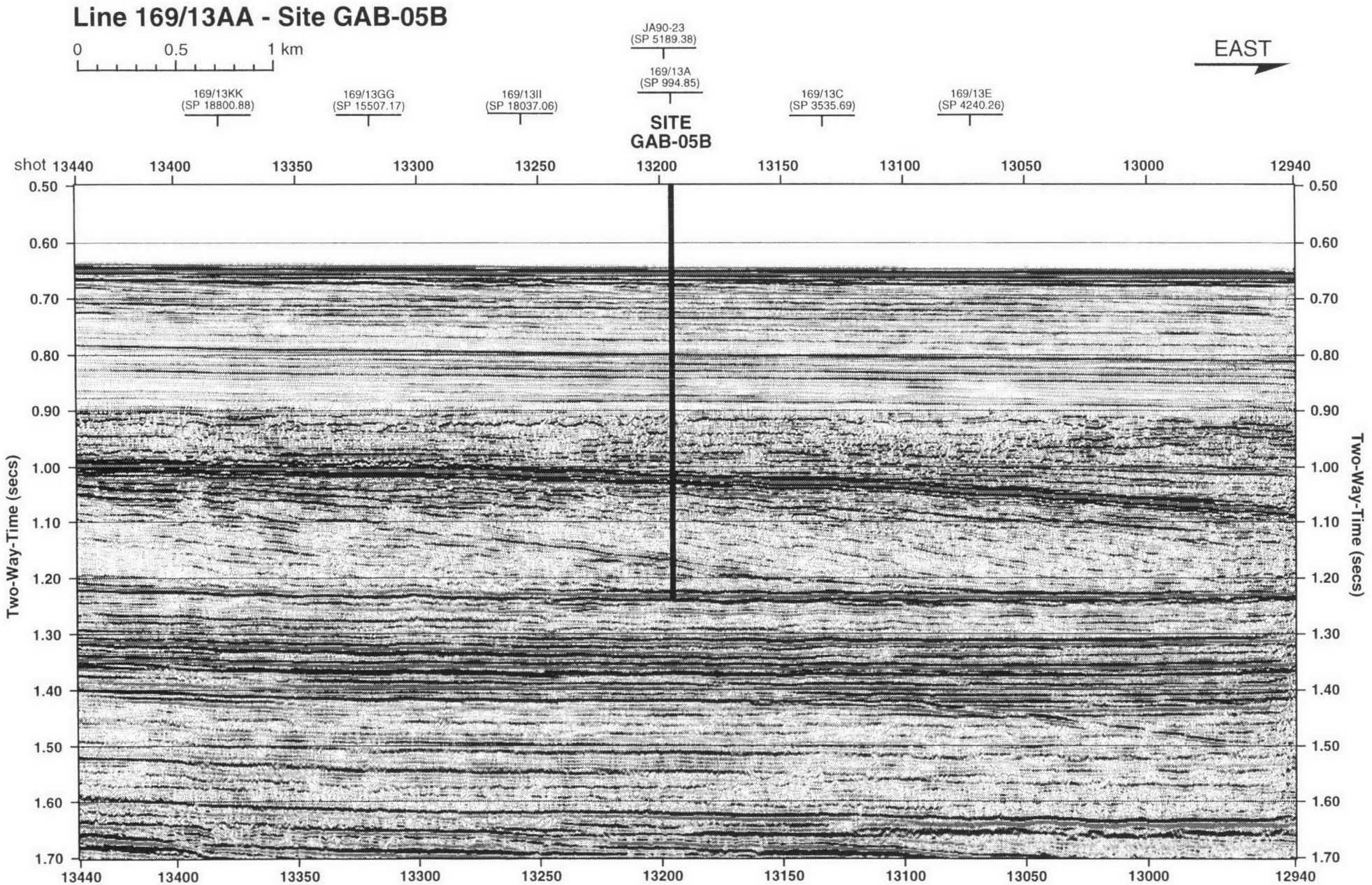


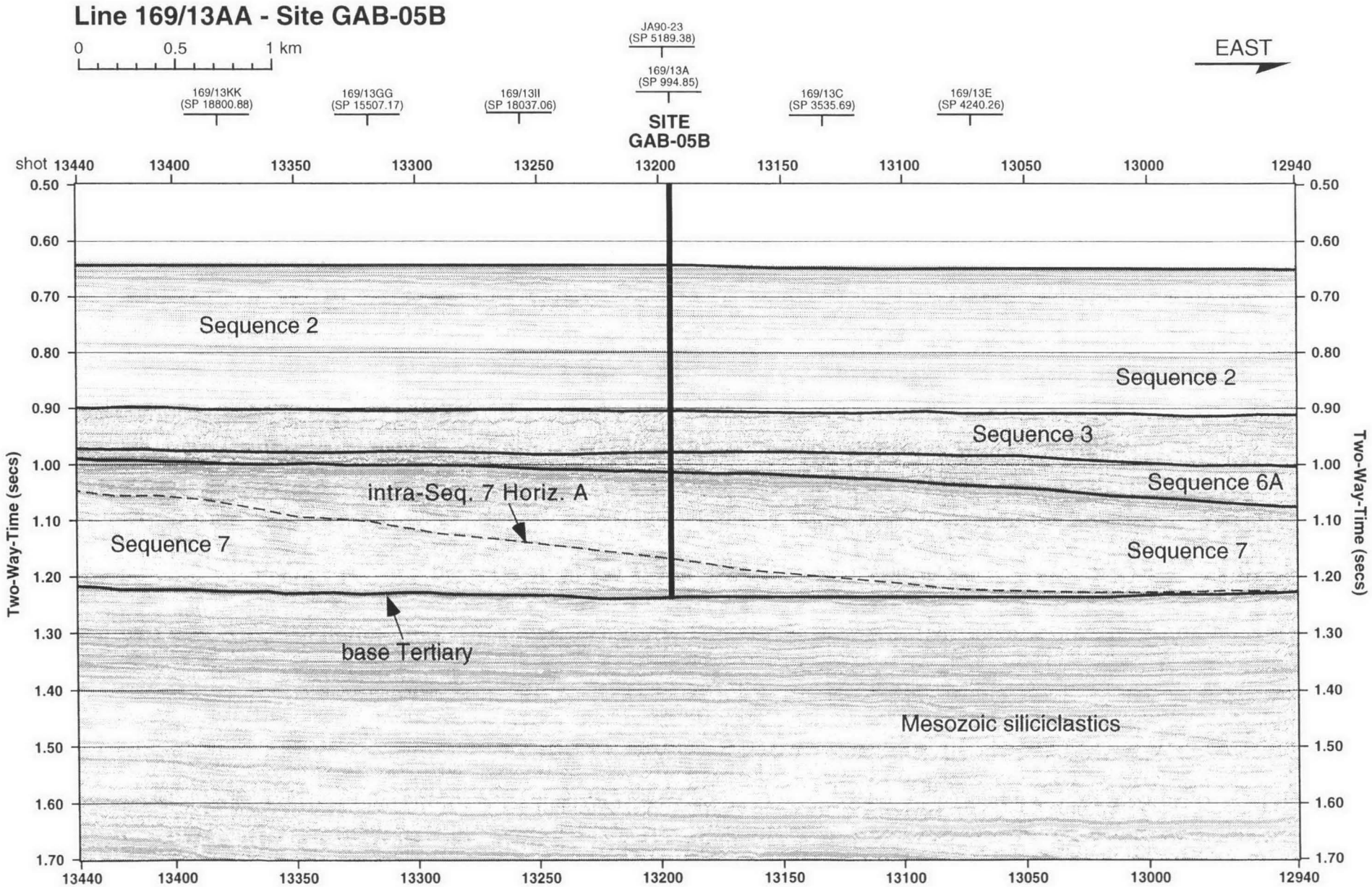
Line 169/13A - Site GAB-05B



Line 169/13A - Site GAB-05B

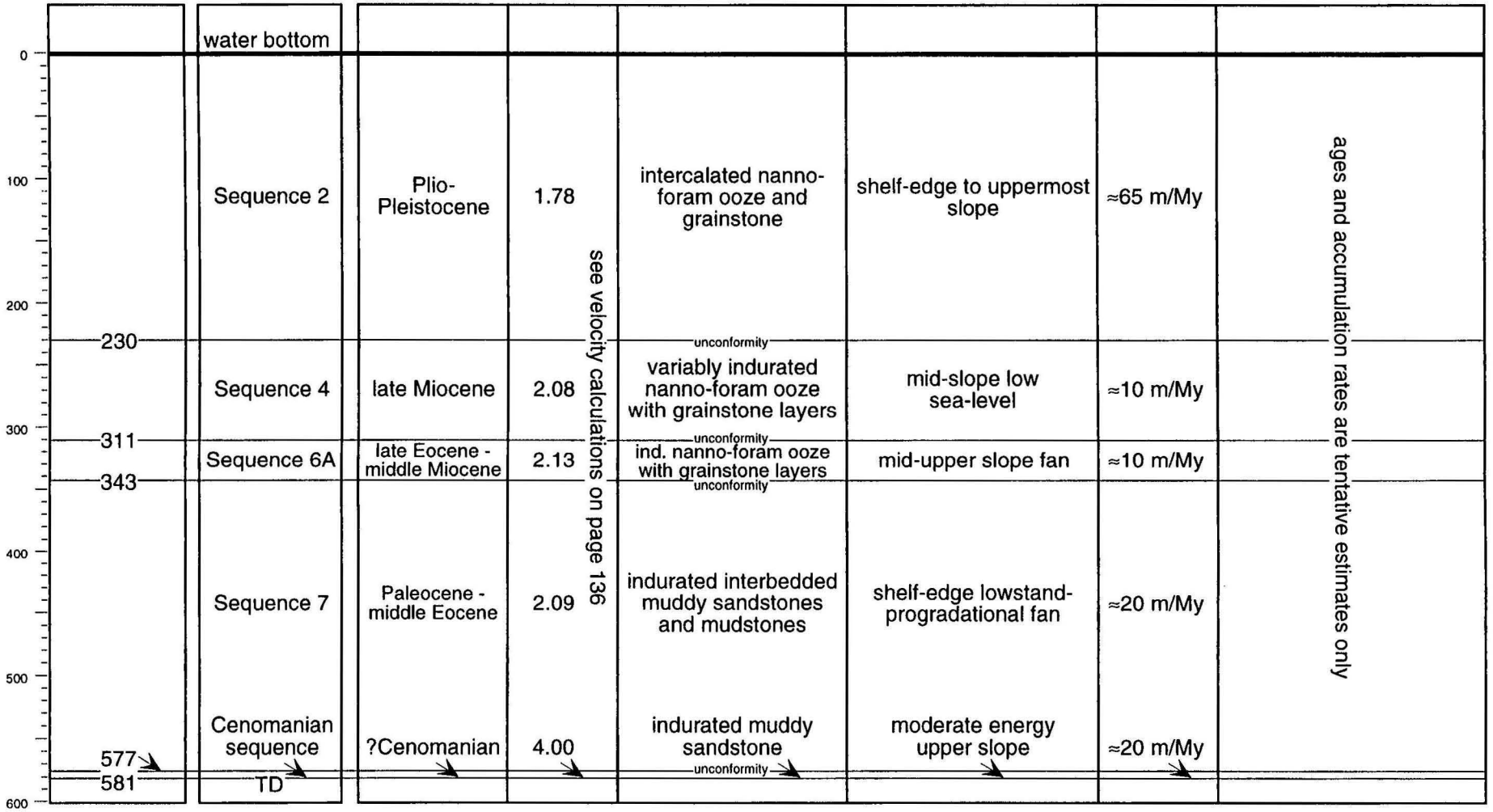



Line 169/13AA - Site GAB-05B
0
0.5
1 km
JA90-23
(SP 5189.38)
169/13A
(SP 994.85)
EAST
169/13KK
(SP 18800.88)
169/13GG
(SP 15507.17)
169/13II
(SP 18037.06)
SITE
GAB-05B
169/13C
(SP 3535.69)
169/13E
(SP 4240.26)
shot 13440
13400
13350
13300
13250
13200
13150
13100
13050
13000
12940
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60
1.70
Two-Way-Time (secs)

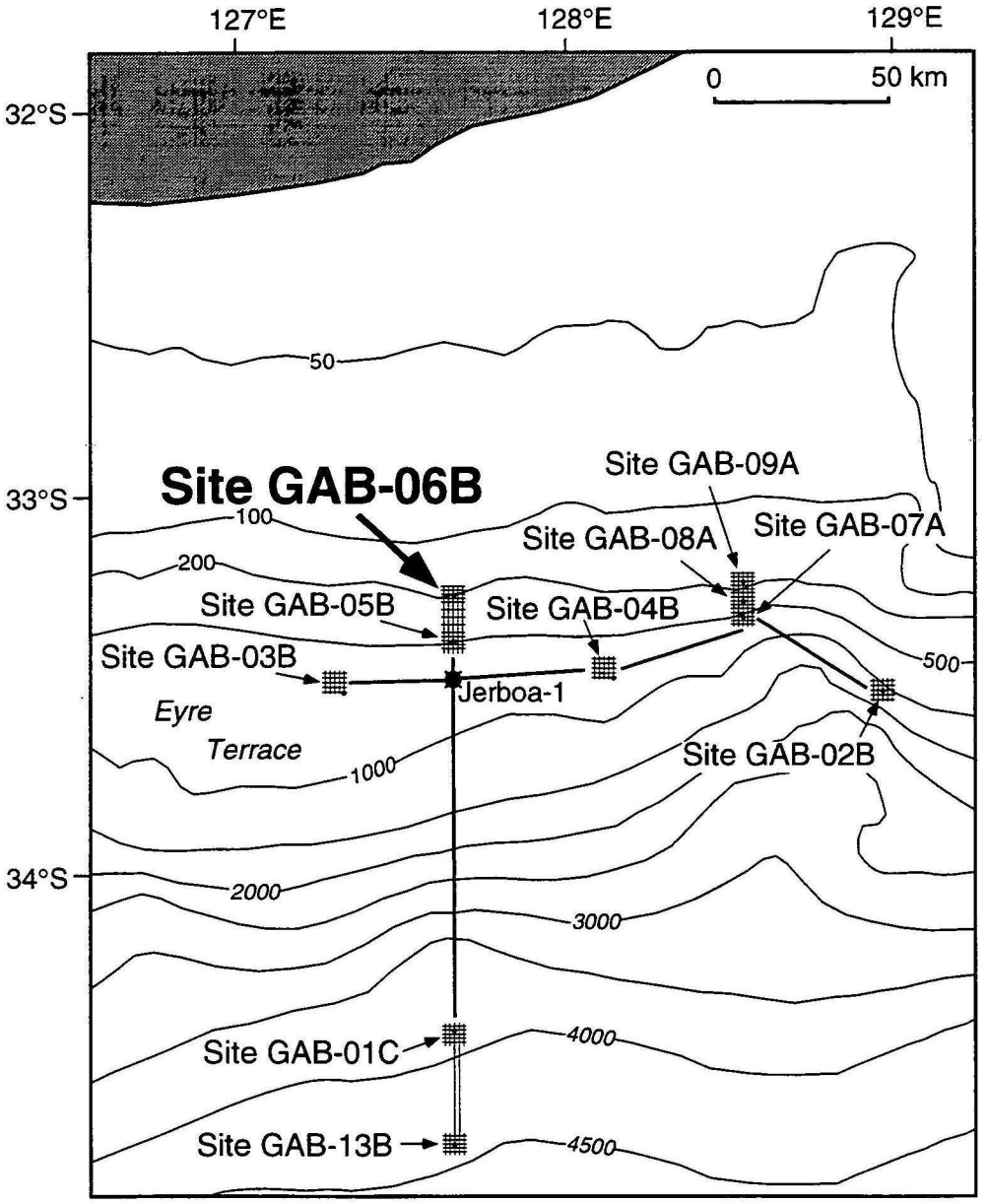

Line 169/13AA - Site GAB-05B
0
0.5
1 km
JA90-23
(SP 5189.38)
169/13A
(SP 994.85)
EAST
169/13KK
(SP 18800.88)
169/13GG
(SP 15507.17)
169/13II
(SP 18037.06)
SITE
GAB-05B
169/13C
(SP 3535.69)
169/13E
(SP 4240.26)
shot 13440
13400
13350
13300
13250
13200
13150
13100
13050
13000
12940
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60
1.70
Two-Way-Time (secs)
Sequence 2
Sequence 2
Sequence 3
Sequence 6A
intra-Seq. 7 Horiz. A
Sequence 7
Sequence 7
base Tertiary
Mesozoic siliciclastics

Revised October 1992

GRAPHIC SUMMARY, SITE GAB-05B



SITE GAB-06B


127°E
128°E
129°E
0
50 km
32°S
33°S
34°S
50
100
200
500
1000
2000
3000
4000
4500
Site GAB-06B
Site GAB-09A
Site GAB-08A
Site GAB-07A
Site GAB-05B
Site GAB-04B
Site GAB-03B
Jerboa-1
Eyre
Terrace
Site GAB-02B
Site GAB-01C
Site GAB-13B

Revised October 1992

SAFETY CHECK SHEET
JOIDES POLLUTION PREVENTION AND SAFETY PANEL

1) Basic site information.

Leg: **182**	*Site designation:* **GAB-06B**	*Latitude:* **33°18.9842'S**	*Longitude:* **127°36.1287'E**
Water Depth: **220 m**	*Distance from land:* **65.7 n. mi.**	*Jurisdiction:* **Australia**	
General location or geomorphic province: **Eucla Basin; western Great Australian Bight**			
Probable thickness of sediments: **≈1405 m**	*Proposed total penetration:* **695 m**		

2) Upon what geophysical and/or geological data was this site selection made?

Multichannel Seismic lines: **AGSO (1996) 169/13A (SP 1916.32) and 169/13K (SP 7399.92)**
Single Channel Seismic lines: **Nil**
DSDP/ODP holes: **Nil**
Piston cores: **Vibra-core 173/VC12 (4.36 m)**
Other: **Also on JNOC (1990) multichannel seismic line JA90-23 (SP 4727.11)**

3) What is your proposed drilling program?

Triple APC; XCB; RCB; no re-entry system required.

4) What is your proposed logging program?

Triple Combo; FMS/Sonic; WST.

5) From previous DSDP/ODP drilling in this area, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock:

No relevant DSDP/ODP drilling in the area.

6) From available information, list all commercial drilling in this area that produced or yielded significant shows. Give depths and ages of hydrocarbon-bearing deposits:

Only relevant commercial drilling in the area is Jerboa-1, 11.2 n mi. to the south, which targetted the Mesozoic section in the Eyre Sub-basin. Jerboa-1 encountered no significant shows, with vitrinite reflectance indicating an immature to marginally mature Mesozoic section to TD.

7) Is there any indication of gas hydrates at this location?

No indication of gas hydrates; no BSR present.

8) Is there any reason to expect any hydrocarbon accumulation at this site? Please comment.

No hydrocarbon accumulation expected; however, the lower part of this hole (from 560 m to TD) is likely to intersect interbedded calcareous mudstone and sandstone, overlain by a carbonate seal, and underlain by Mesozoic siliciclastic sediments. No DHI's are visible, but increased monitoring is recommended.

9) What "special" precautions will be taken during drilling?

Standard hydrocarbon monitoring, except for cores immediately preceding and coinciding with the sequence boundary at approx. 560 m, which should each be subject to gas analysis prior to further drilling.

10) What abandonment procedures do you plan to follow?

Standard abandonment procedures.

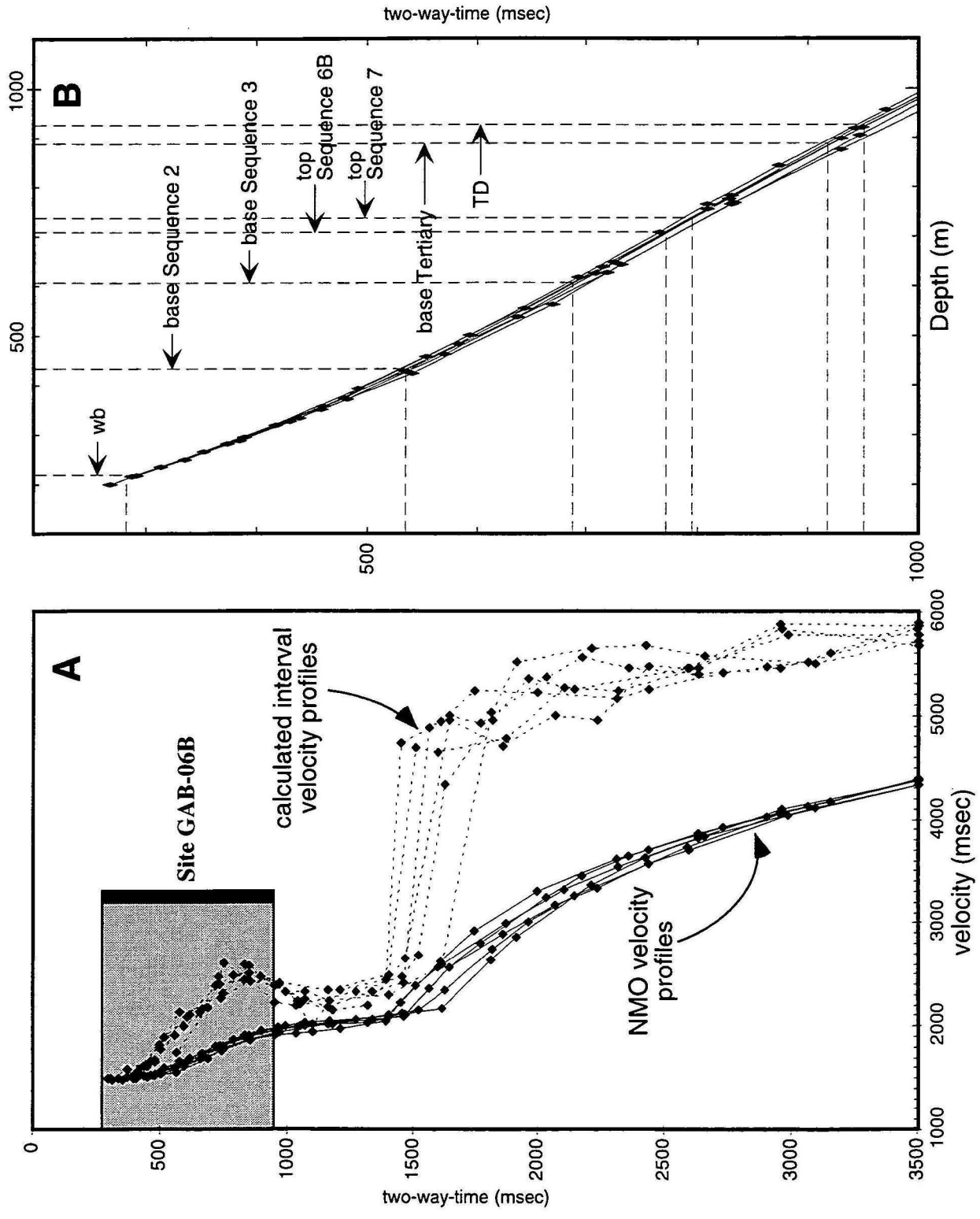
Summary: *What do you consider to be the major risks in drilling at this site?*

No significant drilling risks are anticipated at this site; however increased monitoring should be undertaken close to the sequence boundary at approx. 560 m. This site should be drilled prior to GAB-05B to increase predictive ability.

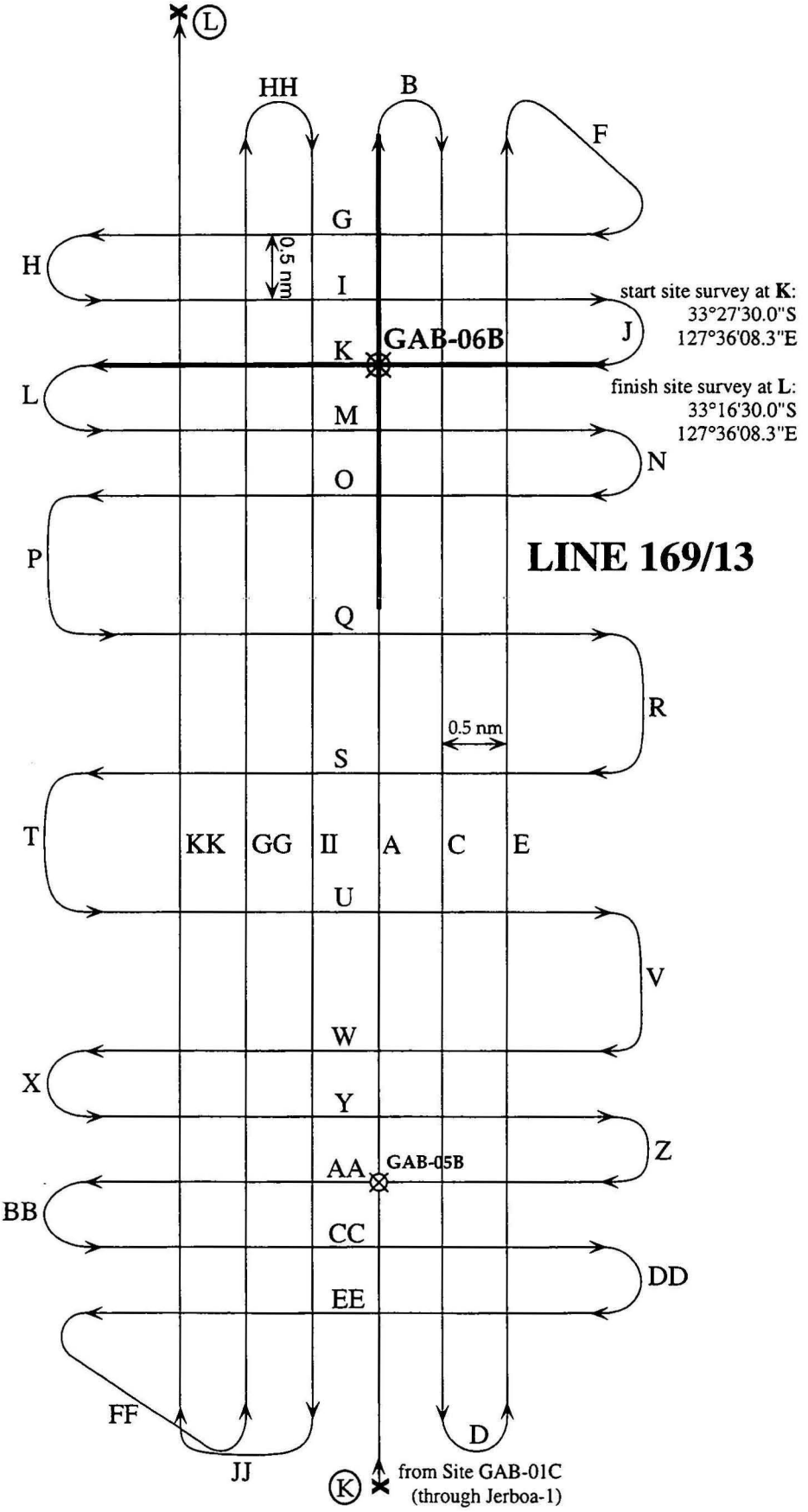
There is a risk that poor weather conditions may prevent drilling (>1.0 m heave compensator stroke; wind >35 knots; roll >3°), so a flexible drilling schedule will be necessary so that sites in shallower water can be drilled during calmer weather periods.

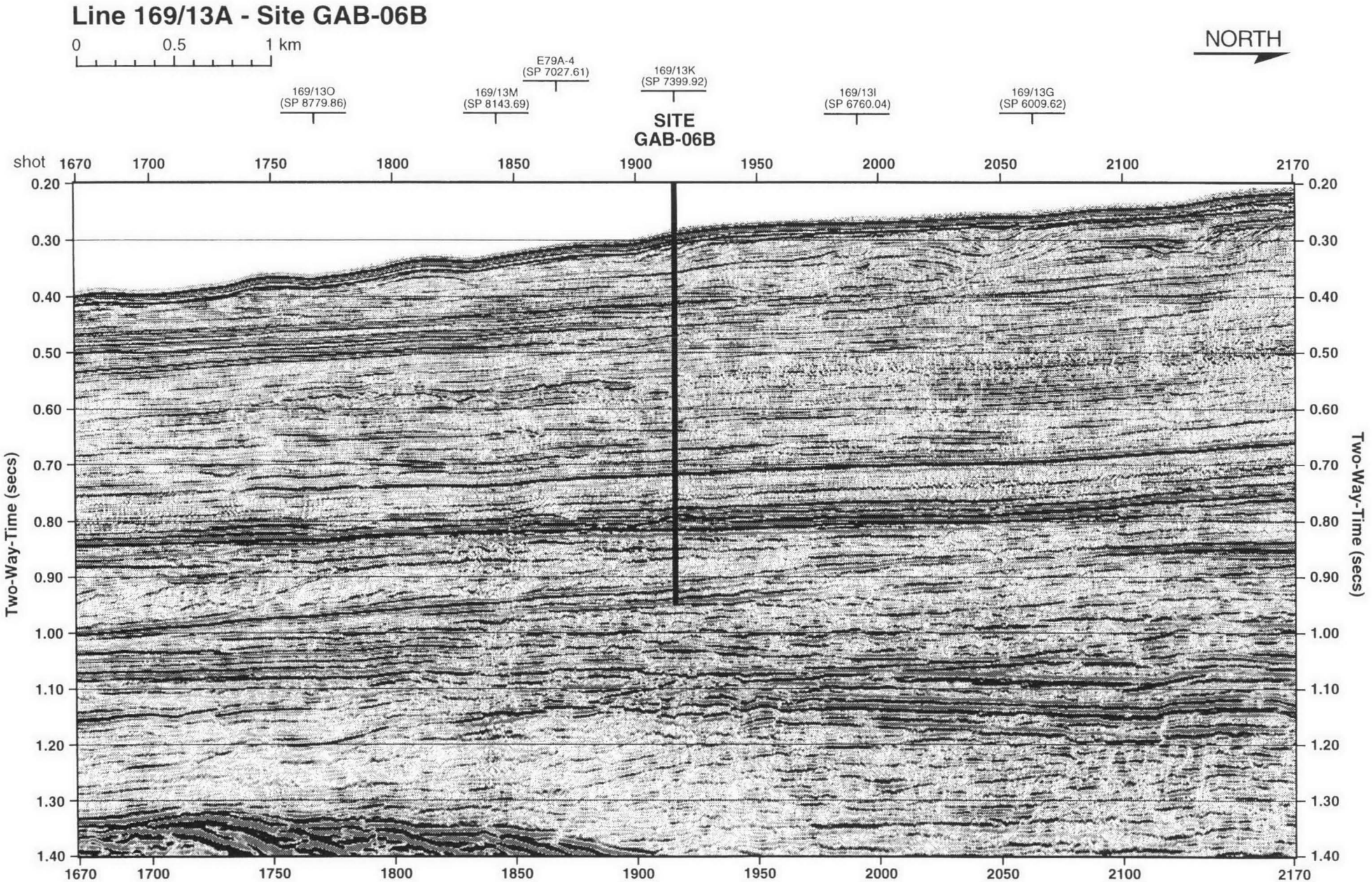
Velocity Calculations: Site GAB-06B

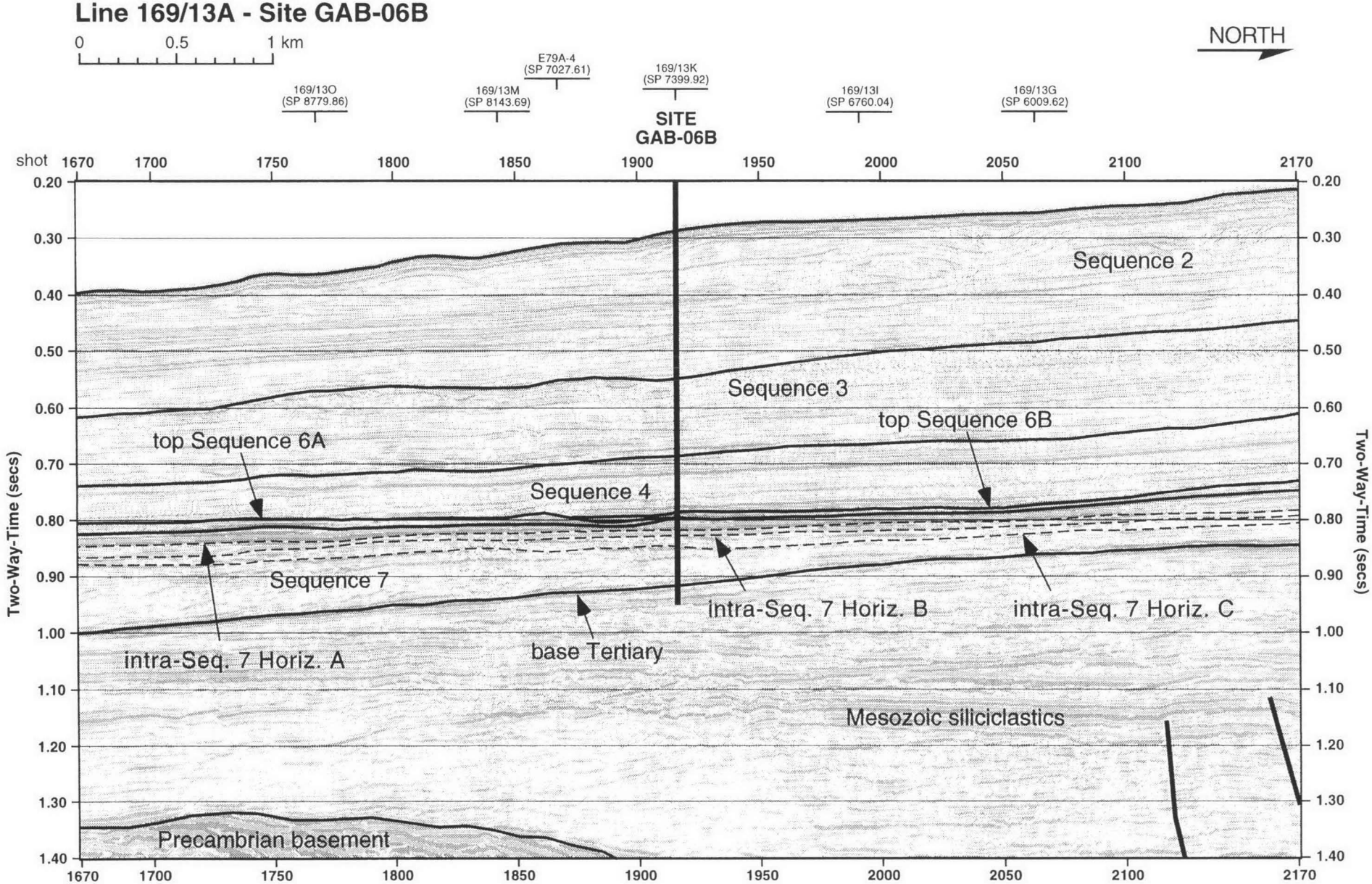
Velocity analysis for site GAB-06B, from seismic line 169/13. The six closest NMO (stacking) velocities to the site have been used to derive interval velocity profiles (A) and time-depth curves (B). Approximate depths to horizons shown on seismic sections presented on the following pages can then be derived from these time-depth curves.

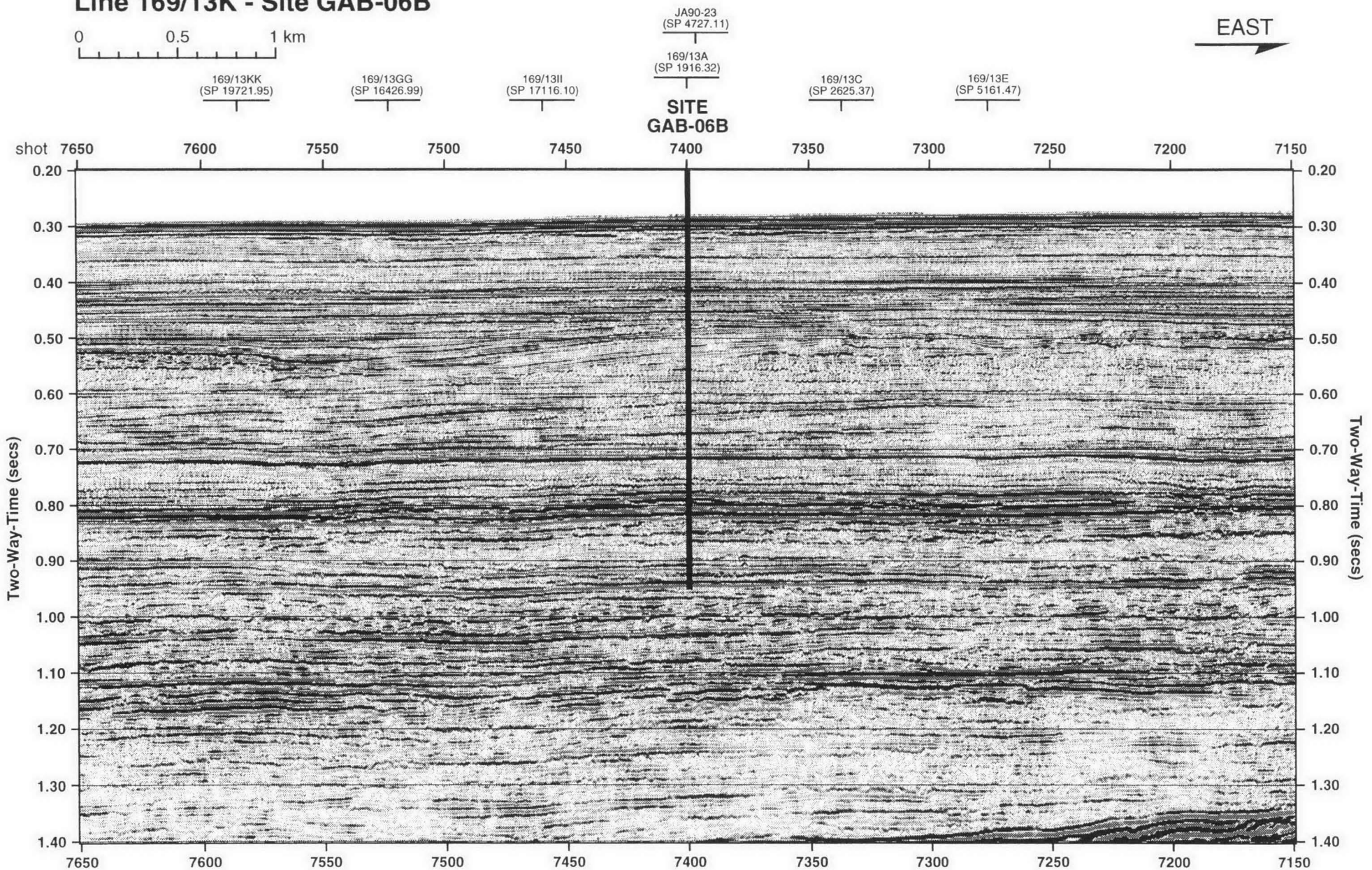


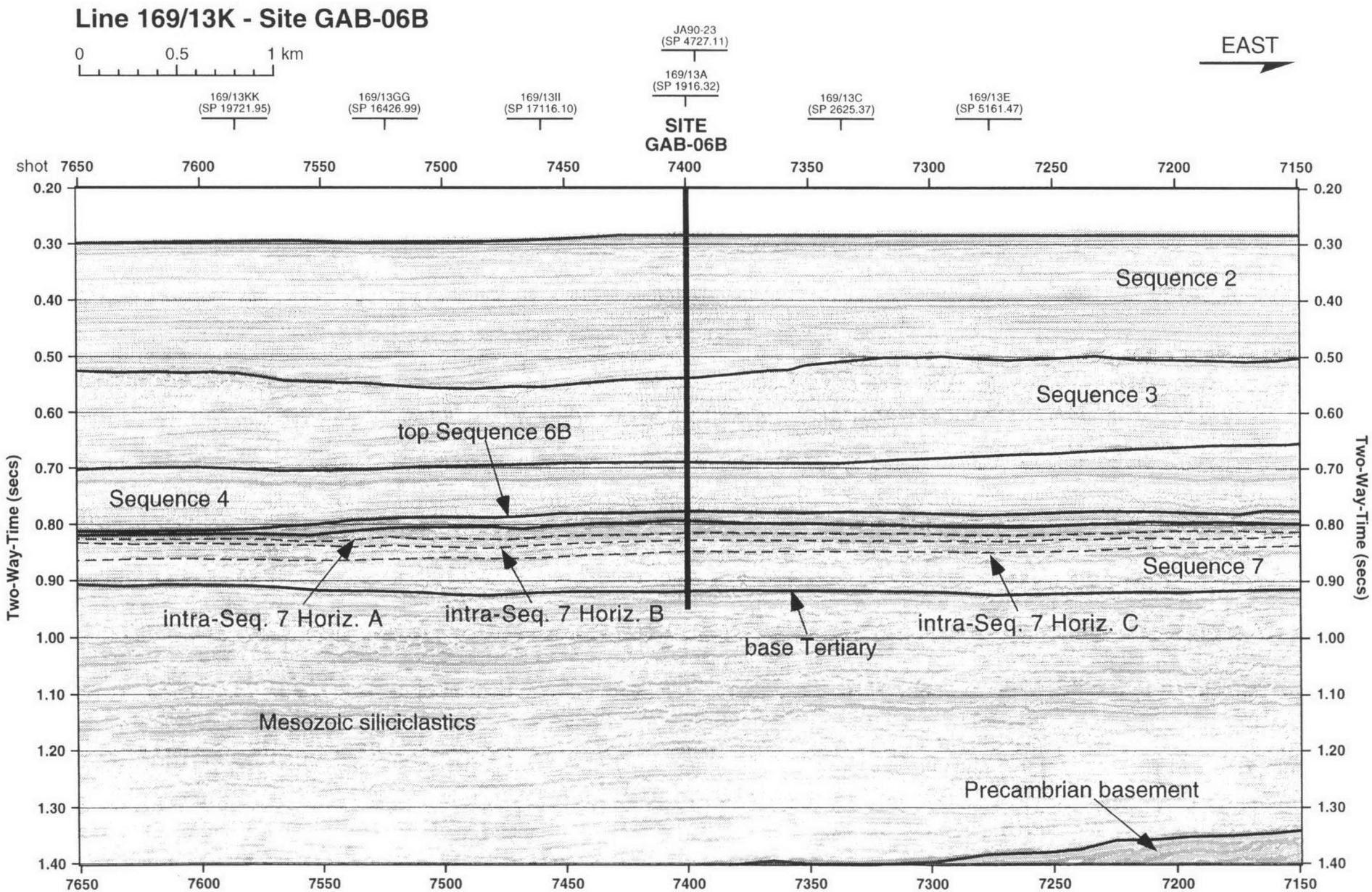
AGSO Survey 169 (February 1996) track map - Site GAB-06B




Line 169/13A - Site GAB-06B
0
0.5
1 km
NORTH
169/13O
(SP 8779.86)
169/13M
(SP 8143.69)
E79A-4
(SP 7027.61)
169/13K
(SP 7399.92)
SITE
GAB-06B
169/13I
(SP 6760.04)
169/13G
(SP 6009.62)
shot
1670
1700
1750
1800
1850
1900
1950
2000
2050
2100
2170
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
Two-Way-Time (secs)


Line 169/13A - Site GAB-06B
0 0.5 1 km
NORTH
169/13O (SP 8779.86)
169/13M (SP 8143.69)
E79A-4 (SP 7027.61)
169/13K (SP 7399.92)
SITE GAB-06B
169/13I (SP 6760.04)
169/13G (SP 6009.62)
shot
1670 1700 1750 1800 1850 1900 1950 2000 2050 2100 2170
0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00 1.10 1.20 1.30 1.40
Two-Way-Time (secs)
Sequence 2
Sequence 3
top Sequence 6B
top Sequence 6A
Sequence 4
Sequence 7
intra-Seq. 7 Horiz. B
intra-Seq. 7 Horiz. C
intra-Seq. 7 Horiz. A
base Tertiary
Mesozoic siliciclastics
Precambrian basement


Line 169/13K - Site GAB-06B
0
0.5
1 km
JA90-23
(SP 4727.11)
169/13A
(SP 1916.32)
EAST
169/13KK
(SP 19721.95)
169/13GG
(SP 16426.99)
169/13II
(SP 17116.10)
SITE
GAB-06B
169/13C
(SP 2625.37)
169/13E
(SP 5161.47)
shot 7650 7600 7550 7500 7450 7400 7350 7300 7250 7200 7150
Two-Way-Time (secs)
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
7650 7600 7550 7500 7450 7400 7350 7300 7250 7200 7150

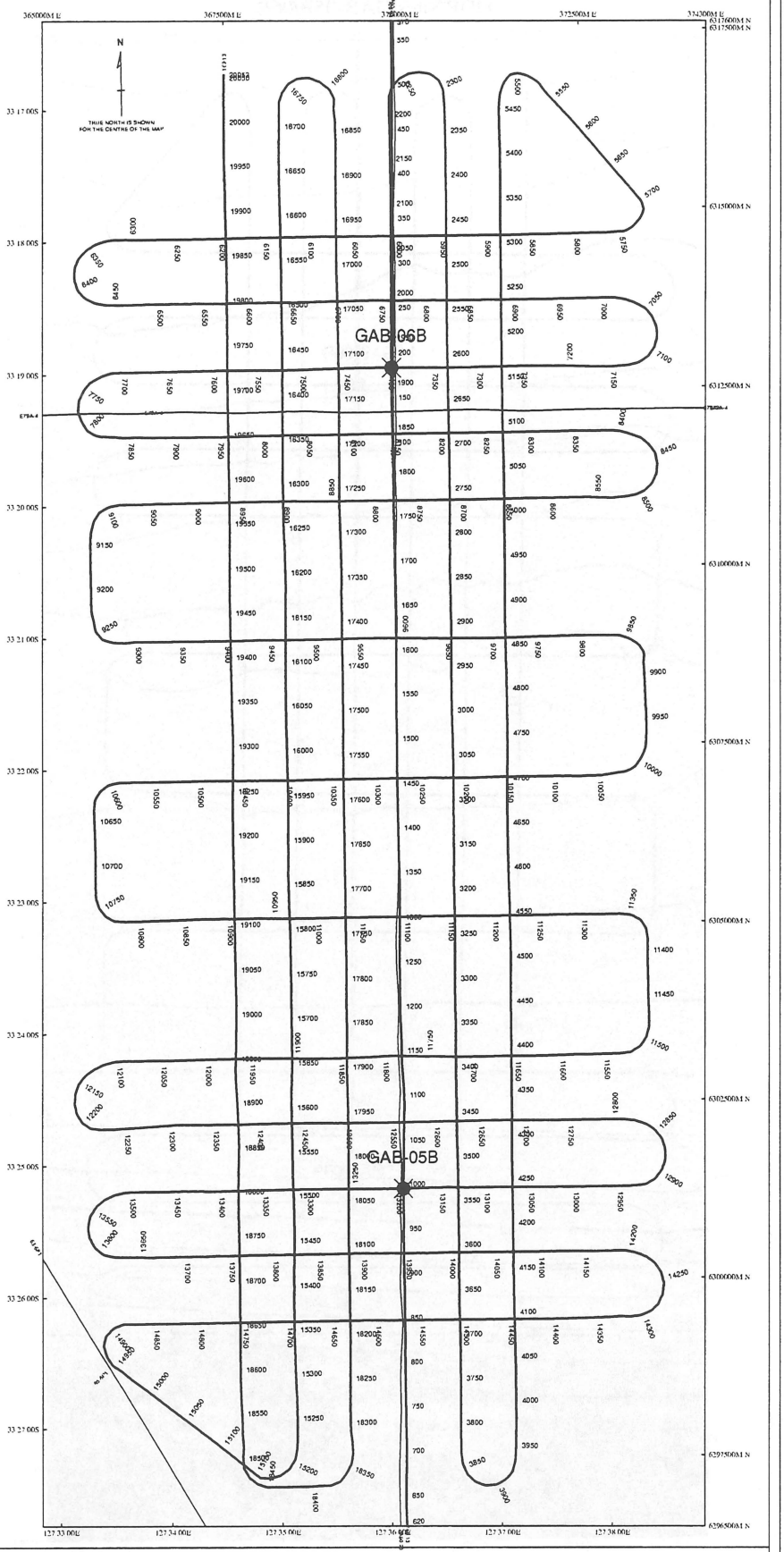

Line 169/13K - Site GAB-06B
0
0.5
1 km
JA90-23
(SP 4727.11)
169/13A
(SP 1916.32)
EAST
169/13KK
(SP 19721.95)
169/13GG
(SP 16426.99)
169/13II
(SP 17116.10)
SITE
GAB-06B
169/13C
(SP 2625.37)
169/13E
(SP 5161.47)
shot
7650
7600
7550
7500
7450
7400
7350
7300
7250
7200
7150
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
Two-Way-Time (secs)
Sequence 2
Sequence 3
top Sequence 6B
Sequence 4
Sequence 7
intra-Seq. 7 Horiz. A
intra-Seq. 7 Horiz. B
base Tertiary
intra-Seq. 7 Horiz. C
Mesozoic siliciclastics
Precambrian basement

GRAPHIC SUMMARY, SITE GAB-06B

Sub-bottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Av. rate of sediment accumulation (m/My)	Comments
	water bottom						
	Sequence 2	Plio-Pleistocene	1.70	intercalated nanno-foram ooze and grainstone	shelf-edge to uppermost slope	≈65 m/My	ages and accumulation rates are tentative estimates only
213	unconformity						
	Sequence 3	early Pliocene	2.25	nanno-foram ooze with grainstone layers	upper slope during rising sea-level	≈100 m/My	
386	unconformity						
	Sequence 4	late Miocene	2.43	variably indurated nanno-foram ooze with grainstone layers	mid-slope low sea-level	≈20 m/My	
488	unconformity						
	Sequence 6B	late Eocene - middle Miocene	2.42	ind. nanno-foram ooze	upper slope	≈10 m/My	
517	unconformity						
	Sequence 7	Paleocene - middle Eocene	2.49	indurated interbedded muddy sandstones and mudstones	shelf-edge lowstand-progradational fan	≈15 m/My	
669	unconformity						
	Cenomanian sequence	?Cenomanian	2.30	ind. muddy sandstone	mod. energy upper slope	≈20 m/My	
707	TD						

see velocity calculations on page 146

ODP Sites GAB-05B/06B



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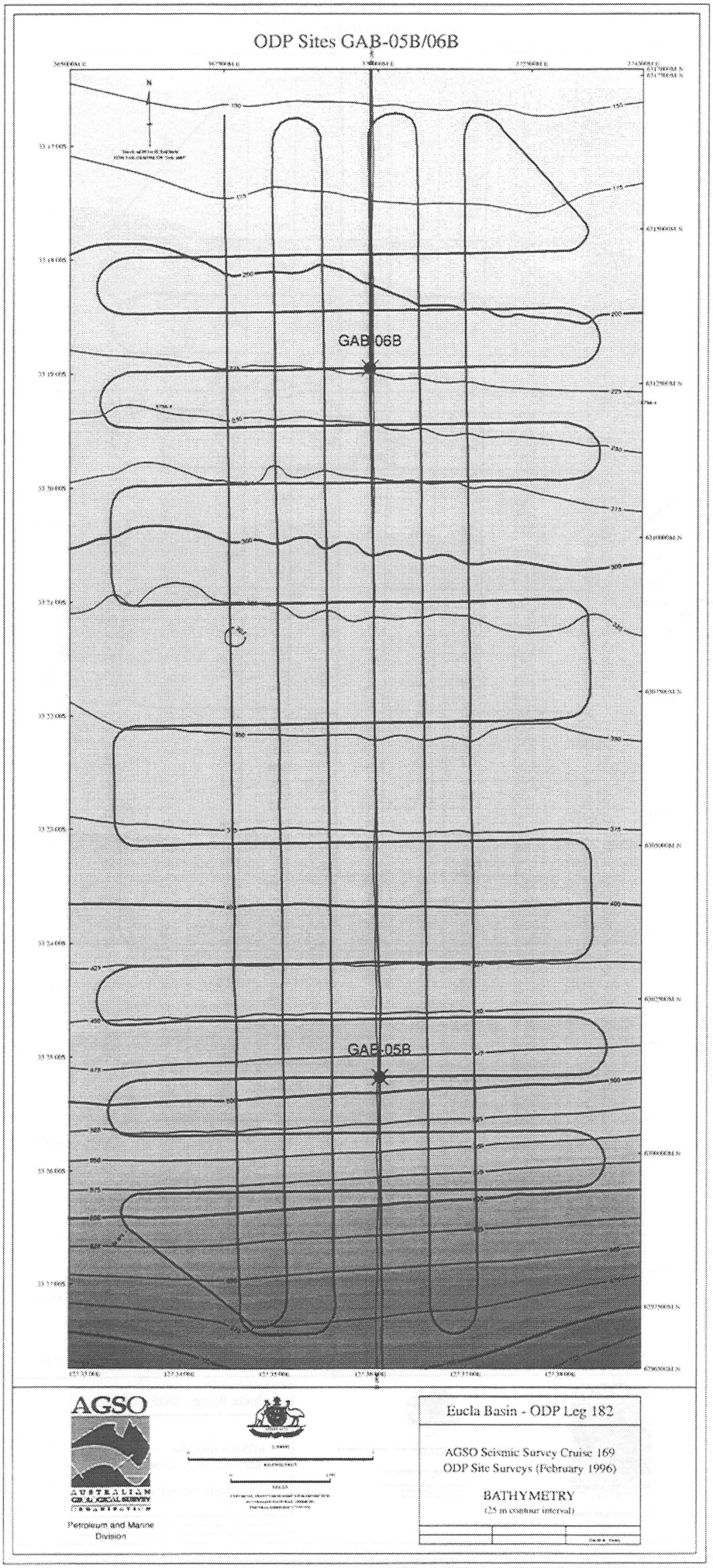
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

SHOT POINT MAP


ODP Sites GAB-05B/06B
N
GAB-06B
GAB-05B
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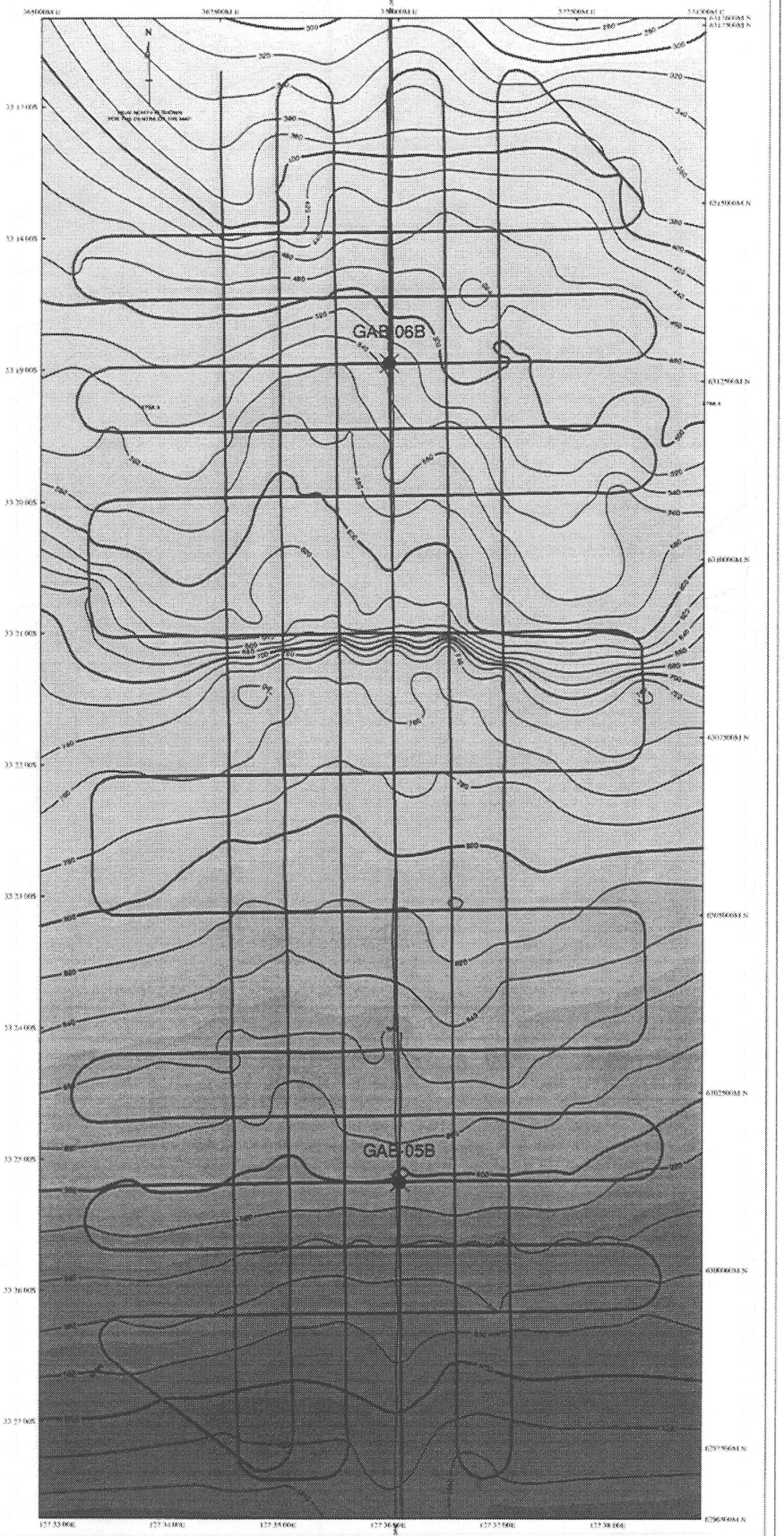
Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)
BATHYMETRY
(25 m contour interval)

ODP Sites GAB-05B/06B



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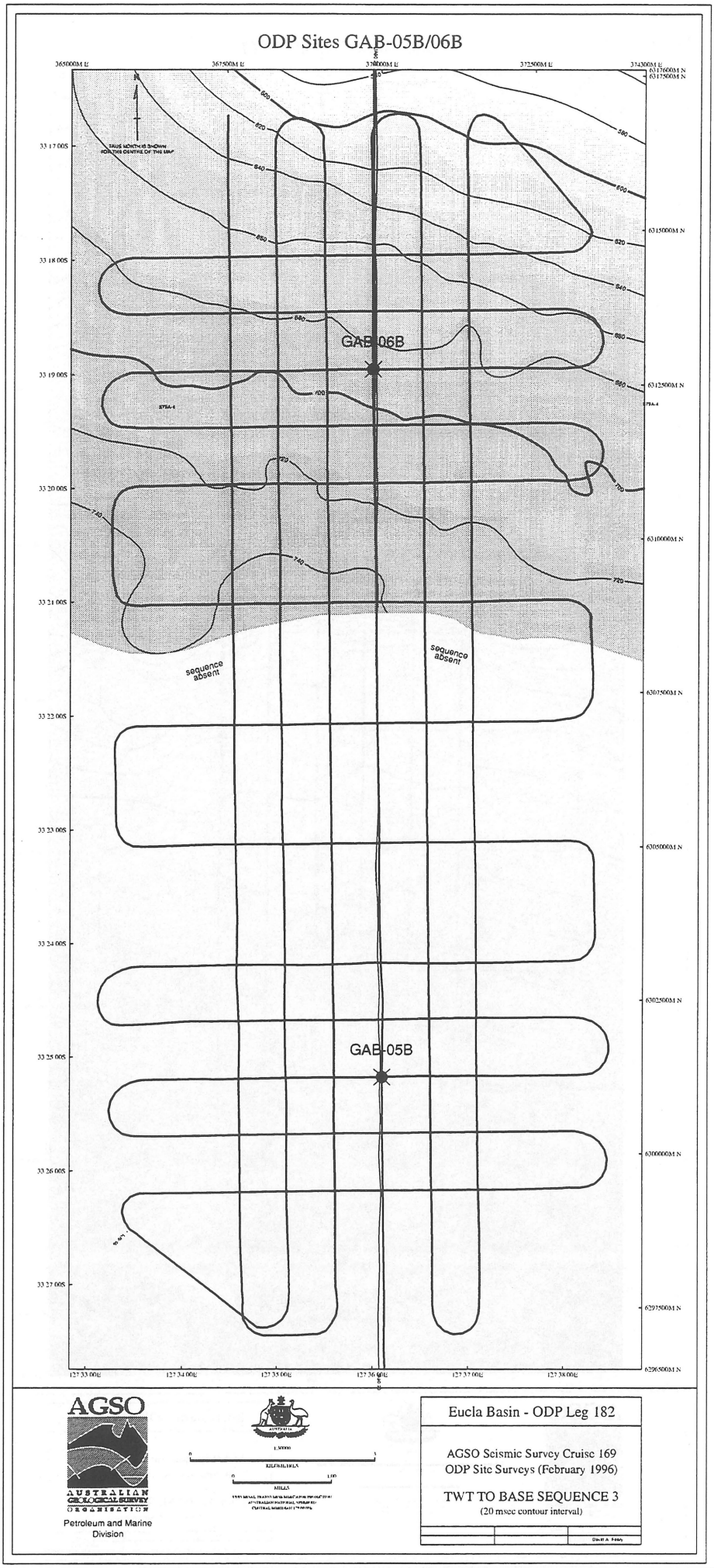
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO BASE SEQUENCE 2
(20 msec contour interval)


ODP Sites GAB-05B/06B
365000M E
367500M E
370000M E
372500M E
374300M E
6317600M N
6317500M N
33 17 00S
33 18 00S
33 19 00S
33 20 00S
33 21 00S
33 22 00S
33 23 00S
33 24 00S
33 25 00S
33 26 00S
33 27 00S
6315000M N
6312500M N
6310000M N
6307500M N
6305000M N
6302500M N
6300000M N
6297500M N
6295000M N
TRUE NORTH IS SHOWN ALONG THE CENTRE OF THE MAP
GAB-06B
GAB-05B
sequence absent
sequence absent
127 33 00E
127 34 00E
127 35 00E
127 36 00E
127 37 00E
127 38 00E
AGSO
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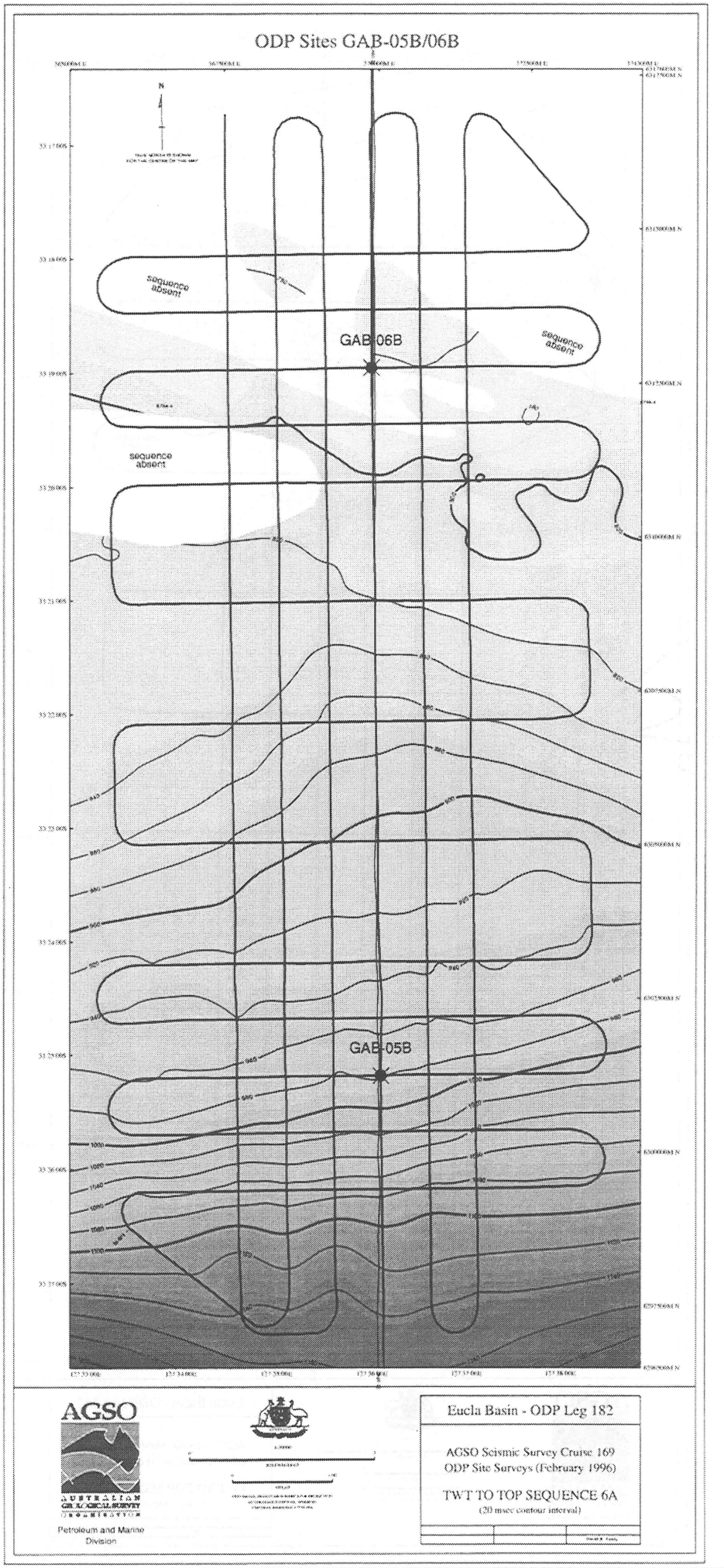
Petroleum and Marine Division
Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)
TWT TO BASE SEQUENCE 3
(20 msec contour interval)


ODP Sites GAB-05B/06B
N
sequence absent
GAB-06B
sequence absent
sequence absent
GAB-05B
AGSO
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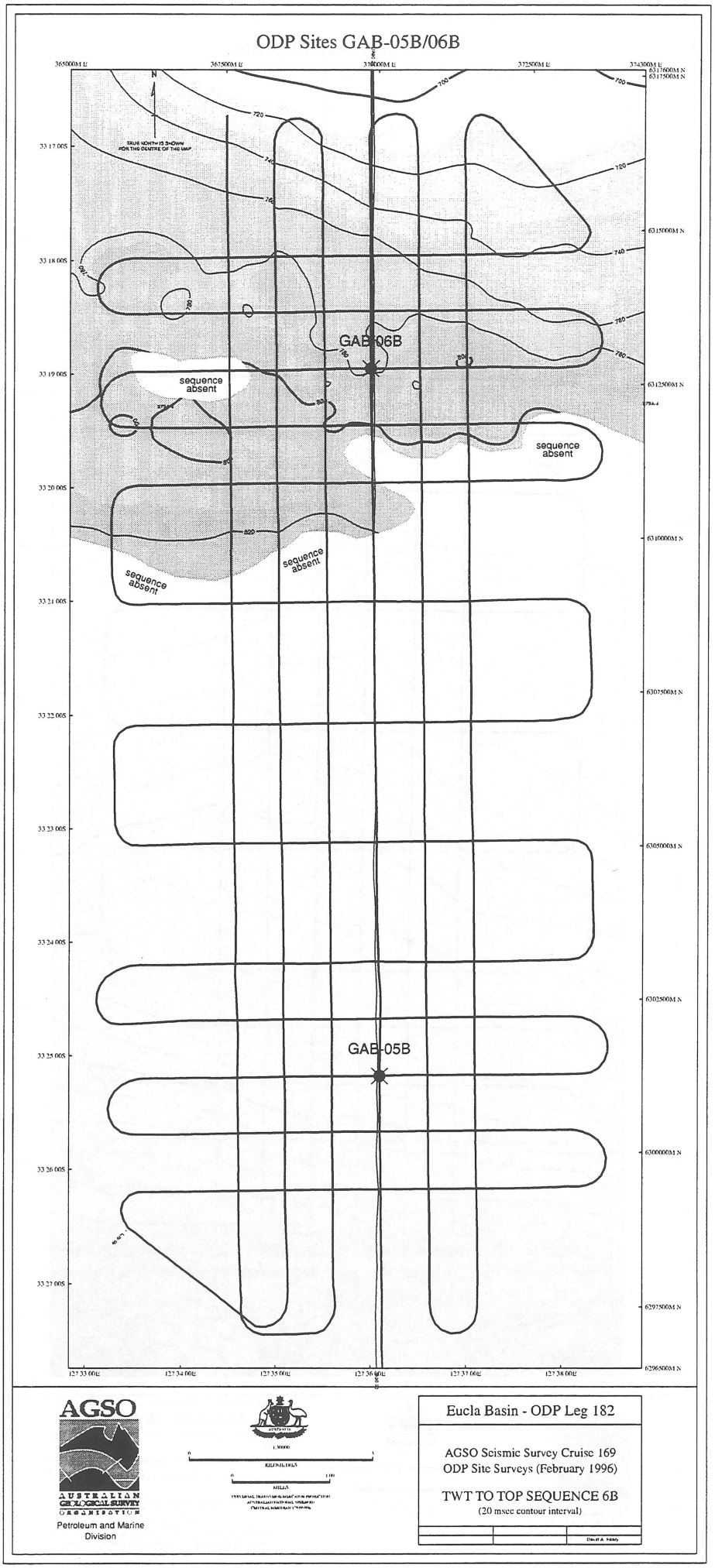
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)
TWT TO TOP SEQUENCE 6A
(20 msec contour interval)


ODP Sites GAB-05B/06B
GAB-06B
GAB-05B
sequence absent
sequence absent
sequence absent
sequence absent
AGSO
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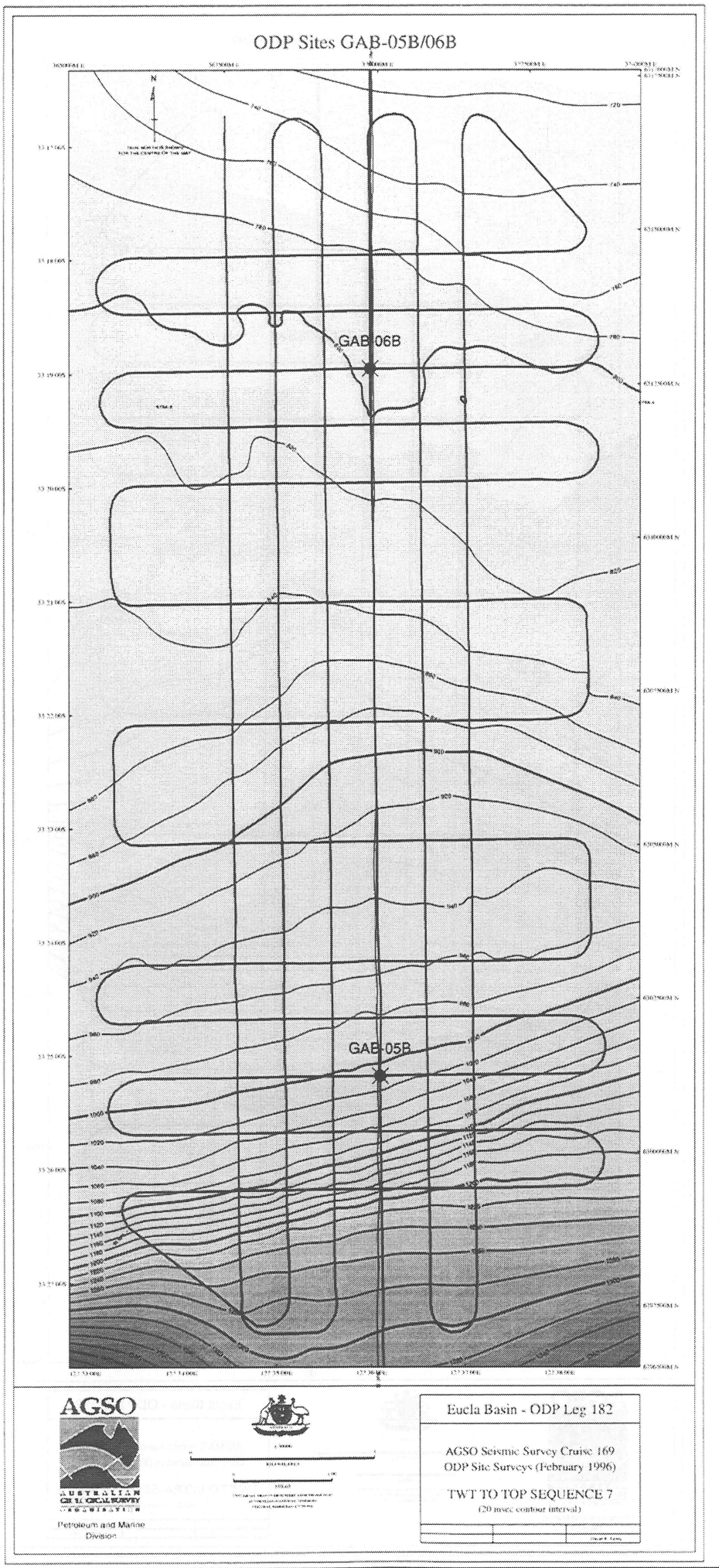
Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)
TWT TO TOP SEQUENCE 6B
(20 msec contour interval)


ODP Sites GAB-05B/06B
GAB-06B
GAB-05B
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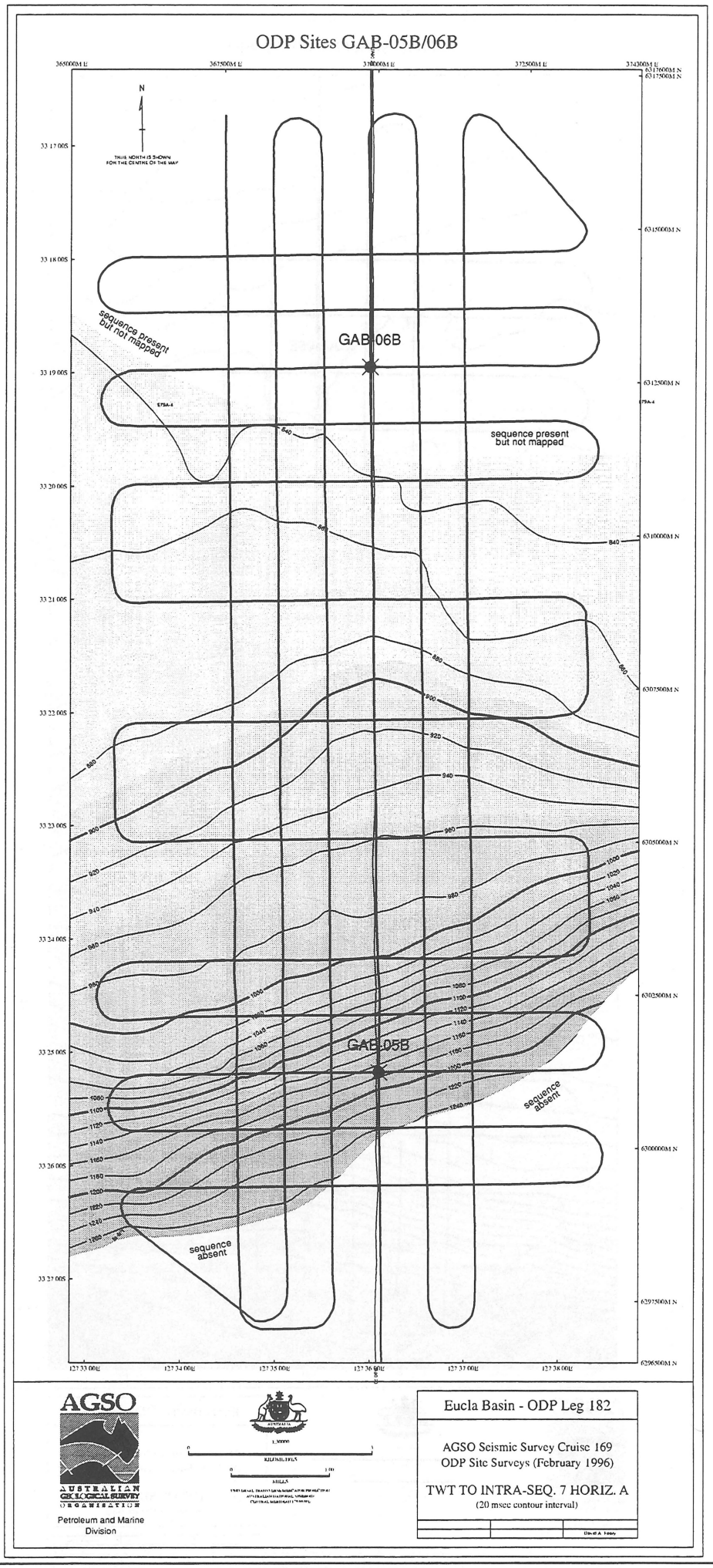
Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)
TWT TO TOP SEQUENCE 7
(20 msec contour interval)


ODP Sites GAB-05B/06B
GAB-06B
GAB-05B
sequence present but not mapped
sequence present but not mapped
sequence absent
sequence absent
AGSO
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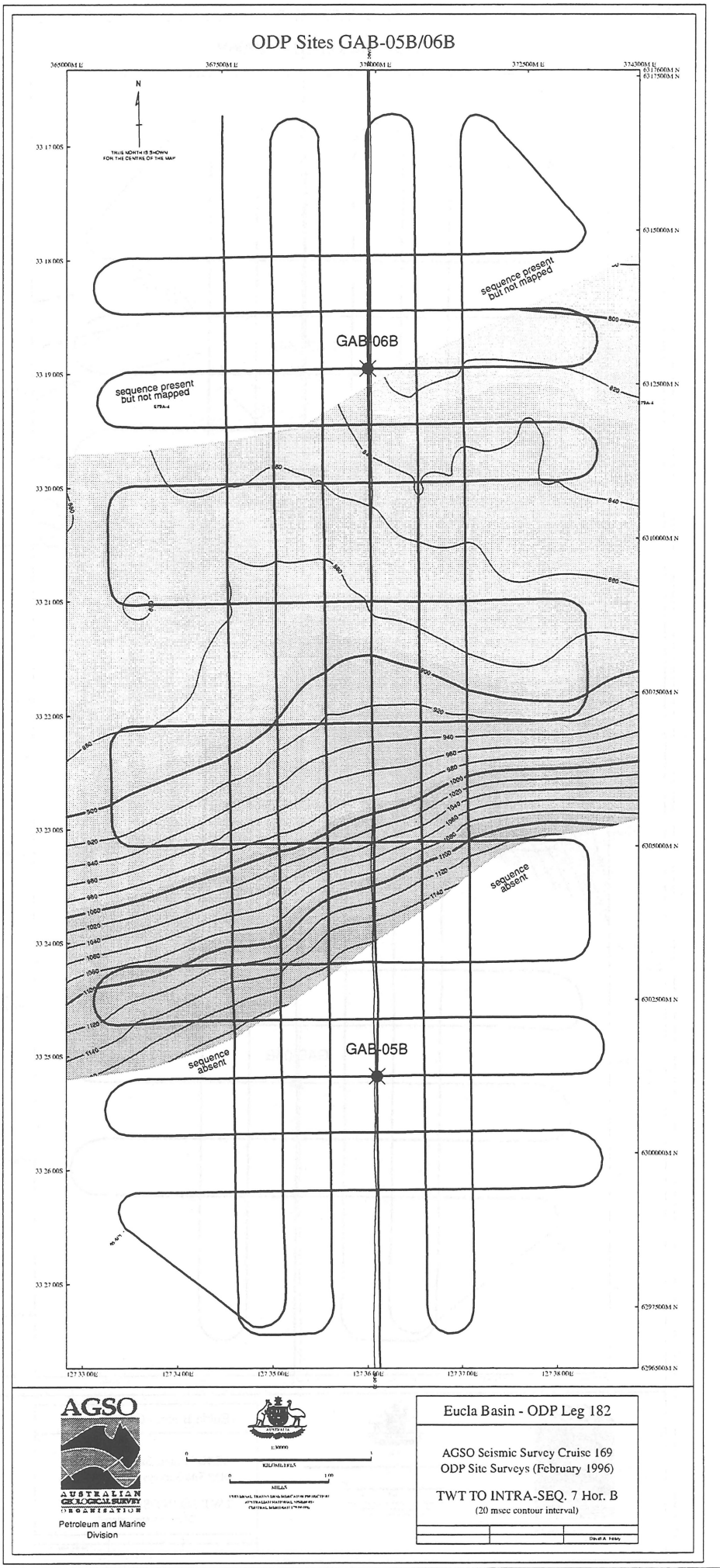
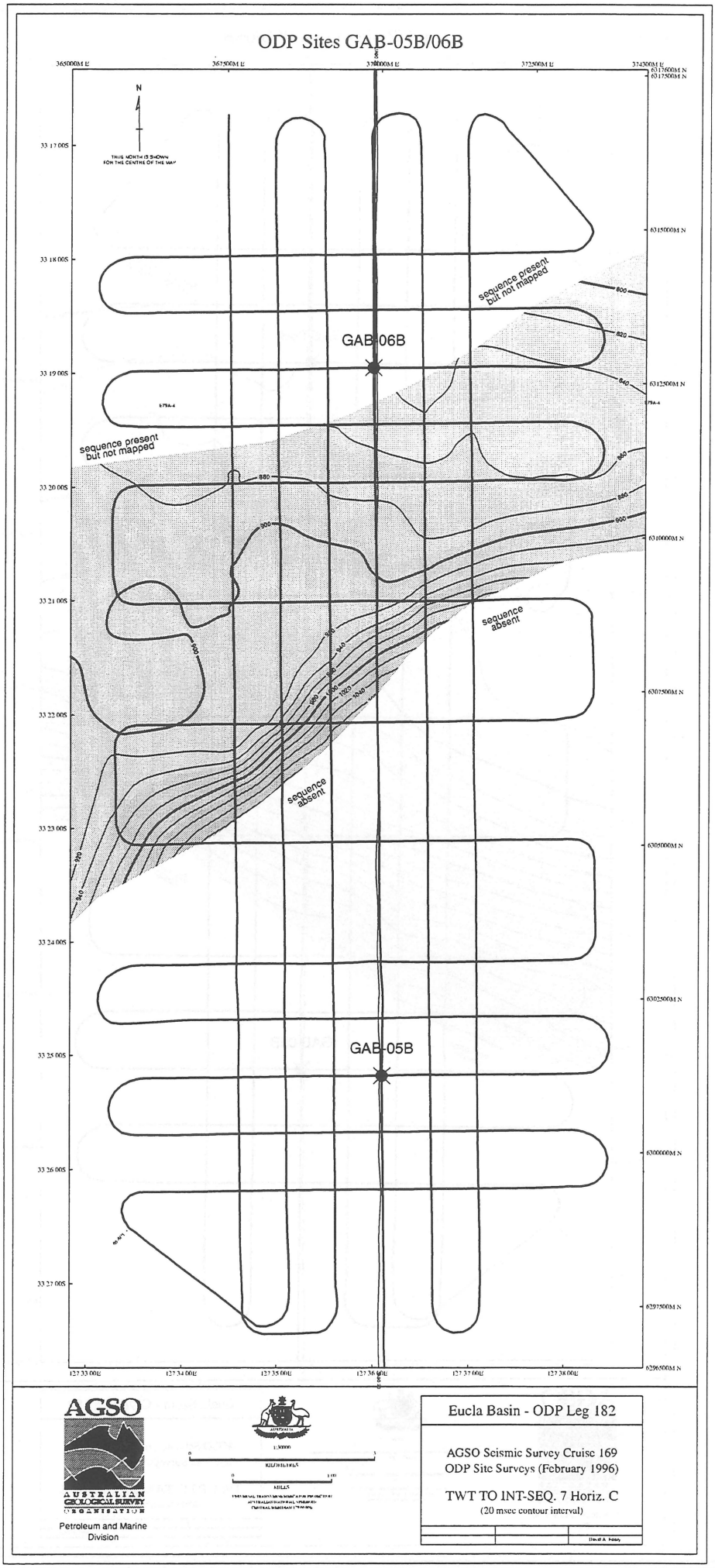
Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)
TWT TO INTRA-SEQ. 7 HORIZ. A
(20 msec contour interval)


ODP Sites GAB-05B/06B
365000M E
367500M E
370000M E
372500M E
374300M E
6317500M N
6315000M N
6312500M N
6310000M N
6307500M N
6305000M N
6302500M N
6300000M N
6297500M N
6296500M N
33 17 00S
33 18 00S
33 19 00S
33 20 00S
33 21 00S
33 22 00S
33 23 00S
33 24 00S
33 25 00S
33 26 00S
33 27 00S
127 33 00E
127 34 00E
127 35 00E
127 36 00E
127 37 00E
127 38 00E
N
TRUE NORTH IS SHOWN FOR THE CENTRE OF THE MAP
GAB-06B
GAB-05B
sequence present but not mapped
sequence present but not mapped
sequence absent
sequence absent
AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION
Petroleum and Marine Division
1:50000
KILOMETRES
MILES
Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)
TWT TO INTRA-SEQ. 7 Hor. B
(20 msec contour interval)


ODP Sites GAB-05B/06B
365000M E
367500M E
370000M E
372500M E
374300M E
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6315000M N
6312500M N
6310000M N
6307500M N
6305000M N
6302500M N
6300000M N
6297500M N
6296500M N
33 17.00S
33 18.00S
33 19.00S
33 20.00S
33 21.00S
33 22.00S
33 23.00S
33 24.00S
33 25.00S
33 26.00S
33 27.00S
127 33.00E
127 34.00E
127 35.00E
127 36.00E
127 37.00E
127 38.00E
N
TRUE NORTH IS SHOWN FOR THE CENTRE OF THE MAP
GAB-06B
GAB-05B
sequence present but not mapped
sequence absent
sequence present but not mapped
sequence absent
800
820
840
860
880
900
920
940
960
980
1000
1020
1040
500
200
240
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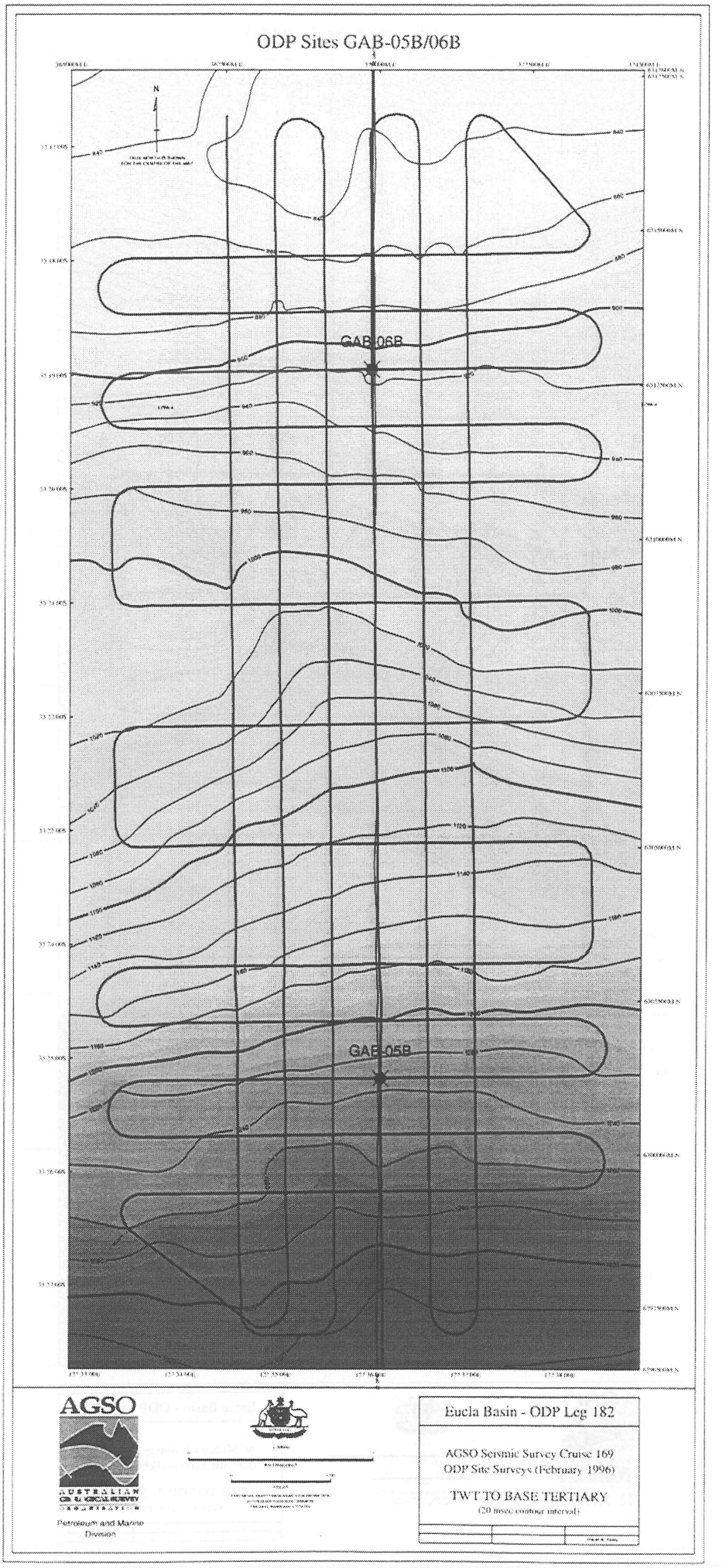
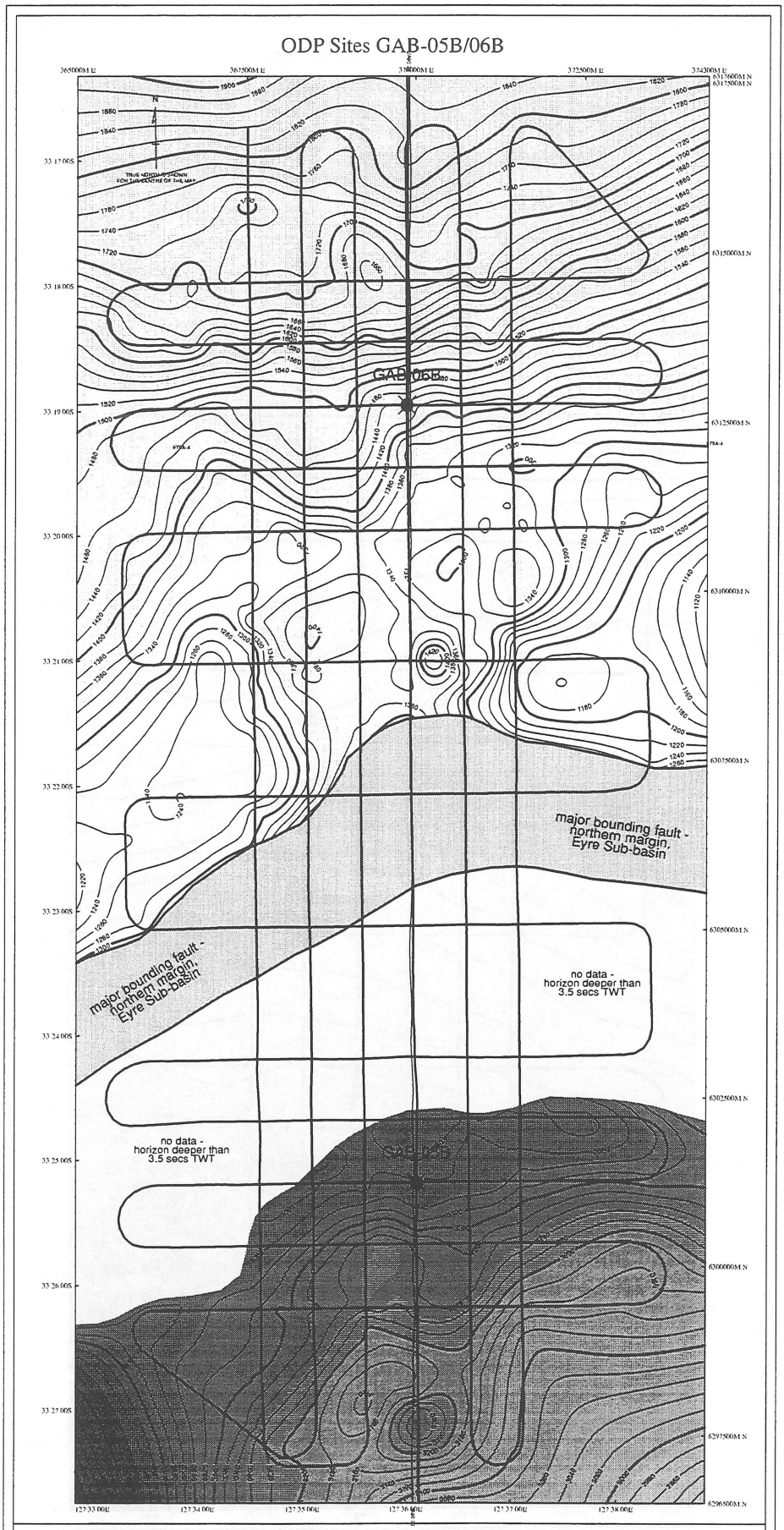
Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)
TWT TO INT-SEQ. 7 Horiz. C
(20 msec contour interval)


ODP Sites GAB-05B/06B
N
GAB-06B
GAB-05B
AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION
Petroleum and Marine Division
Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)
TWT TO BASE TERTIARY
(20 msec contour interval)



AGSO

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Petroleum and Marine Division

1:300000

KILOMETRES

MILES

Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO TOP BASEMENT
(20 msec contour interval)

9.4 SITES GAB-07A TO GAB-09A

Sites GAB-07A, GAB-08A, and GAB-09A will intersect a spectacular set of late Neogene (?Plio-Pleistocene) clinoforms underlying the present-day shelf edge. Site GAB-07A will intersect the lowest, more condensed portion of the clinoform sequence, but will also have the best record of the youngest clinoforms; Site GAB-08A will intersect a ?Pleistocene-Holocene biogenic mound immediately below the sea-floor, together with the best record of the middle part of the clinoform sequence; and Site GAB-09A will intersect a buried biogenic mound originally formed immediately below the paleoshelf edge, together with the best record of the oldest part of the clinoform sequence.

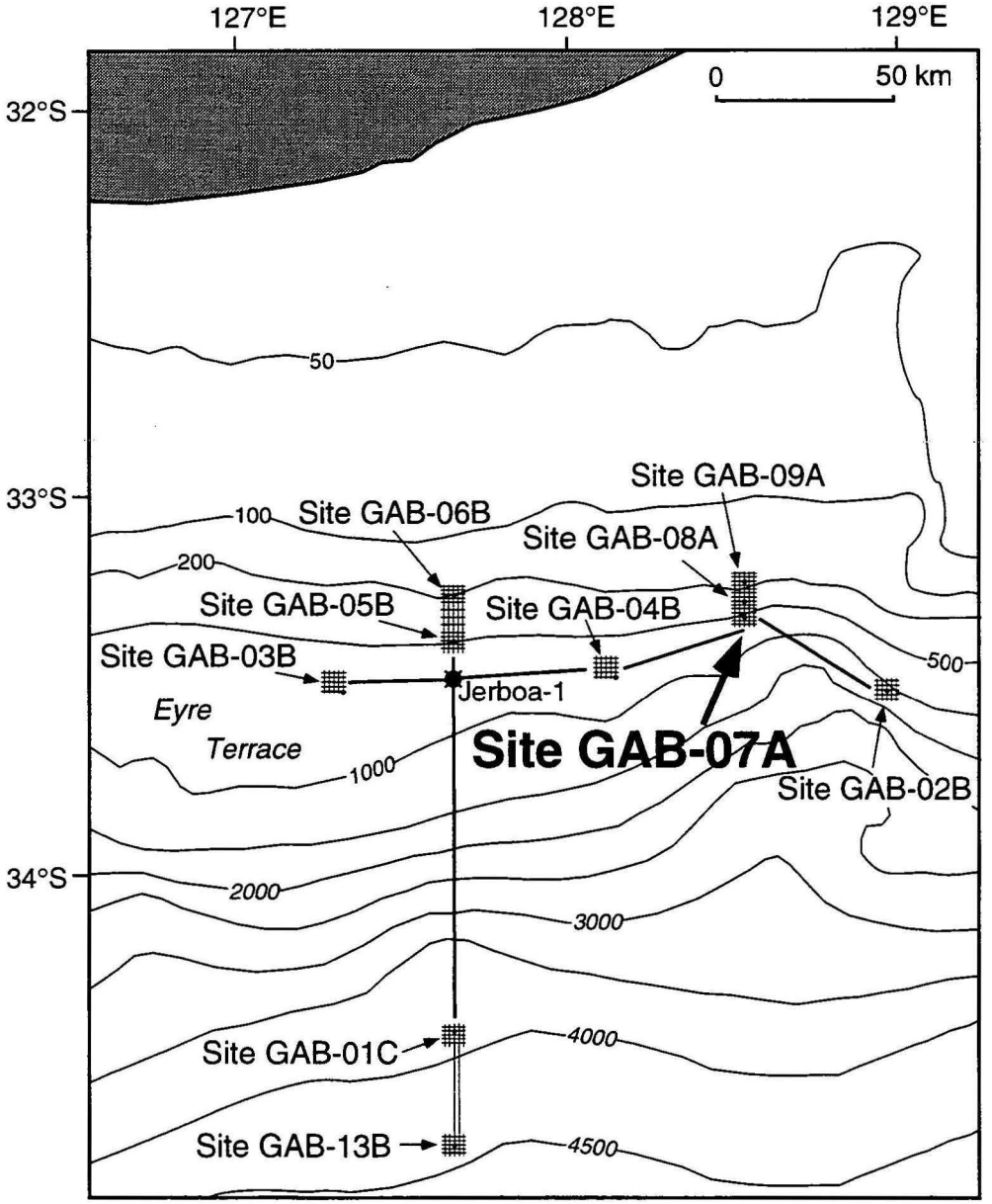
Principal Objective:

- to collect detailed, high resolution profiles through a late Neogene succession deposited within a high-energy, cool-water carbonate environment in order to determine the response of such a depositional system to Plio-Pleistocene sea-level fluctuations.

Additional Objectives:

- to obtain a high resolution record of late Neogene paleoceanographic variation within an upper slope to shelf-edge setting, as a component of the shelf-to-basin paleoceanographic transect.
- to evaluate the diagenetic history of calcitic sediments deposited within a high energy environment subject to wave 'pumping' (in the upper part of the clinoform succession), for comparison with calcitic sediments deposited below storm wave base (in the lower part of the clinoform succession).

SITE GAB-07A


127°E
128°E
129°E
0
50 km
32°S
33°S
34°S
50
100
200
500
1000
2000
3000
4000
4500
Site GAB-09A
Site GAB-06B
Site GAB-08A
Site GAB-05B
Site GAB-04B
Site GAB-03B
Jerboa-1
Eyre
Terrace
Site GAB-07A
Site GAB-02B
Site GAB-01C
Site GAB-13B

Revised October 1992

SAFETY CHECK SHEET
JOIDES POLLUTION PREVENTION AND SAFETY PANEL

1) Basic site information.

Leg: **182**	*Site designation:* **GAB-07A**	*Latitude:* **33°21.4498'S**	*Longitude:* **128°28.8772'E**
Water Depth: **480 m**	*Distance from land:* **81.1 n. mi.**	*Jurisdiction:* **Australia**	
General location or geomorphic province: **Eucla Basin; western Great Australian Bight**			
Probable thickness of sediments: **≈2645 m**		*Proposed total penetration:* **540 m**	

2) Upon what geophysical and/or geological data was this site selection made?

Multichannel Seismic lines: **AGSO (1996) 169/05A (SP 599.92) and 169/05CC (SP 10569.55)**
Single Channel Seismic lines: **Nil**
DSDP/ODP holes: **Nil**
Piston cores: **Gravity cores 173/GC10 (5.00 m) and 173/GC12 (2.02 m)**
Other: **Also on JNOC (1990) multichannel seismic line JA90-31 (SP 2089.75)**

3) What is your proposed drilling program?

Double APC; XCB; no re-entry system required.

4) What is your proposed logging program?

Triple Combo; FMS/Sonic; WST.

5) From previous DSDP/ODP drilling in this area, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock:

No relevant DSDP/ODP drilling in the area.

6) From available information, list all commercial drilling in this area that produced or yielded significant shows. Give depths and ages of hydrocarbon-bearing deposits:

Only relevant commercial drilling in the area is Jerboa-1, 45 n mi. to the WSW, which targetted the Mesozoic section in the Eyre Sub-basin. Jerboa-1 encountered no significant shows, with vitrinite reflectance indicating an immature to marginally mature Mesozoic section to TD.

7) Is there any indication of gas hydrates at this location?

No indication of gas hydrates; no BSR present.

8) Is there any reason to expect any hydrocarbon accumulation at this site? Please comment.

No hydrocarbon accumulation expected.

9) What "special" precautions will be taken during drilling?

Standard hydrocarbon monitoring.

10) What abandonment procedures do you plan to follow?

Standard abandonment procedures.

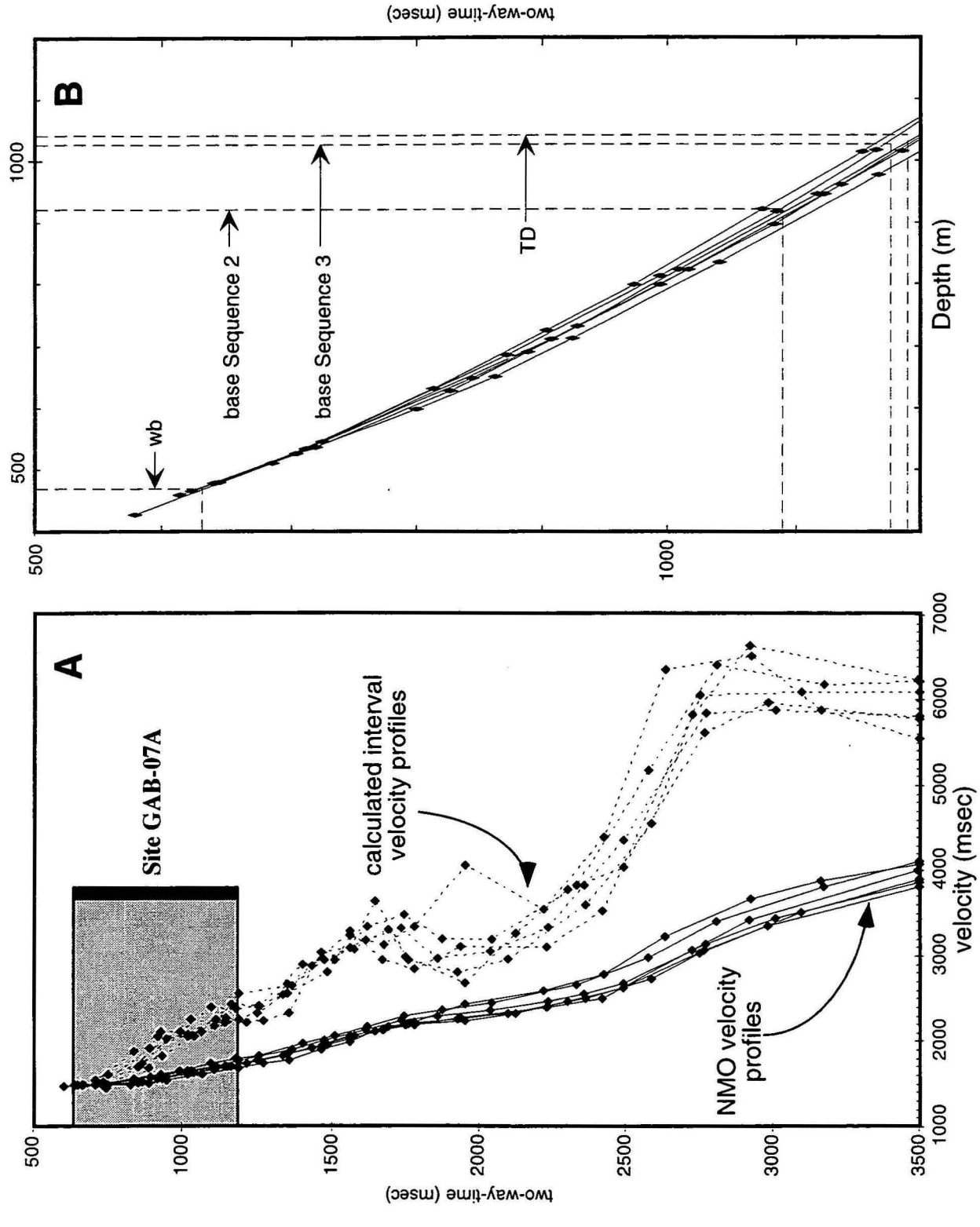
Summary: *What do you consider to be the major risks in drilling at this site?*

No significant drilling risks are anticipated at this site.

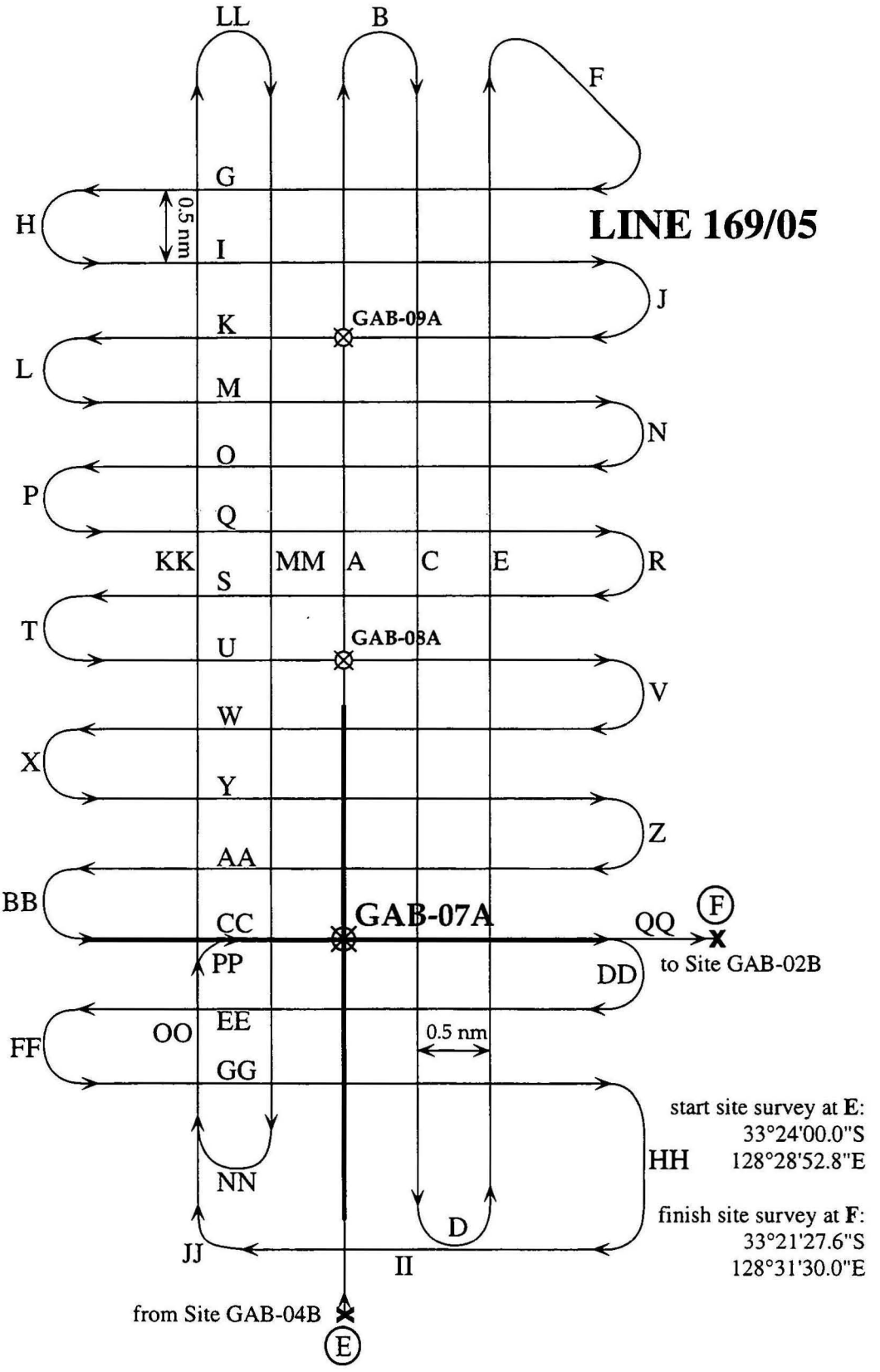
There is a risk that poor weather conditions may prevent drilling (>2.0 m heave compensator stroke), so a flexible drilling schedule will be necessary so that sites in shallower water can be drilled during calmer weather periods.

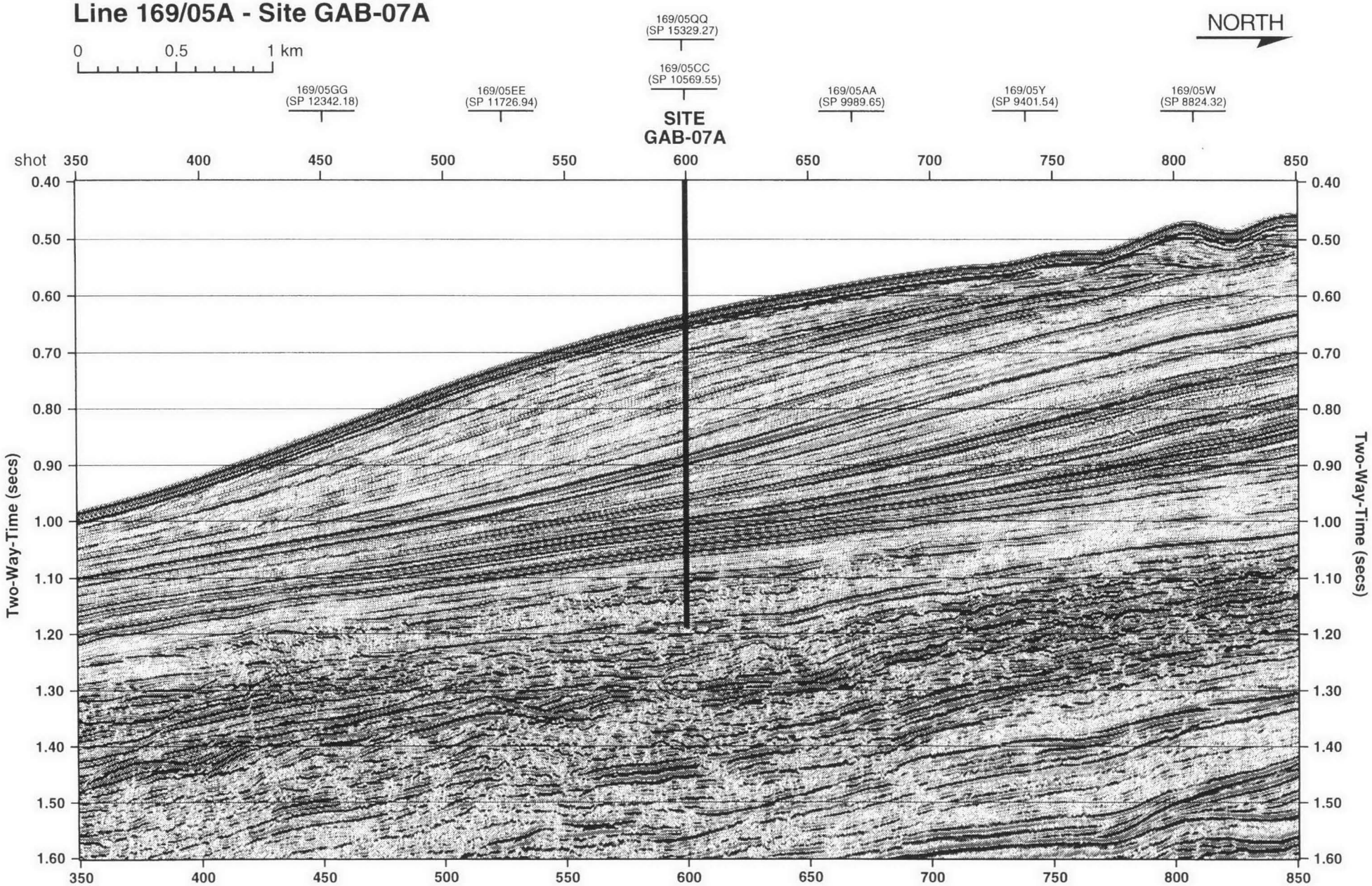
Velocity Calculations: Site GAB-07A

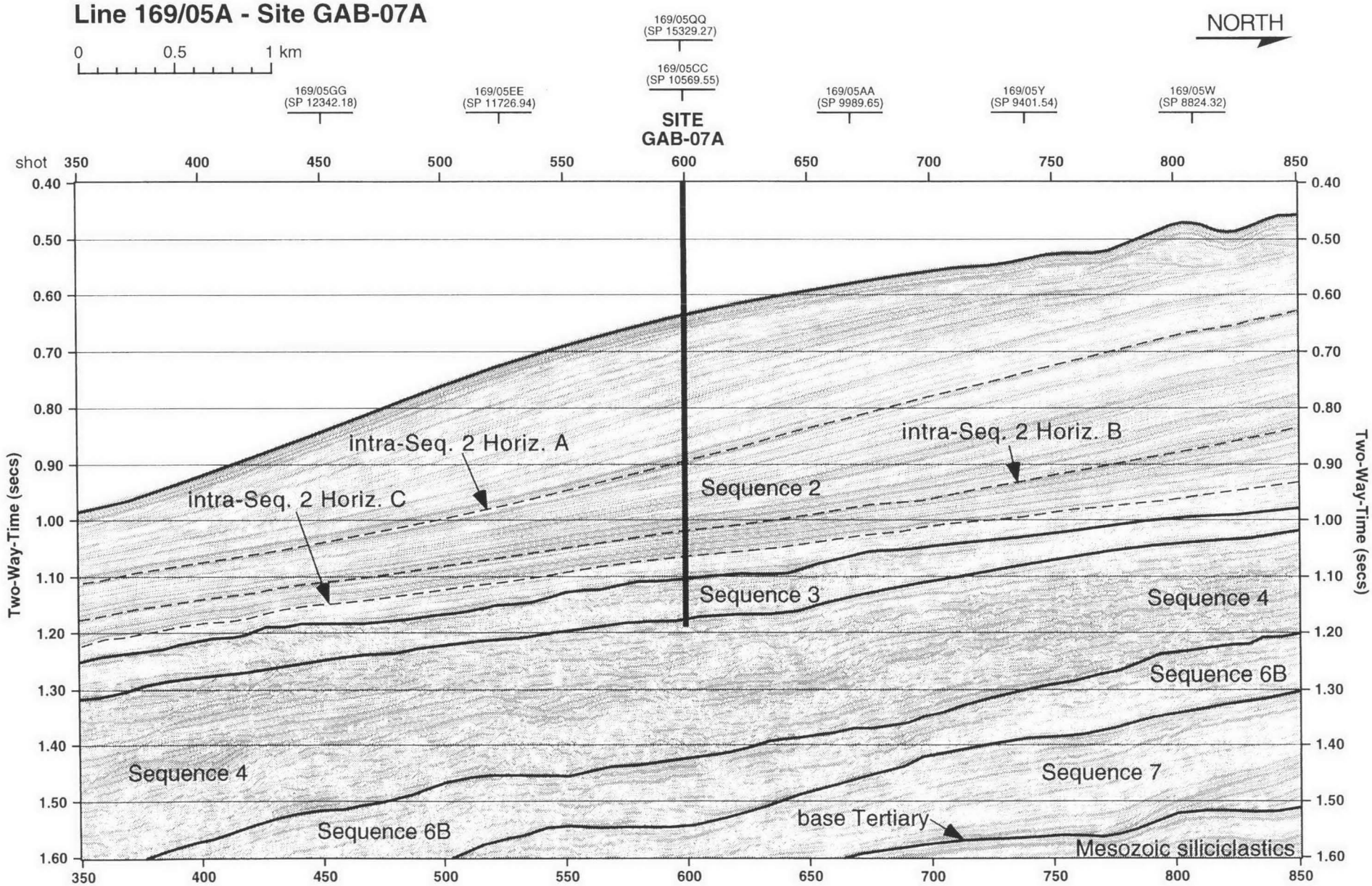
Velocity analysis for site GAB-07A, from seismic line 169/05. The six closest NMO (stacking) velocities to the site have been used to derive interval velocity profiles (A) and time-depth curves (B). Approximate depths to horizons shown on seismic sections presented on the following pages can then be derived from these time-depth curves.

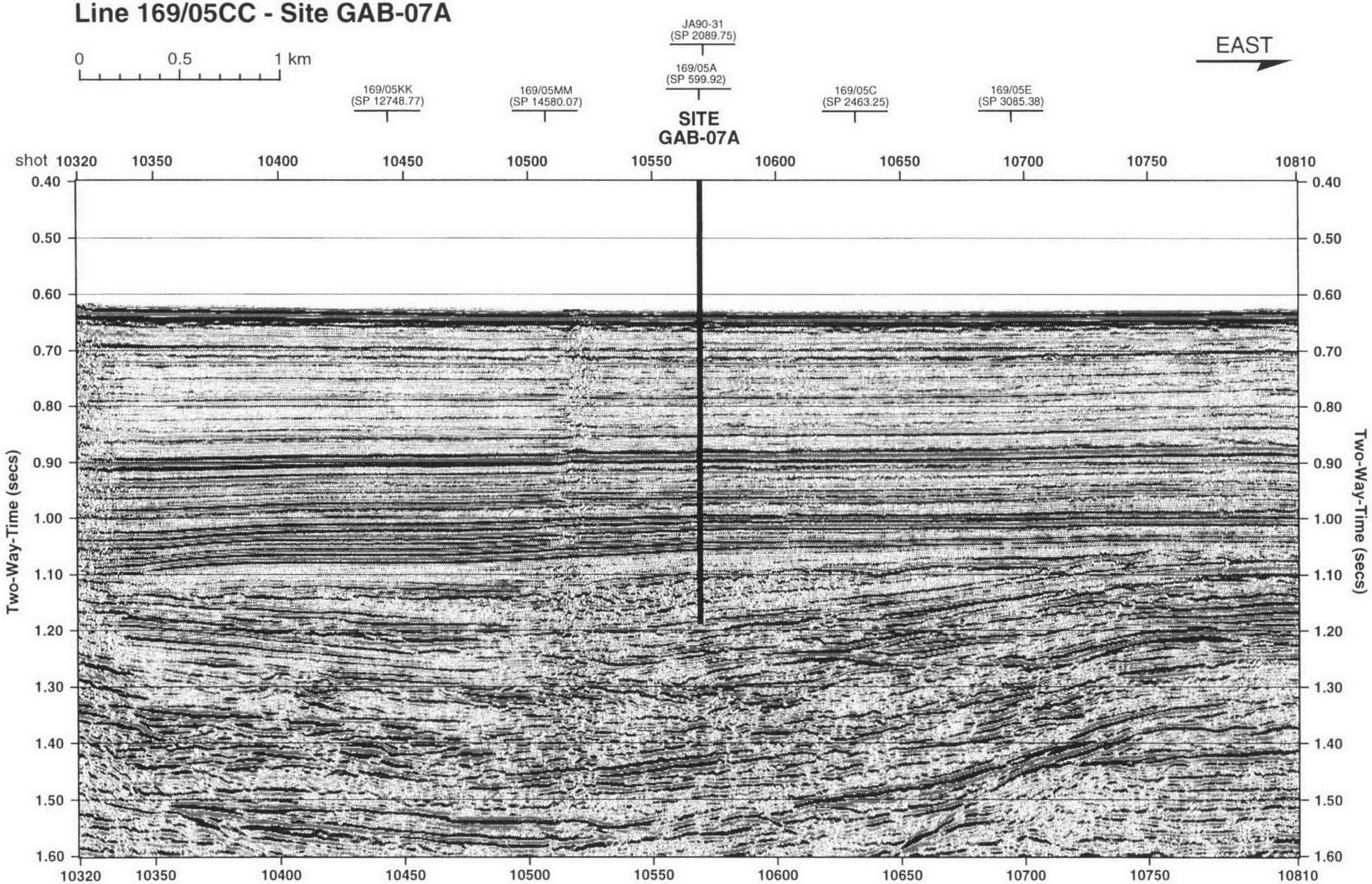


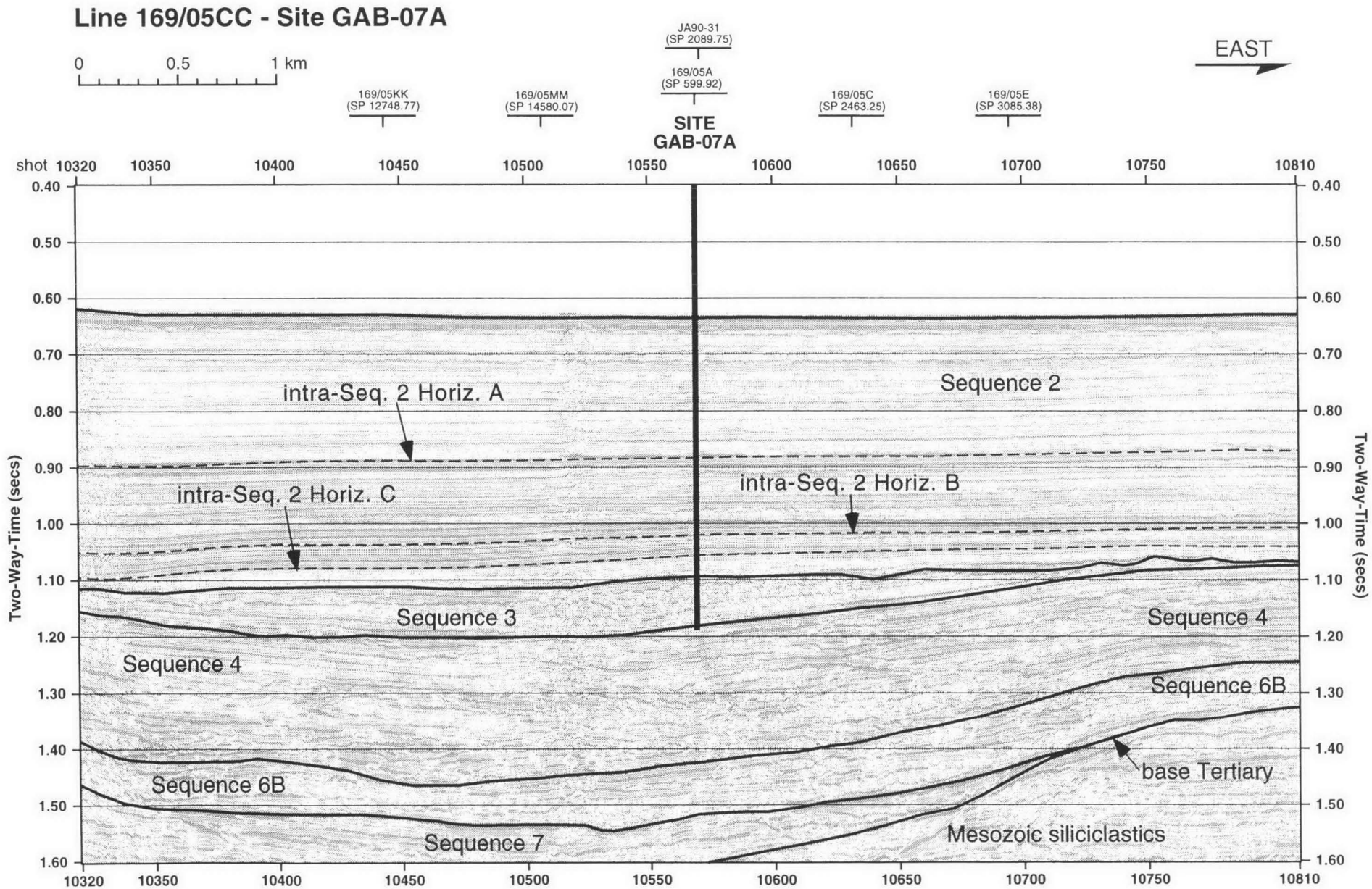
AGSO Survey 169 (February 1996) track map - Site GAB-07A




Line 169/05A - Site GAB-07A
0
0.5
1 km
NORTH
169/05QQ
(SP 15329.27)
169/05CC
(SP 10569.55)
169/05GG
(SP 12342.18)
169/05EE
(SP 11726.94)
SITE
GAB-07A
169/05AA
(SP 9989.65)
169/05Y
(SP 9401.54)
169/05W
(SP 8824.32)
shot
350
400
450
500
550
600
650
700
750
800
850
Two-Way-Time (secs)
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60

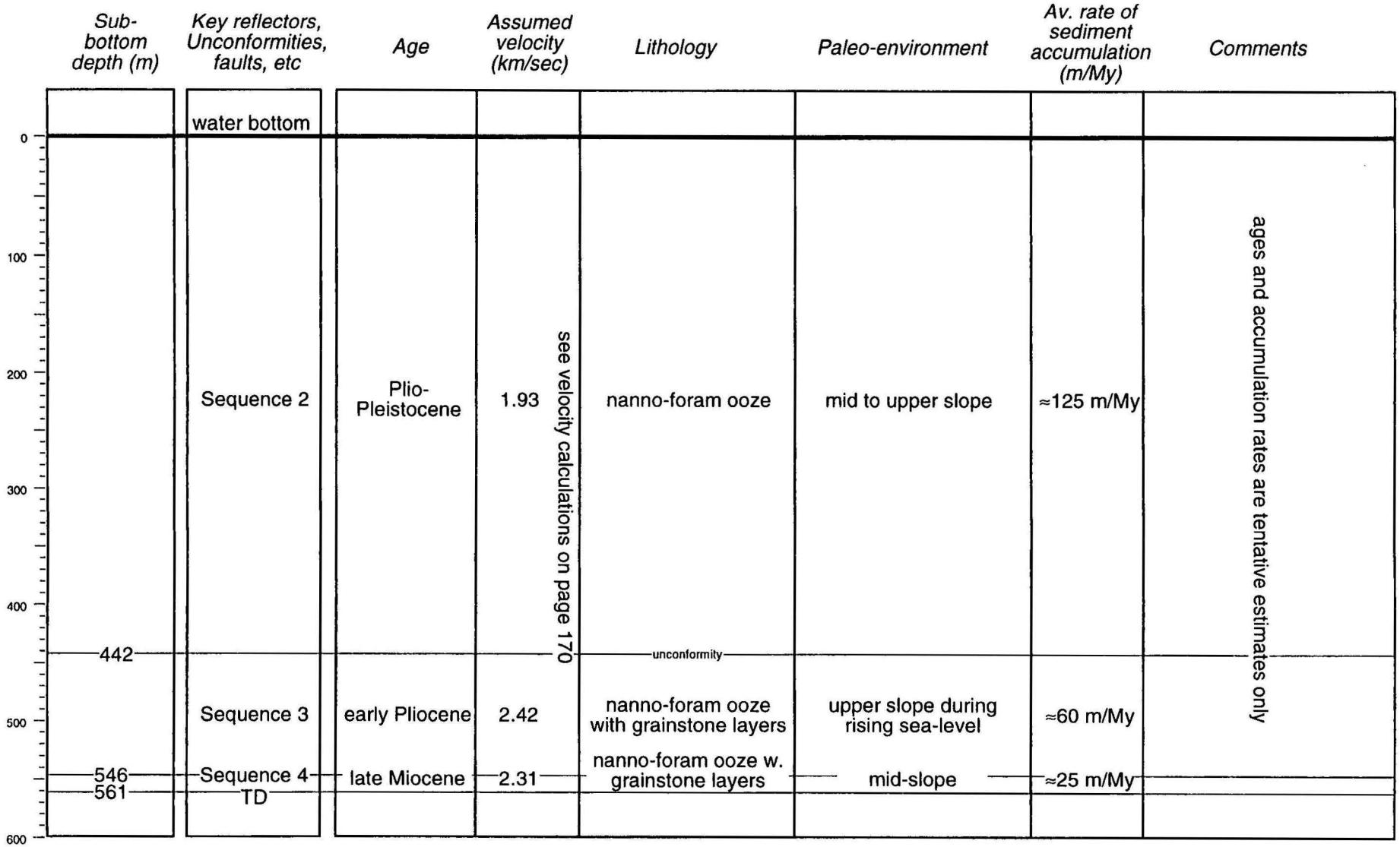

Line 169/05A - Site GAB-07A
0
0.5
1 km
NORTH
169/05QQ
(SP 15329.27)
169/05CC
(SP 10569.55)
169/05GG
(SP 12342.18)
169/05EE
(SP 11726.94)
SITE
GAB-07A
169/05AA
(SP 9989.65)
169/05Y
(SP 9401.54)
169/05W
(SP 8824.32)
shot
350
400
450
500
550
600
650
700
750
800
850
Two-Way-Time (secs)
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60
intra-Seq. 2 Horiz. A
intra-Seq. 2 Horiz. B
intra-Seq. 2 Horiz. C
Sequence 2
Sequence 3
Sequence 4
Sequence 6B
Sequence 4
Sequence 7
Sequence 6B
base Tertiary
Mesozoic siliciclastics


Line 169/05CC - Site GAB-07A
0
0.5
1 km
JA90-31
(SP 2089.75)
169/05A
(SP 599.92)
EAST
169/05KK
(SP 12748.77)
169/05MM
(SP 14580.07)
SITE
GAB-07A
169/05C
(SP 2463.25)
169/05E
(SP 3085.38)
shot 10320 10350 10400 10450 10500 10550 10600 10650 10700 10750 10810
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60
Two-Way-Time (secs)
10320 10350 10400 10450 10500 10550 10600 10650 10700 10750 10810

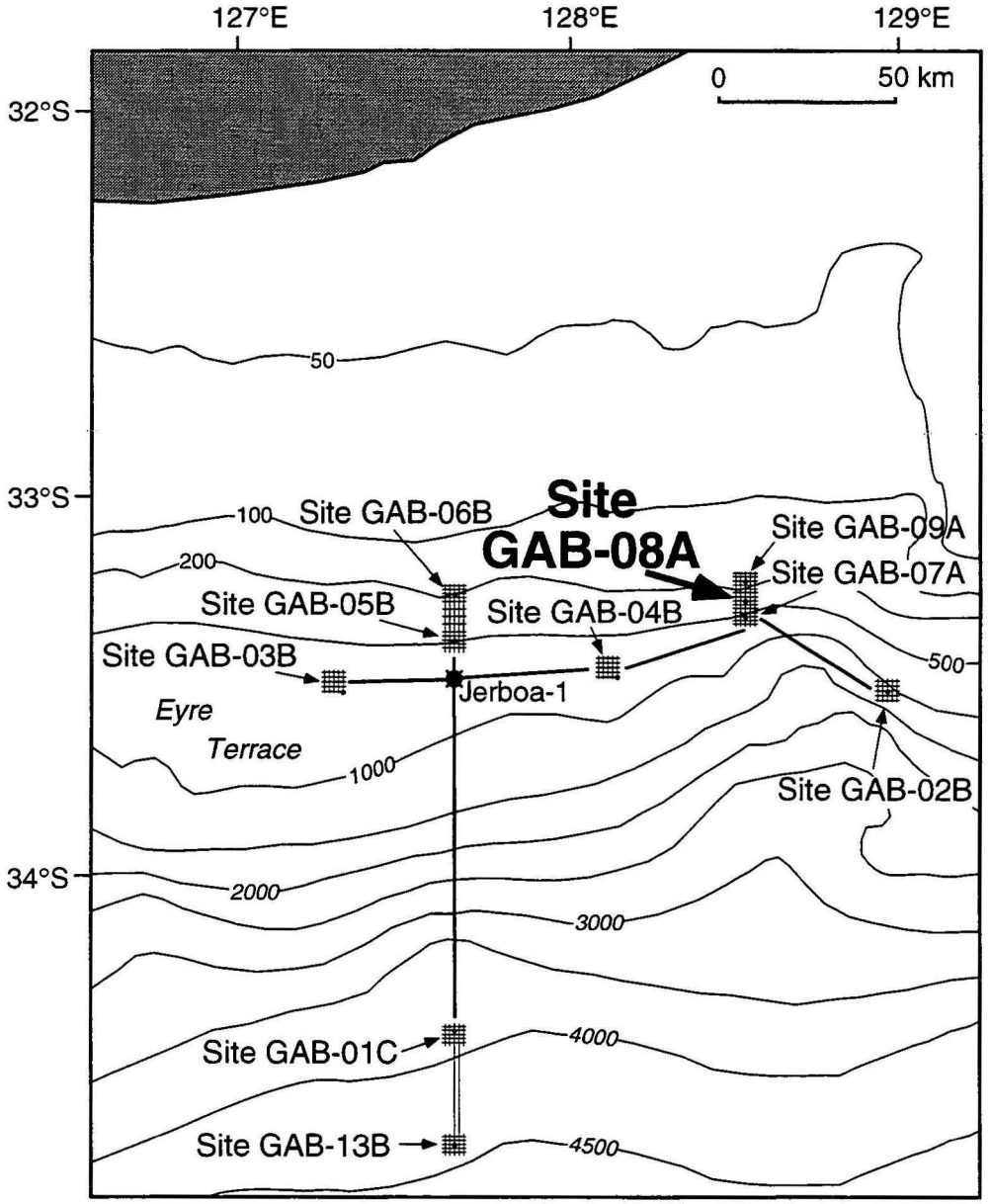

Line 169/05CC - Site GAB-07A
0
0.5
1 km
JA90-31
(SP 2089.75)
169/05A
(SP 599.92)
EAST
169/05KK
(SP 12748.77)
169/05MM
(SP 14580.07)
SITE
GAB-07A
169/05C
(SP 2463.25)
169/05E
(SP 3085.38)
shot 10320 10350 10400 10450 10500 10550 10600 10650 10700 10750 10810
Two-Way-Time (secs)
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
1.50
1.60
intra-Seq. 2 Horiz. A
Sequence 2
intra-Seq. 2 Horiz. C
intra-Seq. 2 Horiz. B
Sequence 3
Sequence 4
Sequence 4
Sequence 6B
Sequence 6B
base Tertiary
Sequence 7
Mesozoic siliciclastics

Revised October 1992

GRAPHIC SUMMARY, SITE GAB-07A



SITE GAB-08A


127°E
128°E
129°E
0
50 km
32°S
33°S
34°S
50
100
200
500
1000
2000
3000
4000
4500
Site GAB-06B
Site GAB-08A
Site GAB-09A
Site GAB-07A
Site GAB-05B
Site GAB-04B
Site GAB-03B
Jerboa-1
Eyre
Terrace
Site GAB-02B
Site GAB-01C
Site GAB-13B

Revised October 1992

SAFETY CHECK SHEET
JOIDES POLLUTION PREVENTION AND SAFETY PANEL

1) Basic site information.

Leg: **182**	*Site designation:* **GAB-08A**	*Latitude:* **33°19.5628'S**	*Longitude:* **128°28.8788'E**
Water Depth: **332 m**	*Distance from land:* **80.0 n. mi.**	*Jurisdiction:* **Australia**	
General location or geomorphic province: **Eucla Basin; western Great Australian Bight**			
Probable thickness of sediments: **≈2880 m**		*Proposed total penetration:* **590 m**	

2) Upon what geophysical and/or geological data was this site selection made?

Multichannel Seismic lines: **AGSO (1996) 169/05A (SP 878.89) and 169/05U (SP 8253.42)**
Single Channel Seismic lines: **Nil**
DSDP/ODP holes: **Nil**
Piston cores:
Other: **Also on JNOC (1990) multichannel seismic line JA90-31 (SP 2229.37)**

3) What is your proposed drilling program?

Triple APC; XCB; no re-entry system required.

4) What is your proposed logging program?

Triple Combo; FMS/Sonic; WST; GHMT.

5) From previous DSDP/ODP drilling in this area, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock:

No relevant DSDP/ODP drilling in the area.

6) From available information, list all commercial drilling in this area that produced or yielded significant shows. Give depths and ages of hydrocarbon-bearing deposits:

Only relevant commercial drilling in the area is Jerboa-1, 45.6 n mi. to the WSW, which targetted the Mesozoic section in the Eyre Sub-basin. Jerboa-1 encountered no significant shows, with vitrinite reflectance indicating an immature to marginally mature Mesozoic section to TD.

7) Is there any indication of gas hydrates at this location?

No indication of gas hydrates; no BSR present.

8) Is there any reason to expect any hydrocarbon accumulation at this site? Please comment.

No hydrocarbon accumulation expected.

9) What "special" precautions will be taken during drilling?

Standard hydrocarbon monitoring.

10) What abandonment procedures do you plan to follow?

Standard abandonment procedures.

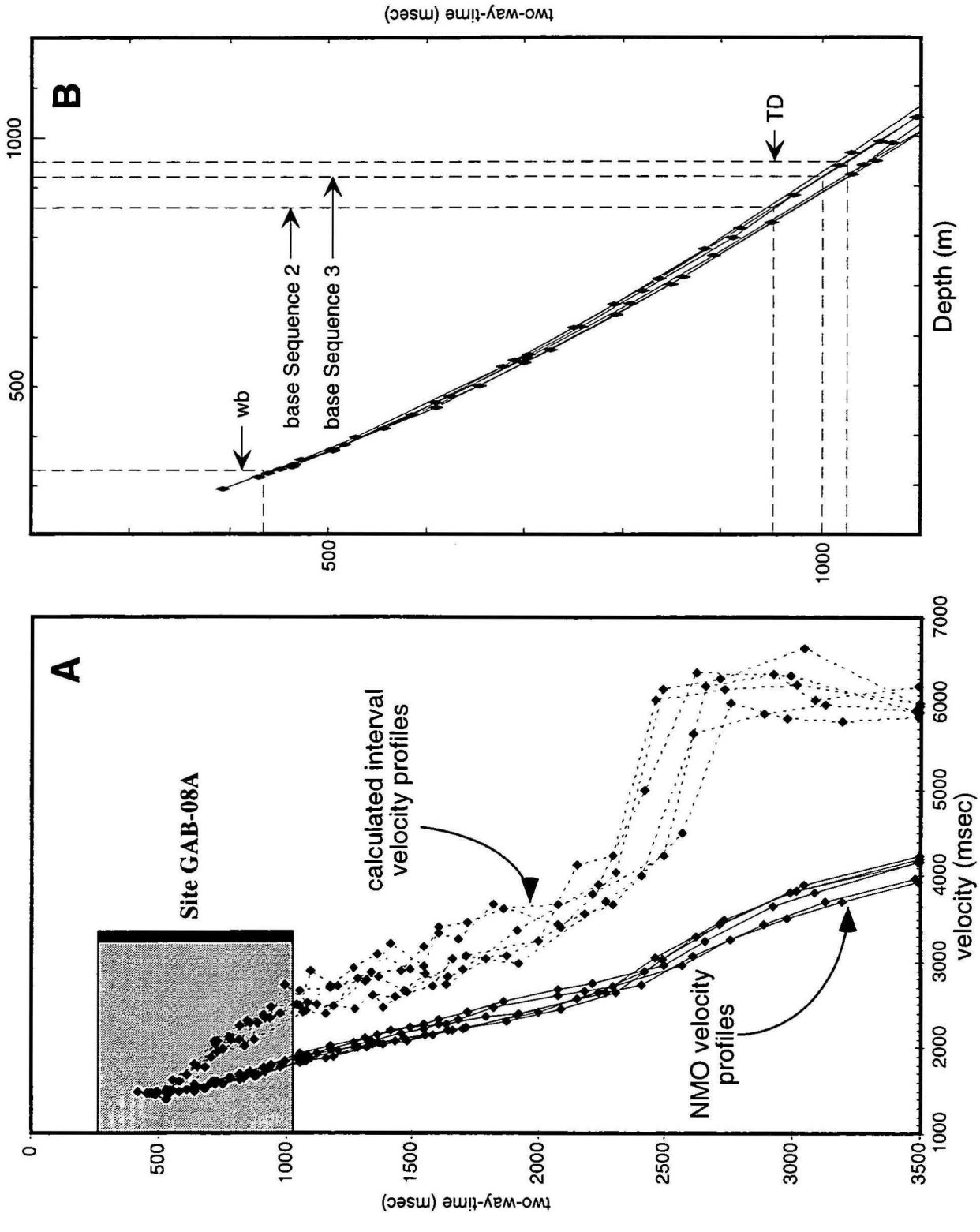
Summary: *What do you consider to be the major risks in drilling at this site?*

No significant drilling risks are anticipated at this site.

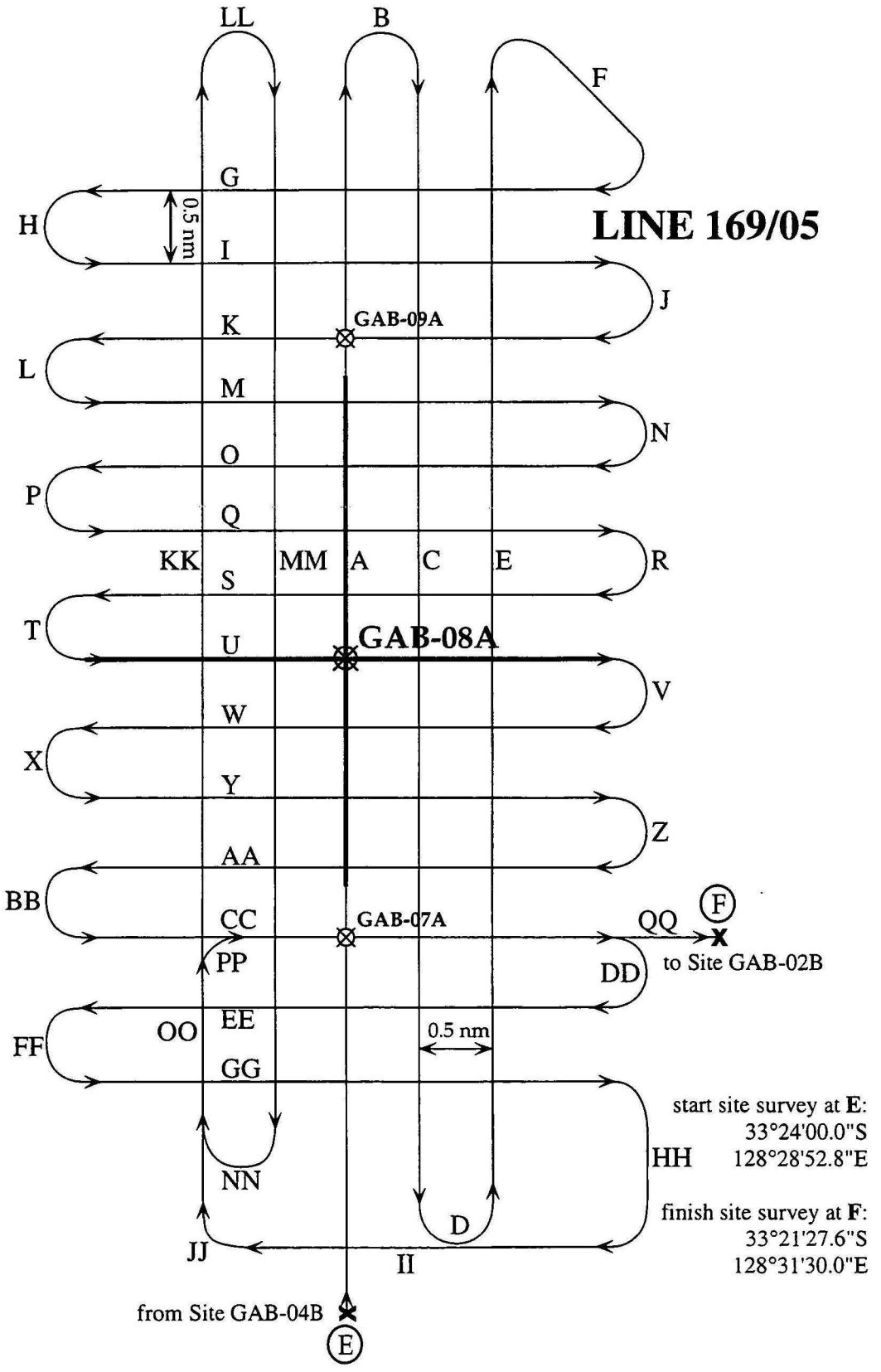
There is a risk that poor weather conditions may prevent drilling (>2.0 m heave compensator stroke), so a flexible drilling schedule will be necessary so that sites in shallower water can be drilled during calmer weather periods.

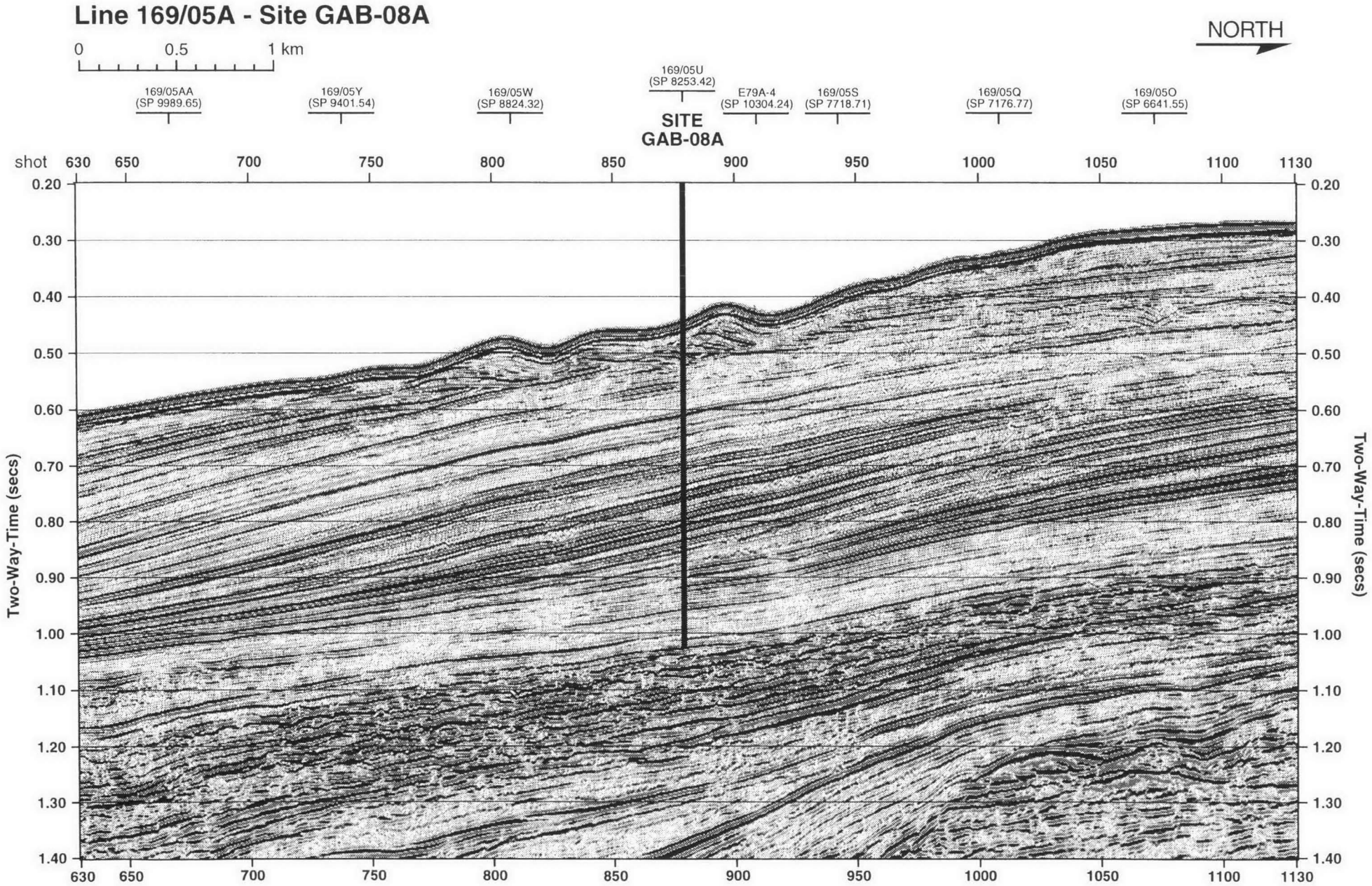
Velocity Calculations: Site GAB-08A

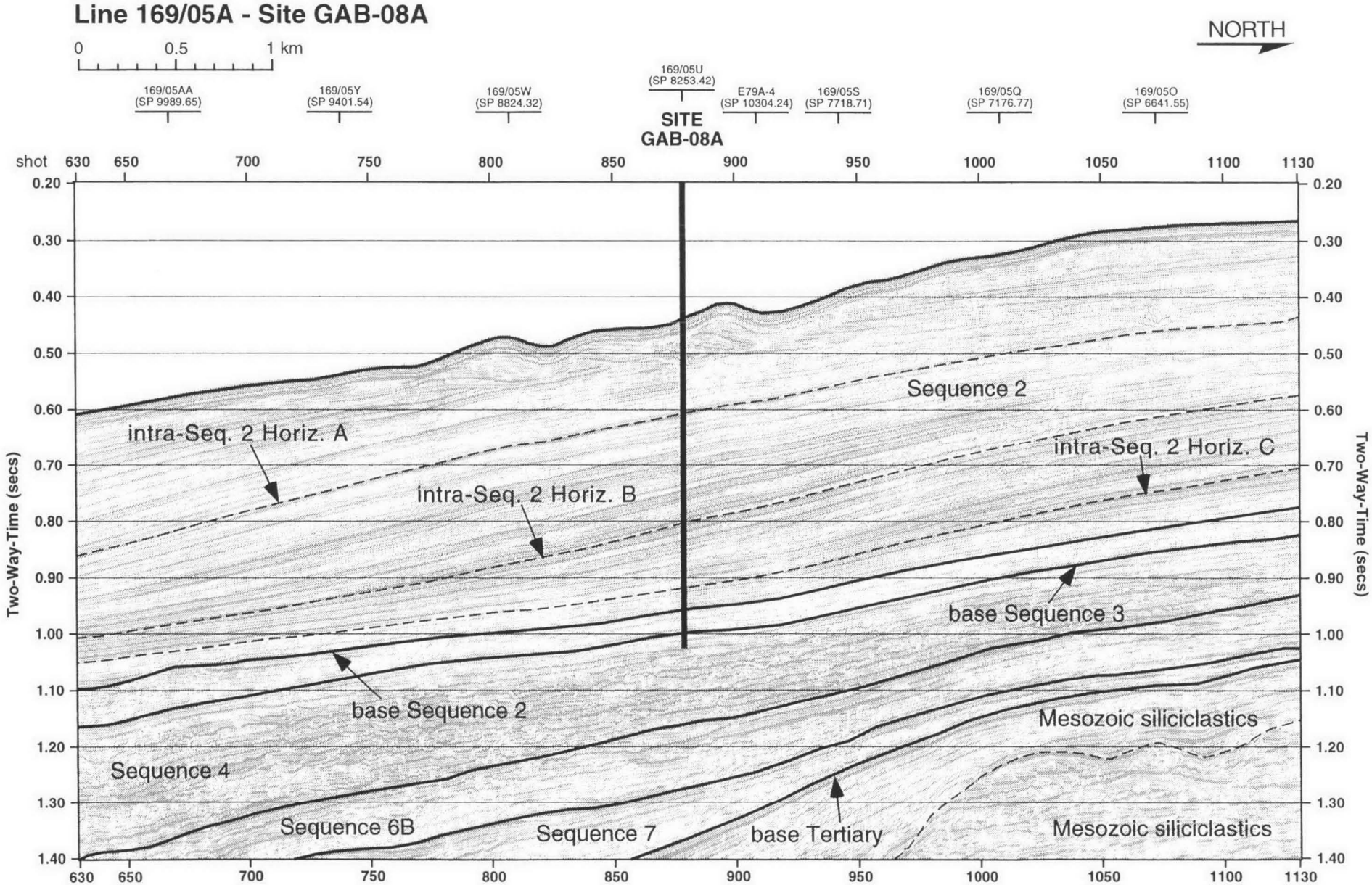
Velocity analysis for site GAB-08A, from seismic line 169/05. The six closest NMO (stacking) velocities to the site have been used to derive interval velocity profiles (A) and time-depth curves (B). Approximate depths to horizons shown on seismic sections presented on the following pages can then be derived from these time-depth curves.

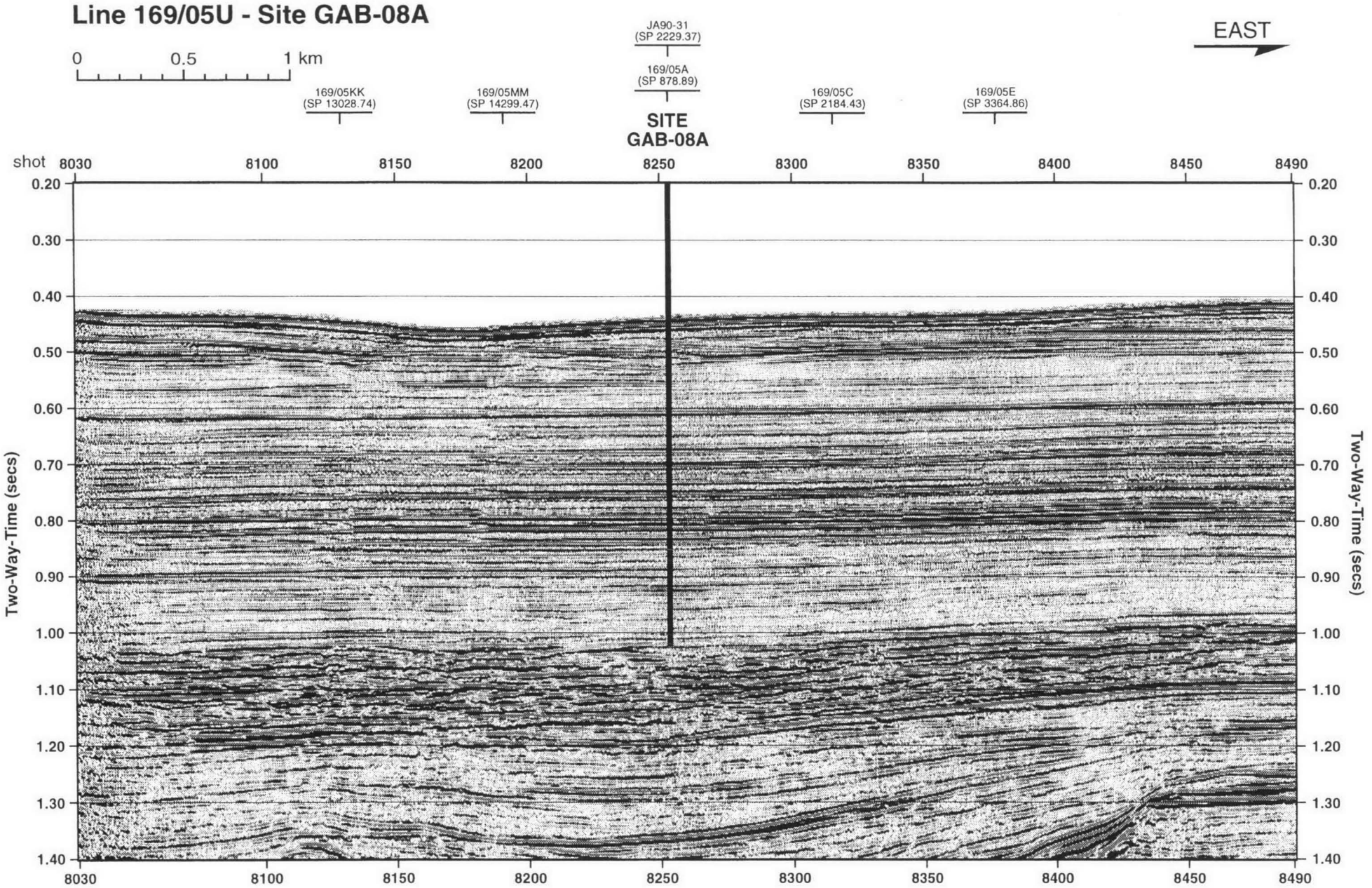


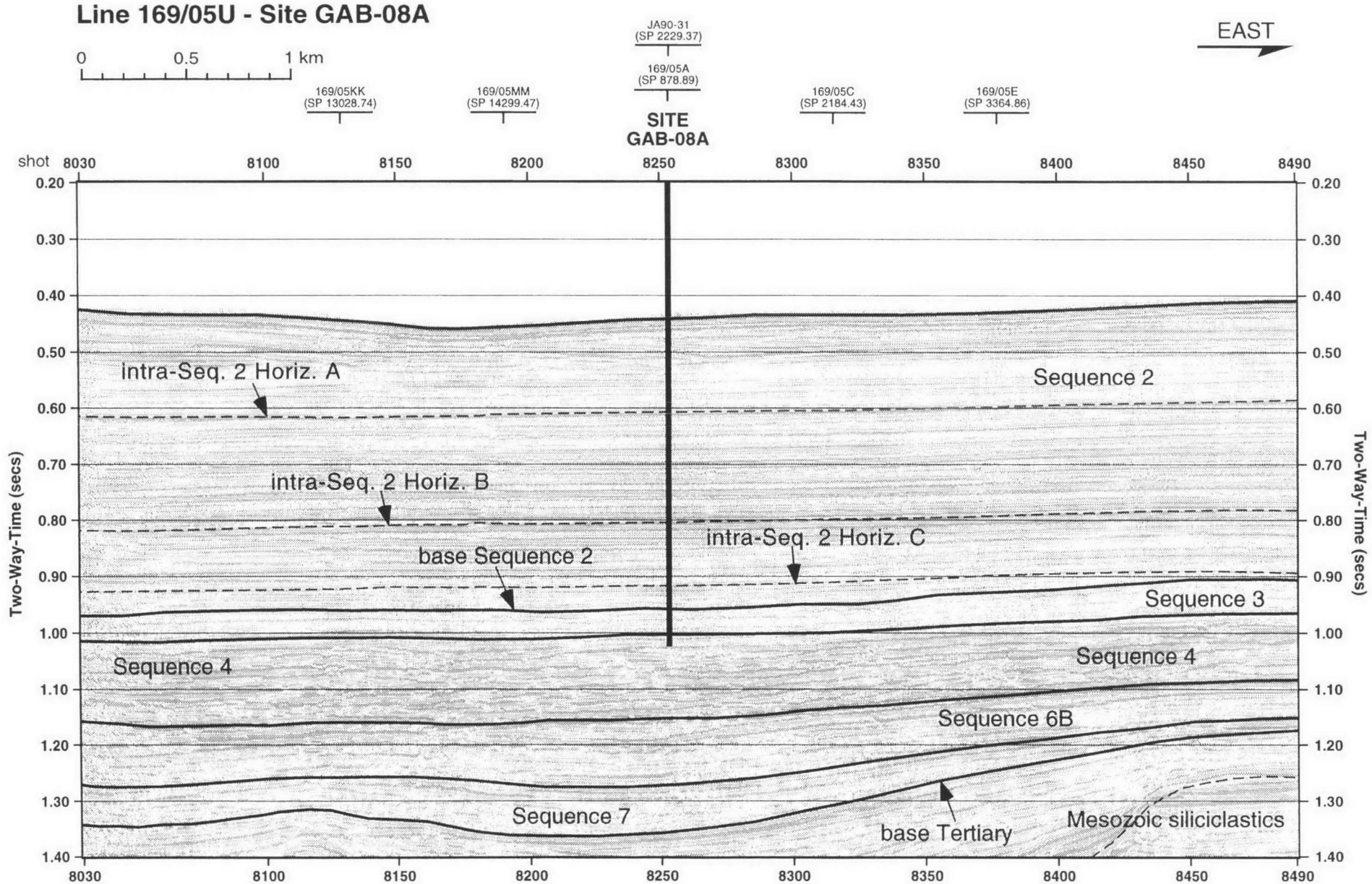
AGSO Survey 169 (February 1996) track map - Site GAB-08A




Line 169/05A - Site GAB-08A
0
0.5
1 km
NORTH
169/05AA (SP 9989.65)
169/05Y (SP 9401.54)
169/05W (SP 8824.32)
169/05U (SP 8253.42)
SITE GAB-08A
E79A-4 (SP 10304.24)
169/05S (SP 7718.71)
169/05Q (SP 7176.77)
169/05O (SP 6641.55)
shot
630
650
700
750
800
850
900
950
1000
1050
1100
1130
Two-Way-Time (secs)
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40

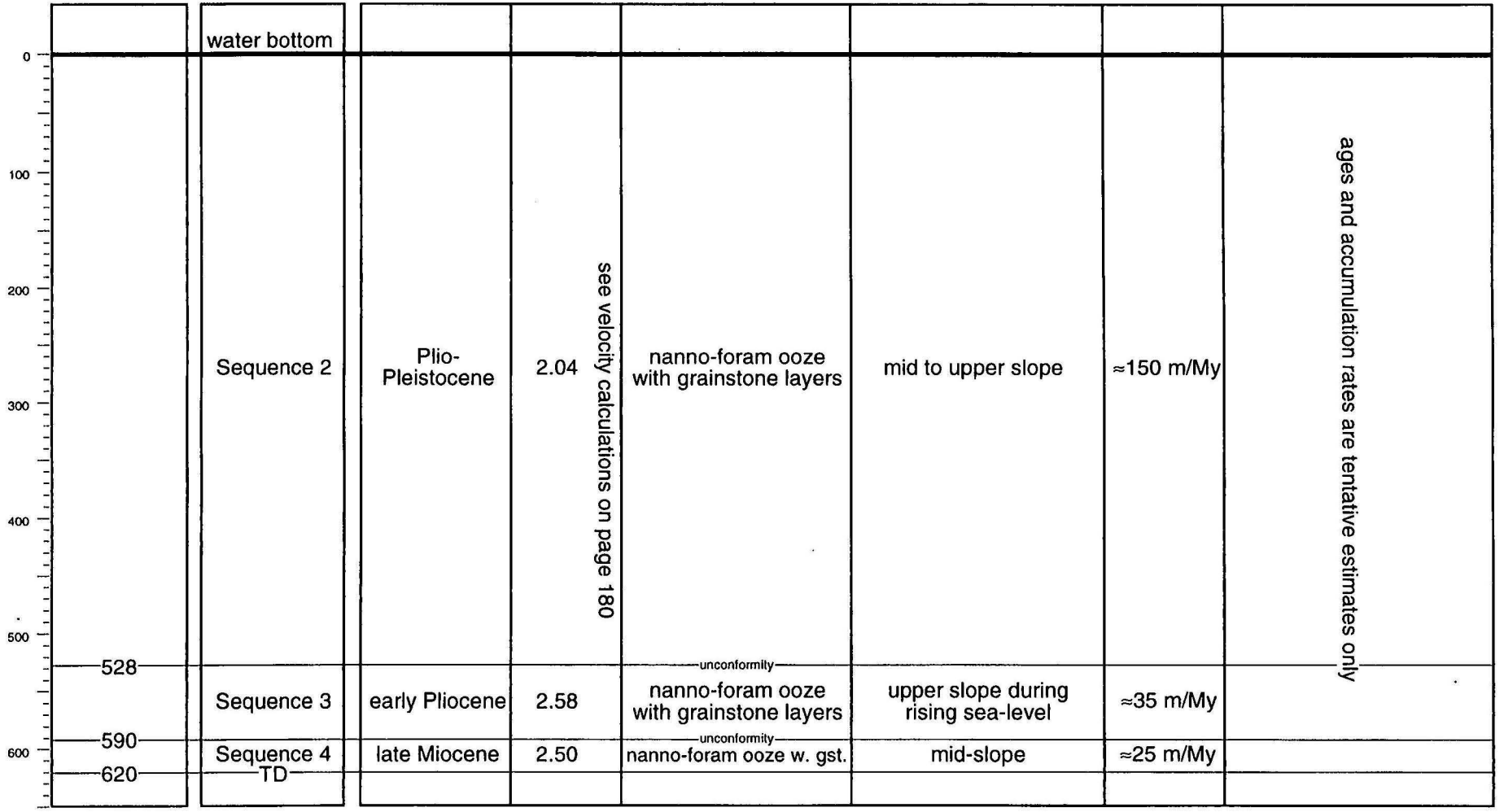

Line 169/05A - Site GAB-08A
0
0.5
1 km
NORTH
169/05AA (SP 9989.65)
169/05Y (SP 9401.54)
169/05W (SP 8824.32)
169/05U (SP 8253.42)
SITE GAB-08A
E79A-4 (SP 10304.24)
169/05S (SP 7718.71)
169/05Q (SP 7176.77)
169/05O (SP 6641.55)
shot
630
650
700
750
800
850
900
950
1000
1050
1100
1130
Two-Way-Time (secs)
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
intra-Seq. 2 Horiz. A
intra-Seq. 2 Horiz. B
Sequence 2
intra-Seq. 2 Horiz. C
base Sequence 3
base Sequence 2
Sequence 4
Mesozoic siliciclastics
Sequence 6B
Sequence 7
base Tertiary
Mesozoic siliciclastics


Line 169/05U - Site GAB-08A
0
0.5
1 km
JA90-31
(SP 2229.37)
169/05A
(SP 878.89)
EAST
169/05KK
(SP 13028.74)
169/05MM
(SP 14299.47)
SITE
GAB-08A
169/05C
(SP 2184.43)
169/05E
(SP 3364.86)
shot
8030
8100
8150
8200
8250
8300
8350
8400
8450
8490
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
Two-Way-Time (secs)

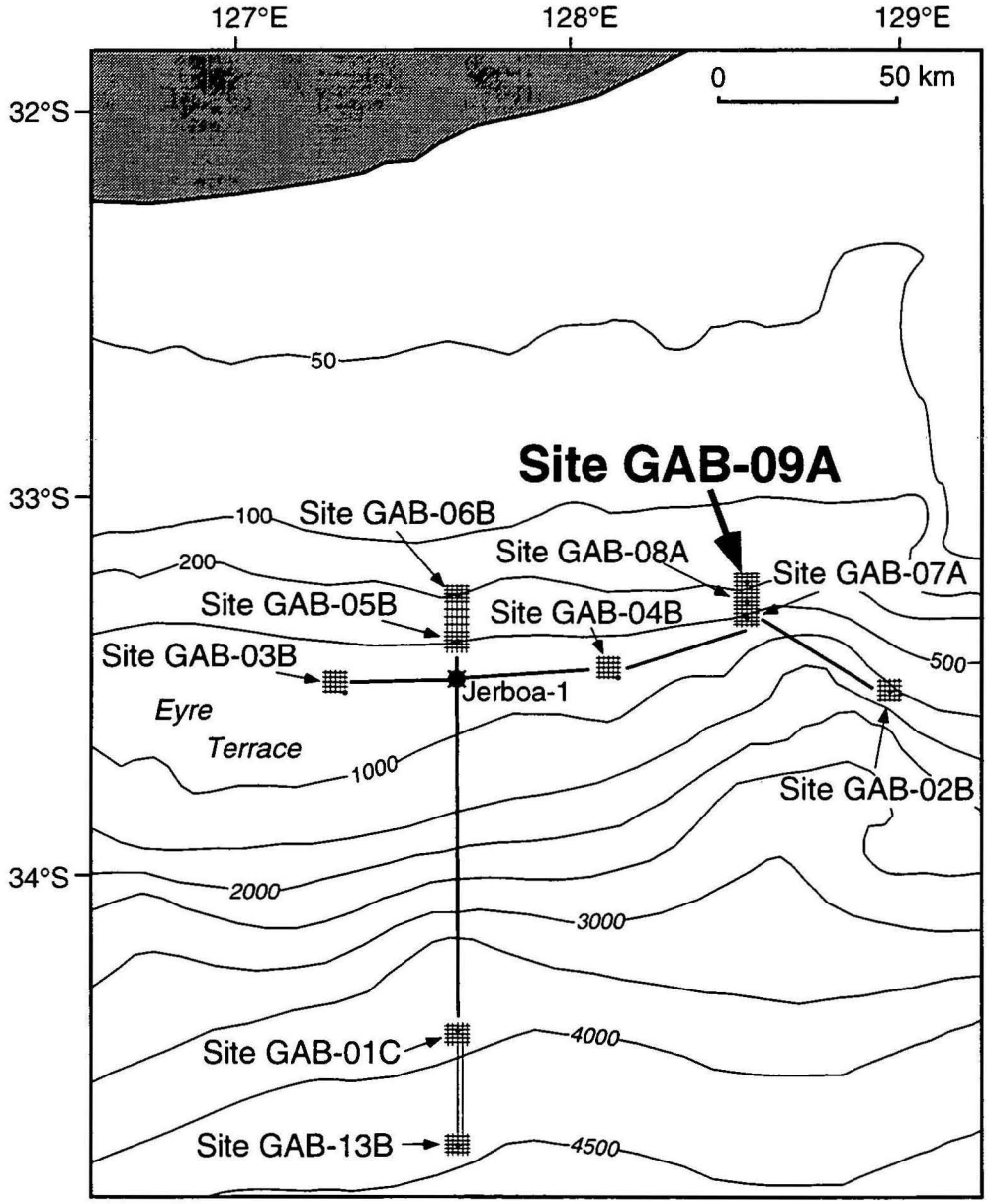

Line 169/05U - Site GAB-08A
0
0.5
1 km
EAST
JA90-31
(SP 2229.37)
169/05A
(SP 878.89)
169/05KK
(SP 13028.74)
169/05MM
(SP 14299.47)
SITE
GAB-08A
169/05C
(SP 2184.43)
169/05E
(SP 3364.86)
shot
8030
8100
8150
8200
8250
8300
8350
8400
8450
8490
Two-Way-Time (secs)
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
intra-Seq. 2 Horiz. A
Sequence 2
intra-Seq. 2 Horiz. B
base Sequence 2
intra-Seq. 2 Horiz. C
Sequence 3
Sequence 4
Sequence 4
Sequence 6B
Sequence 7
base Tertiary
Mesozoic siliciclastics

Revised October 1992

GRAPHIC SUMMARY, SITE GAB-08A



SITE GAB-09A


127°E
128°E
129°E
0
50 km
32°S
33°S
34°S
50
100
200
500
1000
2000
3000
4000
4500
Site GAB-09A
Site GAB-06B
Site GAB-08A
Site GAB-07A
Site GAB-05B
Site GAB-04B
Site GAB-03B
Jerboa-1
Eyre
Terrace
Site GAB-02B
Site GAB-01C
Site GAB-13B

Revised October 1992

SAFETY CHECK SHEET
JOIDES POLLUTION PREVENTION AND SAFETY PANEL

1) Basic site information.

Leg: **182**	*Site designation:* **GAB-09A**	*Latitude:* **33°17.3793'S**	*Longitude:* **128°28.8748'E**
Water Depth: **200 m**	*Distance from land:* **79.2 n. mi.**	*Jurisdiction:* **Australia**	
General location or geomorphic province: **Eucla Basin; western Great Australian Bight**			
Probable thickness of sediments: **≈2480 m**	*Proposed total penetration:* **585 m**		

2) Upon what geophysical and/or geological data was this site selection made?

Multichannel Seismic lines: **AGSO (1996) 169/05A (SP 1201.86) and 169/05K (SP 5574.41)**
Single Channel Seismic lines: **Nil**
DSDP/ODP holes: **Nil**
Piston cores: **Vibra-cores 173/VC08 (2.33 m) and 173/VC09 (4.07 m)**
Other: **Also on JNOC (1990) multichannel seismic line JA90-31 (SP 2390.70)**

3) What is your proposed drilling program?

Double APC; XCB; no re-entry system required.

4) What is your proposed logging program?

Triple Combo; FMS/Sonic; WST.

5) From previous DSDP/ODP drilling in this area, list all hydrocarbon occurrences of greater than background levels. Give nature of show, age and depth of rock:

No relevant DSDP/ODP drilling in the area.

6) From available information, list all commercial drilling in this area that produced or yielded significant shows. Give depths and ages of hydrocarbon-bearing deposits:

Only relevant commercial drilling in the area is Jerboa-1, 46 n mi. to the WSW, which targetted the Mesozoic section in the Eyre Sub-basin. Jerboa-1 encountered no significant shows, with vitrinite reflectance indicating an immature to marginally mature Mesozoic section to TD.

7) Is there any indication of gas hydrates at this location?

No indication of gas hydrates; no BSR present.

8) Is there any reason to expect any hydrocarbon accumulation at this site? Please comment.

No hydrocarbon accumulation expected.

9) What "special" precautions will be taken during drilling?

Standard hydrocarbon monitoring.

10) What abandonment procedures do you plan to follow?

Standard abandonment procedures.

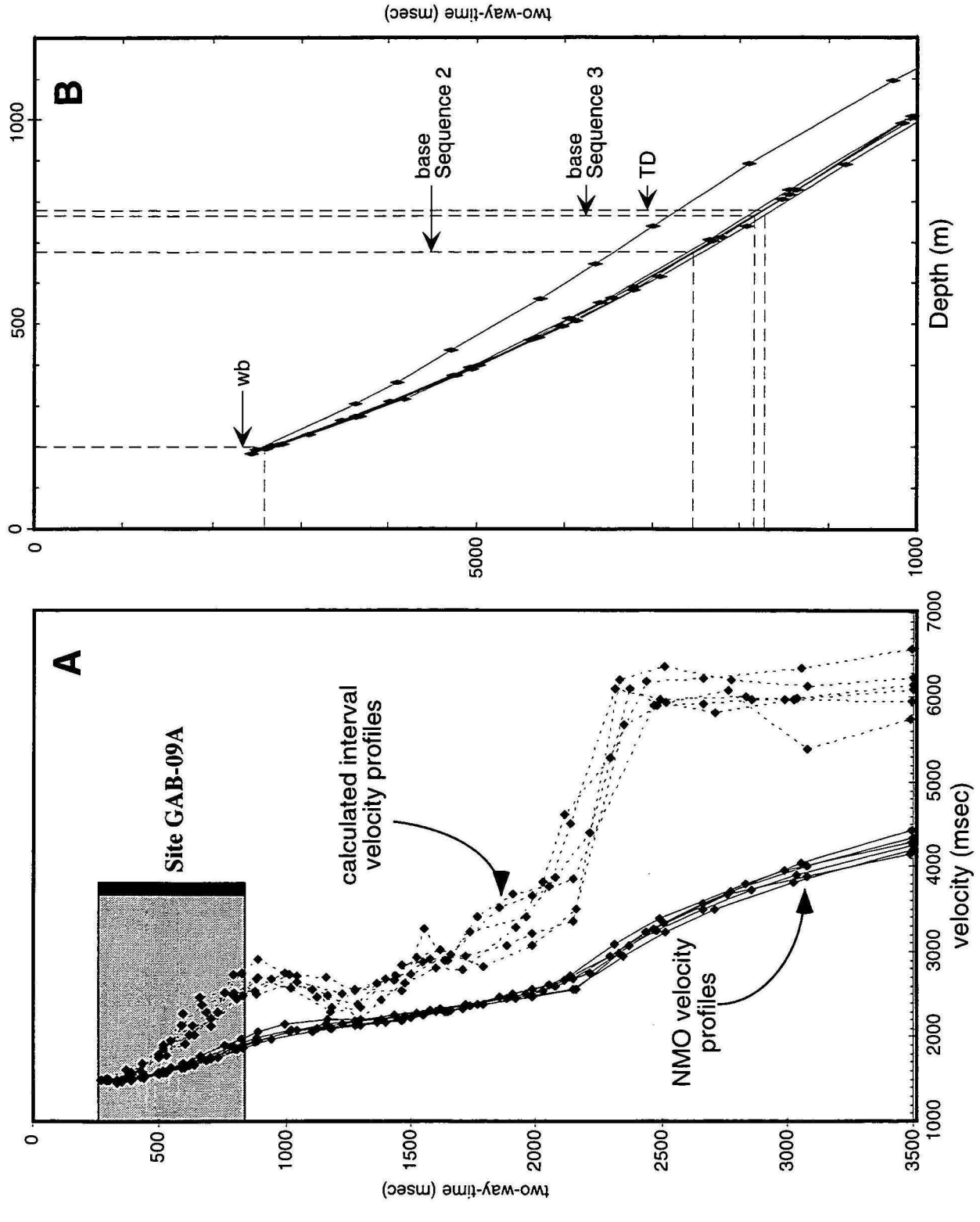
Summary: *What do you consider to be the major risks in drilling at this site?*

No significant drilling risks are anticipated at this site.

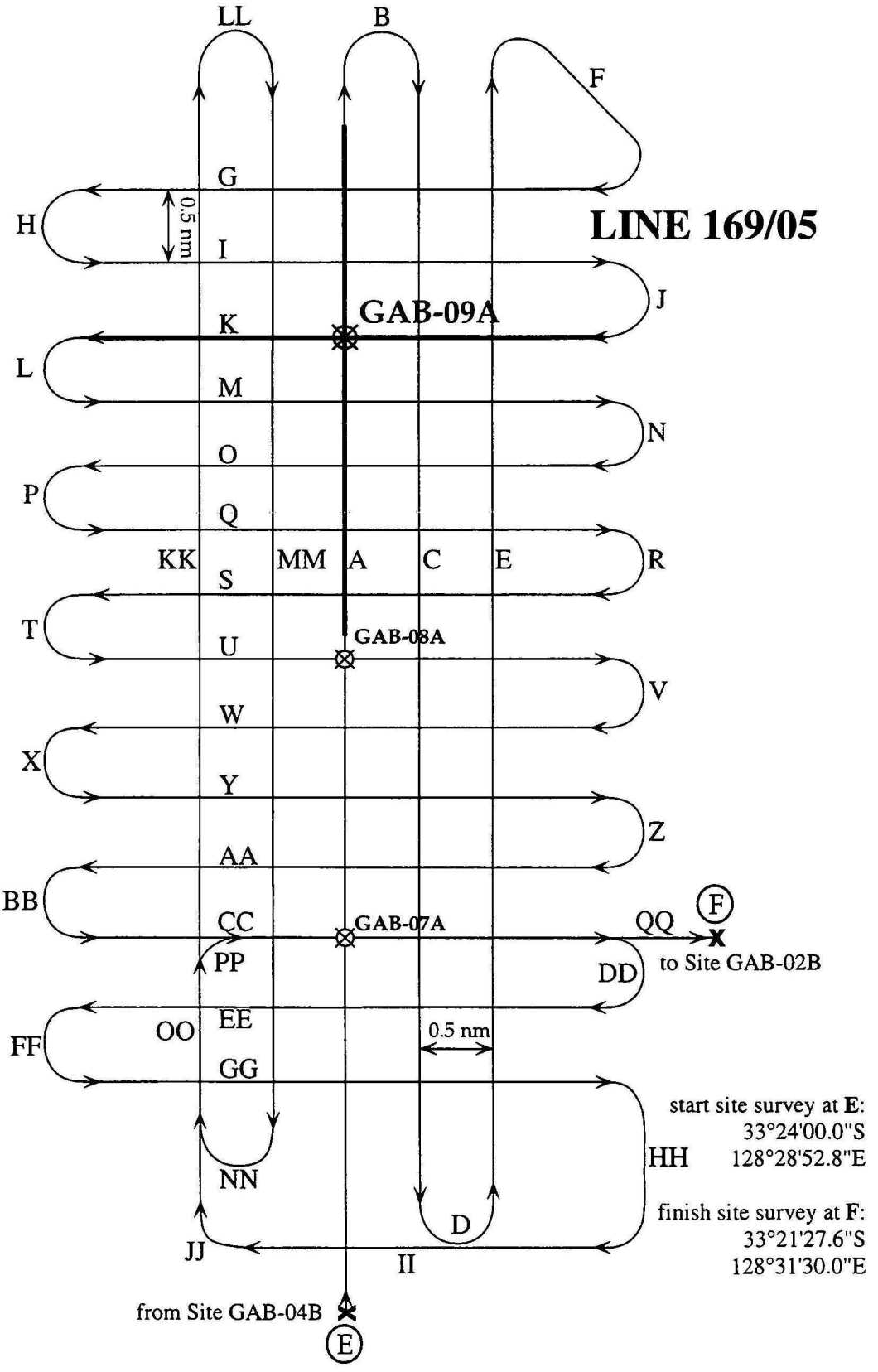
There is a risk that poor weather conditions may prevent drilling (>1.0 m heave compensator stroke; wind >35 knots; roll >3°), so a flexible drilling schedule will be necessary so that sites in shallower water can be drilled during calmer weather periods.

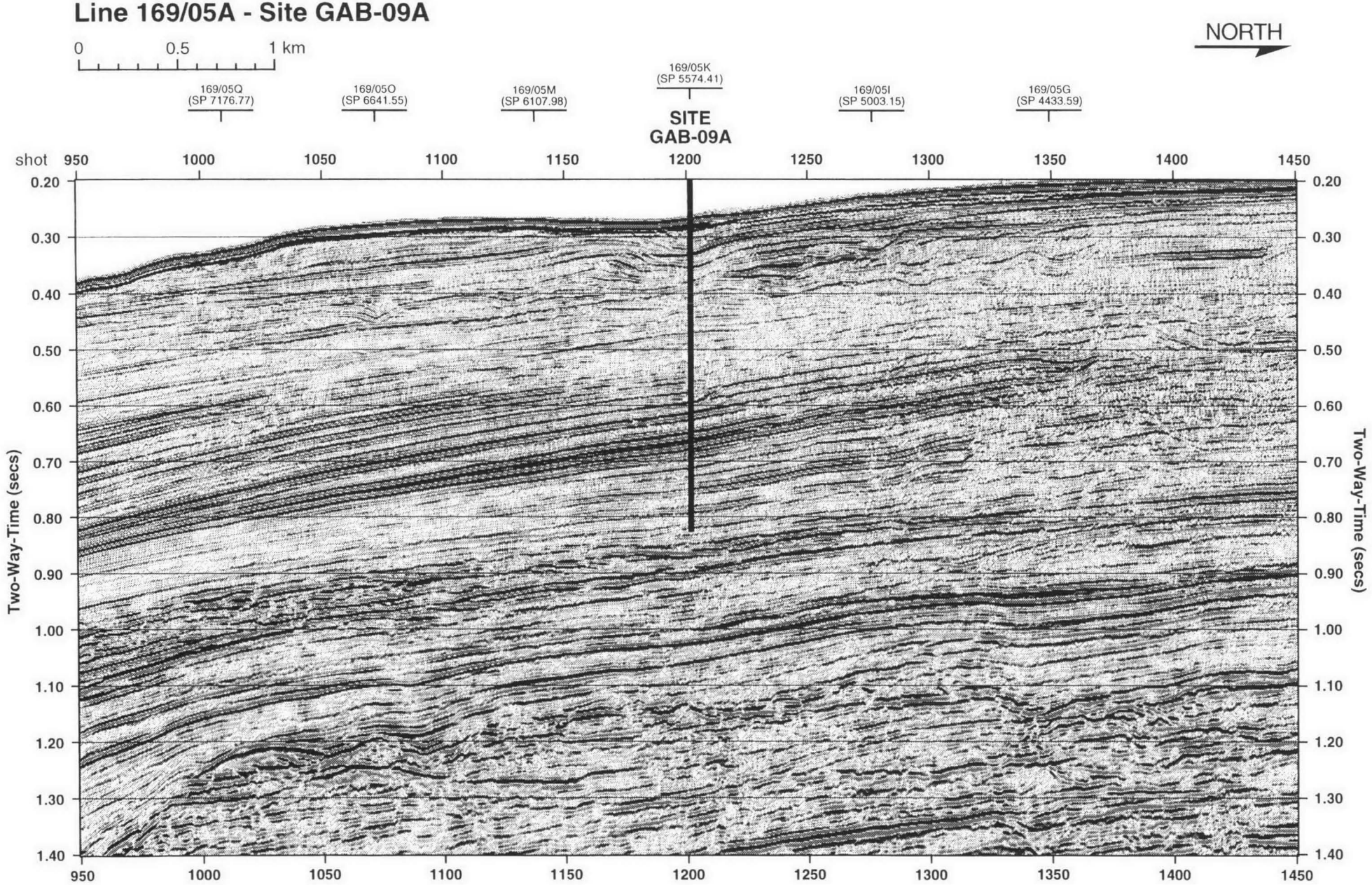
Velocity Calculations: Site GAB-09A

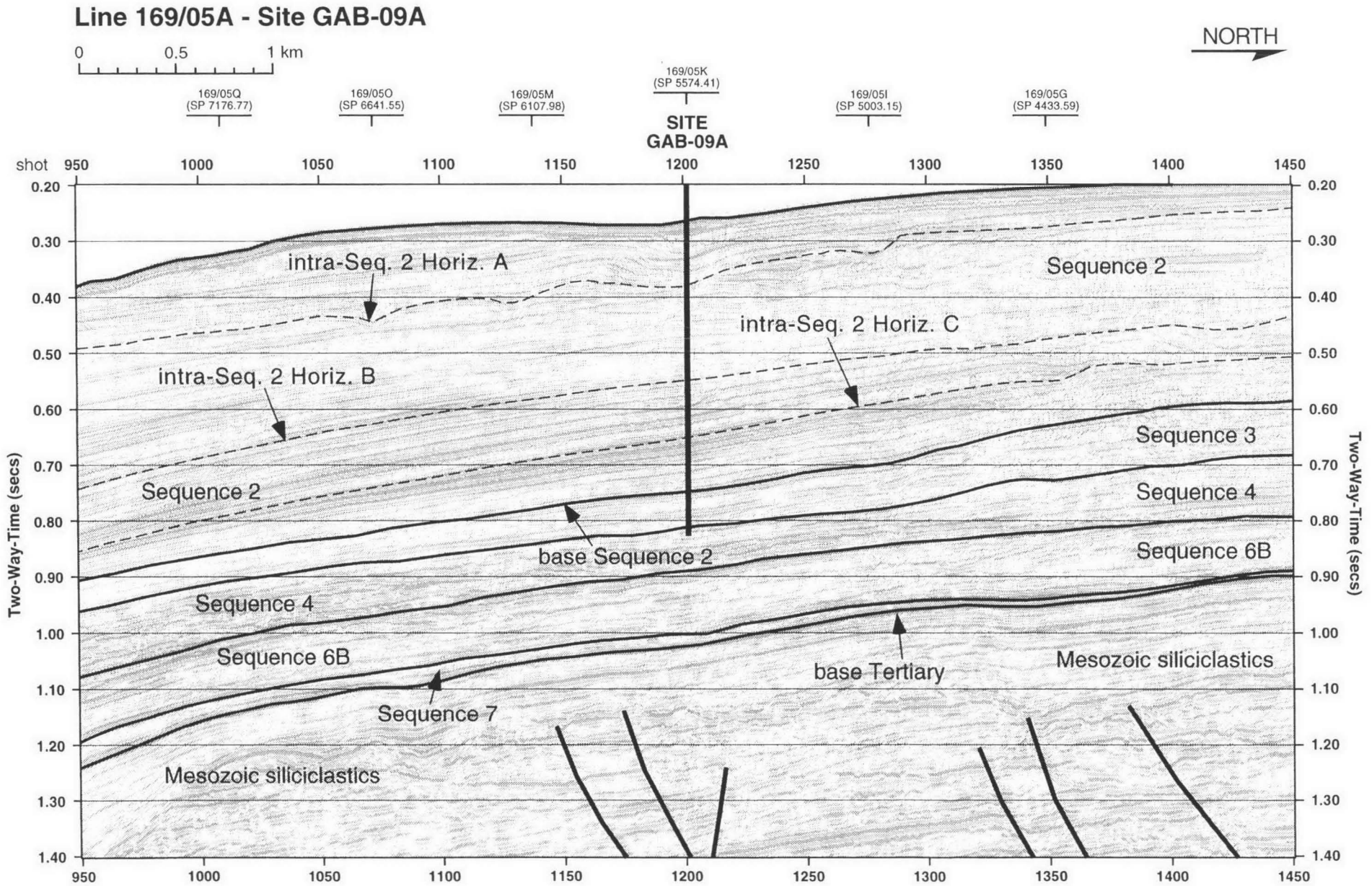
Velocity analysis for site GAB-09A, from seismic line 169/05. The six closest NMO (stacking) velocities to the site have been used to derive interval velocity profiles (A) and time-depth curves (B). Approximate depths to horizons shown on seismic sections presented on the following pages can then be derived from these time-depth curves.



AGSO Survey 169 (February 1996) track map - Site GAB-09A




Line 169/05A - Site GAB-09A
0
0.5
1 km
NORTH
169/05Q
(SP 7176.77)
169/05O
(SP 6641.55)
169/05M
(SP 6107.98)
169/05K
(SP 5574.41)
SITE
GAB-09A
169/05I
(SP 5003.15)
169/05G
(SP 4433.59)
shot
950
1000
1050
1100
1150
1200
1250
1300
1350
1400
1450
Two-Way-Time (secs)
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40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0.5
1 km
NORTH
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169/05K (SP 5574.41)
SITE GAB-09A
169/05I (SP 5003.15)
169/05G (SP 4433.59)
shot
950
1000
1050
1100
1150
1200
1250
1300
1350
1400
1450
Two-Way-Time (secs)
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
1.10
1.20
1.30
1.40
intra-Seq. 2 Horiz. A
intra-Seq. 2 Horiz. B
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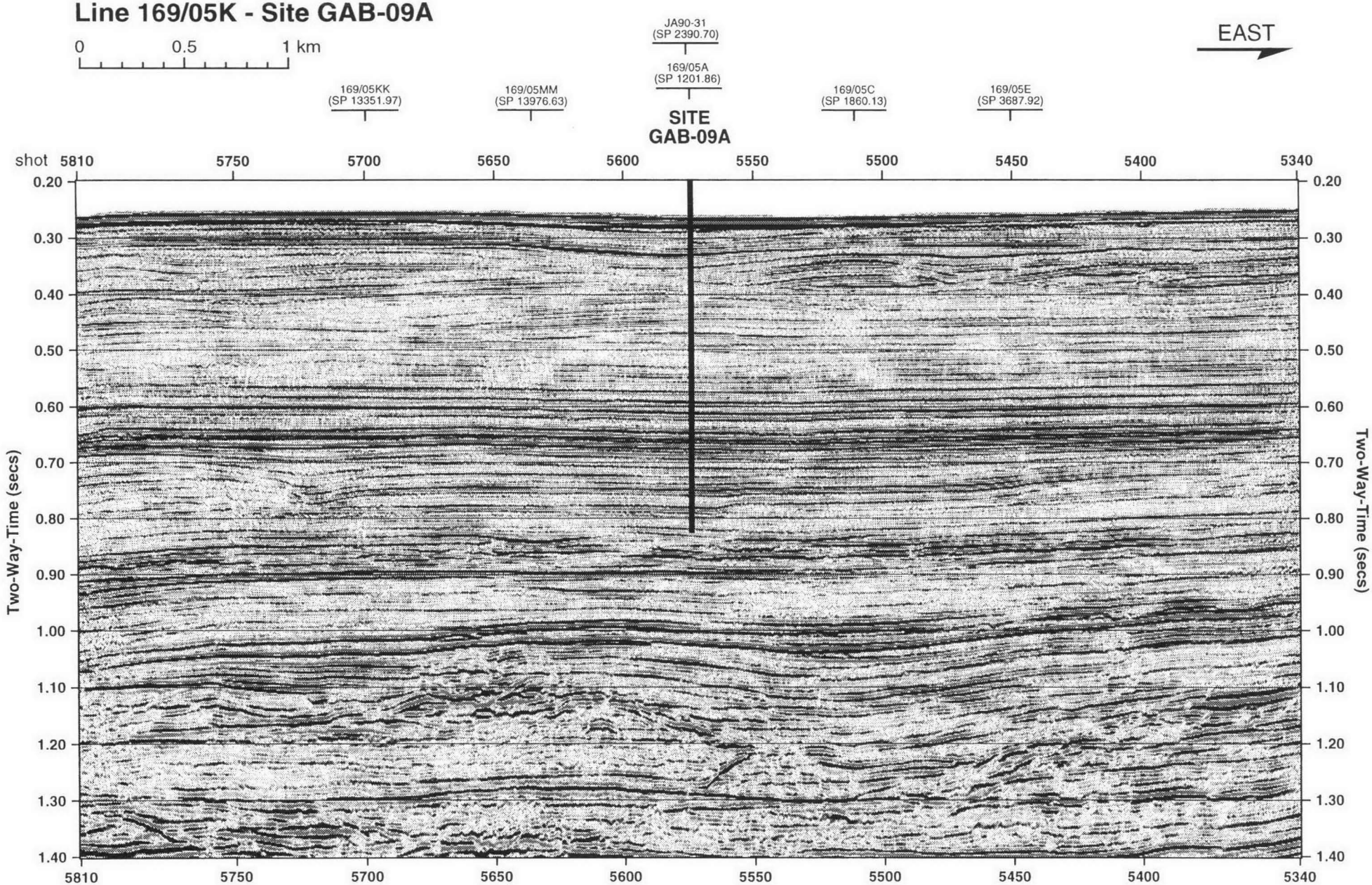
Sequence 2
Sequence 3
Sequence 4
Sequence 6B
Sequence 7
base Sequence 2
base Tertiary
Mesozoic siliciclastics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0.5
1 km
JA90-31
(SP 2390.70)
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(SP 1201.86)
EAST
169/05KK
(SP 13351.97)
169/05MM
(SP 13976.63)
SITE
GAB-09A
169/05C
(SP 1860.13)
169/05E
(SP 3687.92)
shot 5810
5750
5700
5650
5600
5550
5500
5450
5400
5340
0.20
0.30
0.40
0.50
0.60
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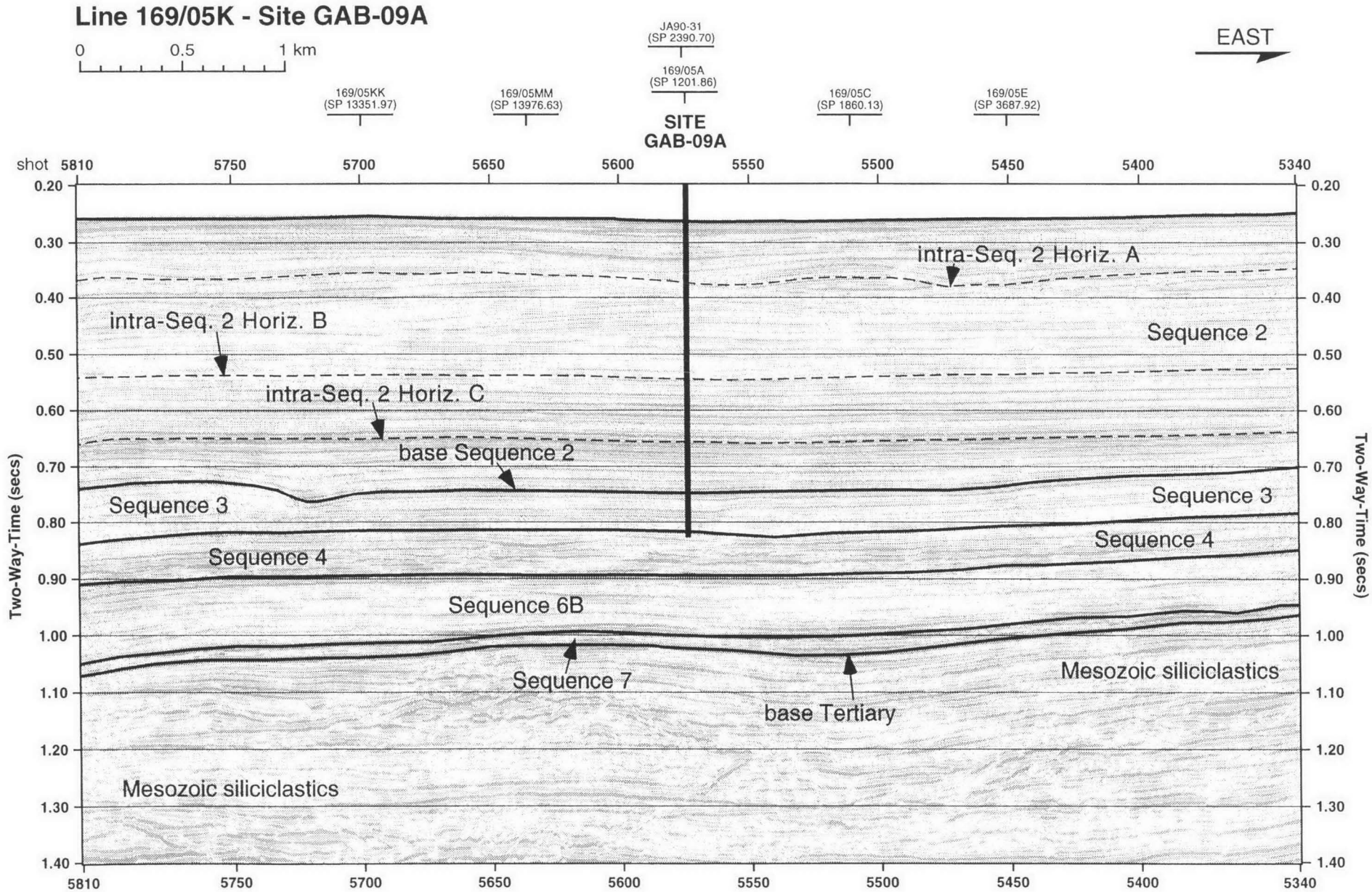
1.30
1.40
Two-Way-Time (secs)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SITE
GAB-09A
169/05C
(SP 1860.13)
169/05E
(SP 3687.92)
shot 5810 5750 5700 5650 5600 5550 5500 5450 5400 5340
Two-Way-Time (secs)
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intra-Seq. 2 Horiz. A
intra-Seq. 2 Horiz. B
Sequence 2
intra-Seq. 2 Horiz. C
base Sequence 2
Sequence 3
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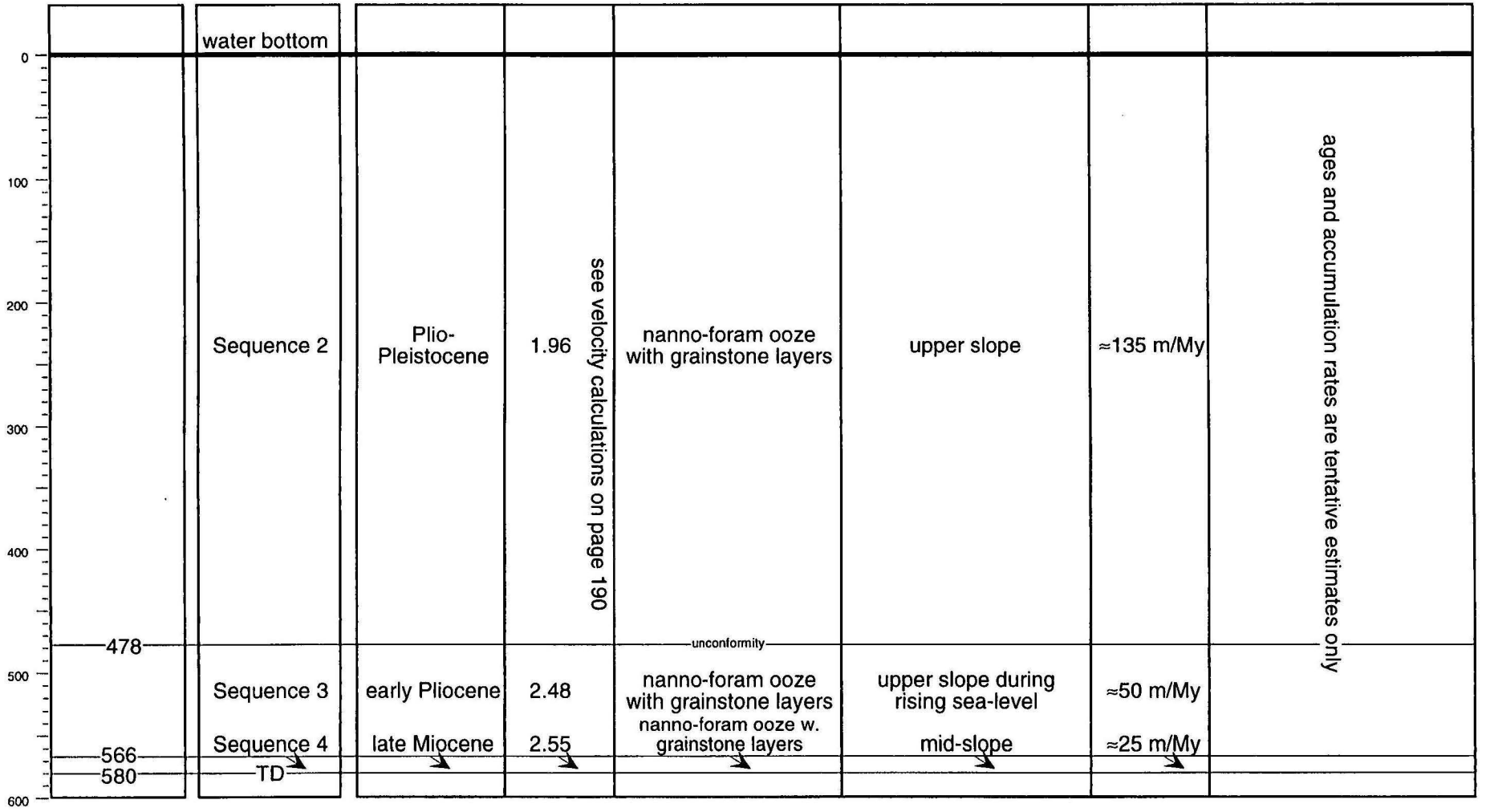
base Tertiary
Mesozoic siliciclastics
Mesozoic siliciclastics

Revised October 1992

GRAPHIC SUMMARY, SITE GAB-09A



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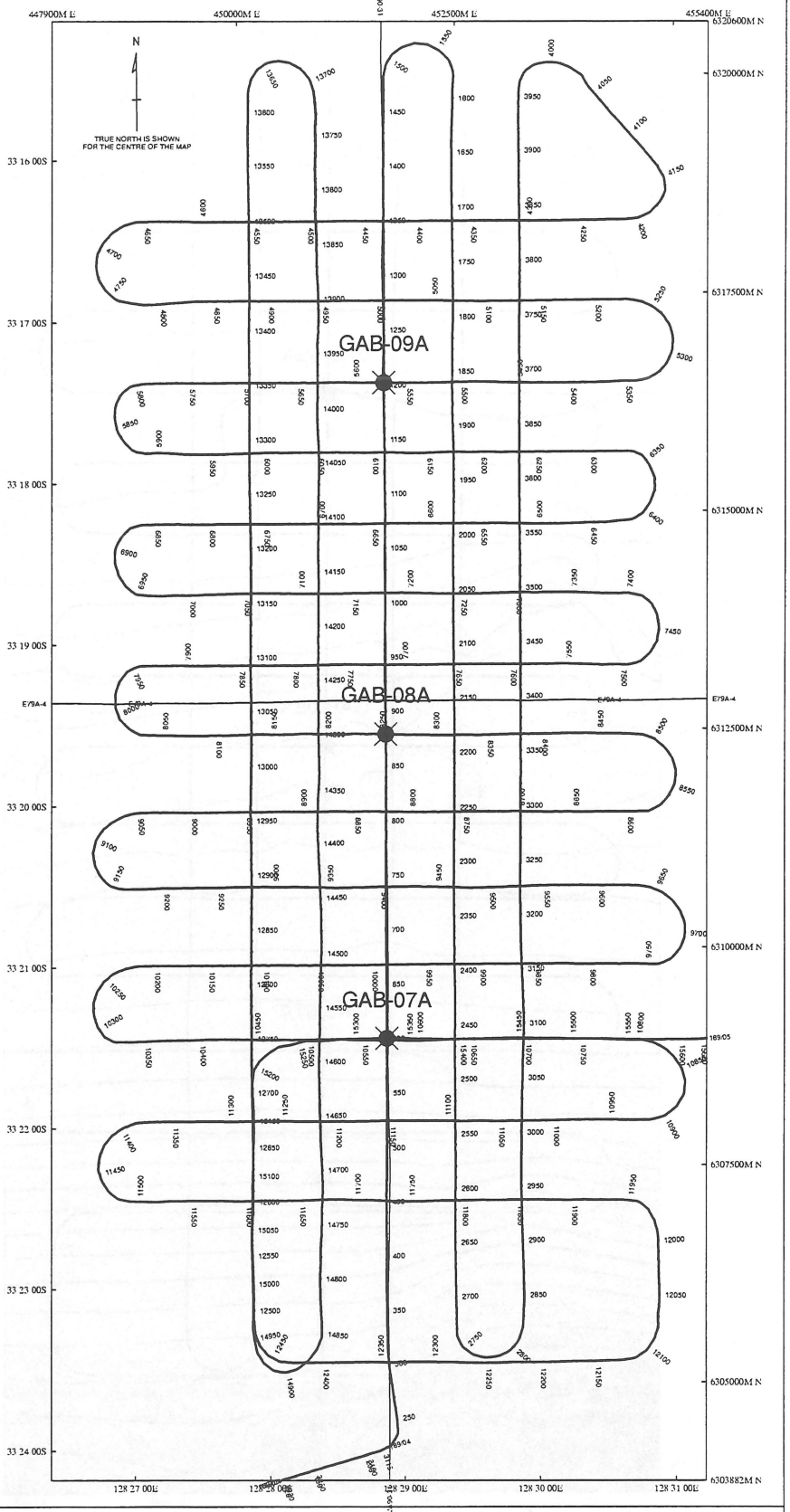

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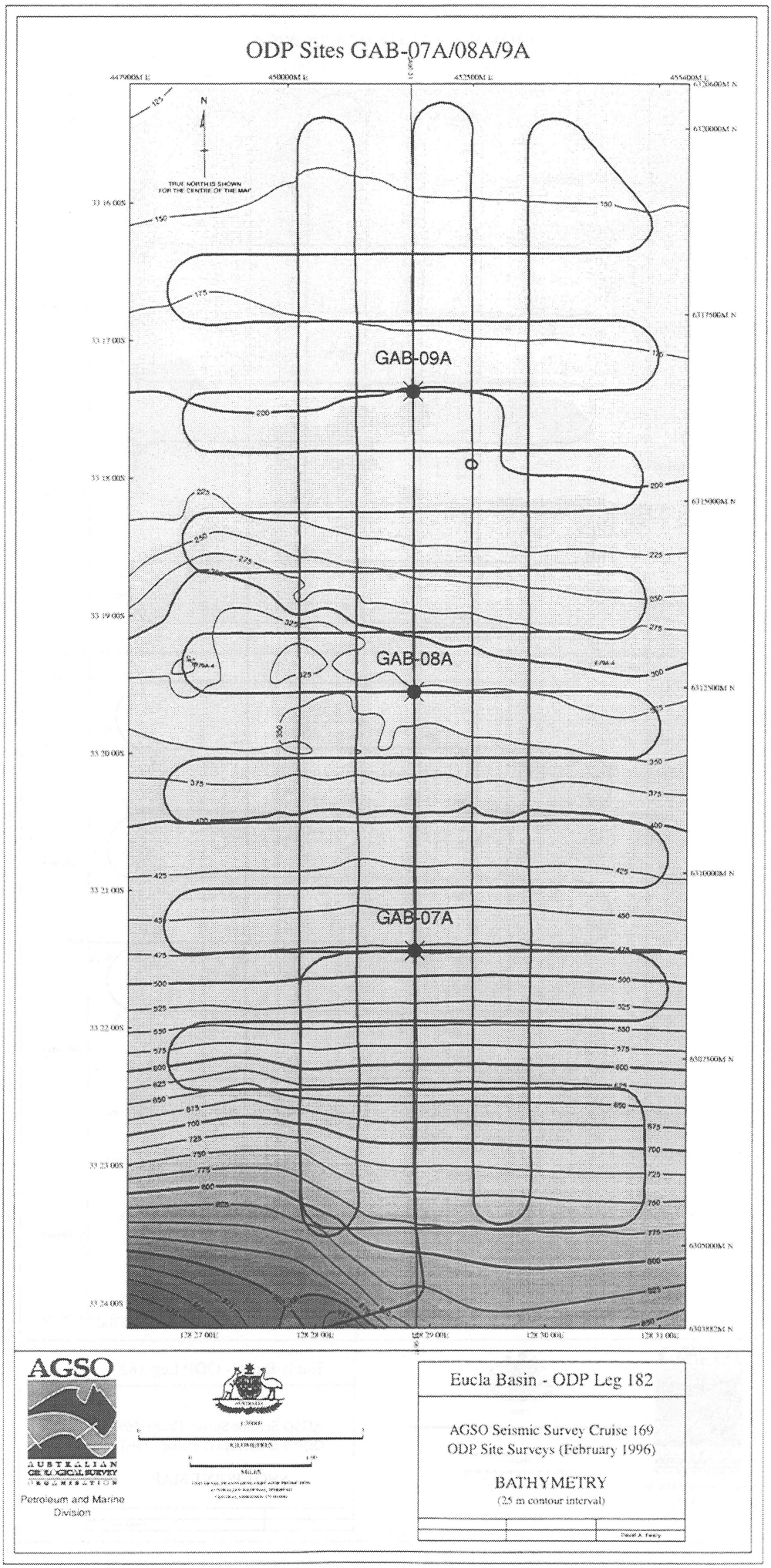
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

SHOT POINT MAP

David A. Feary


ODP Sites GAB-07A/08A/9A
GAB-09A
GAB-08A
GAB-07A
TRUE NORTH IS SHOWN FOR THE CENTRE OF THE MAP
AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION
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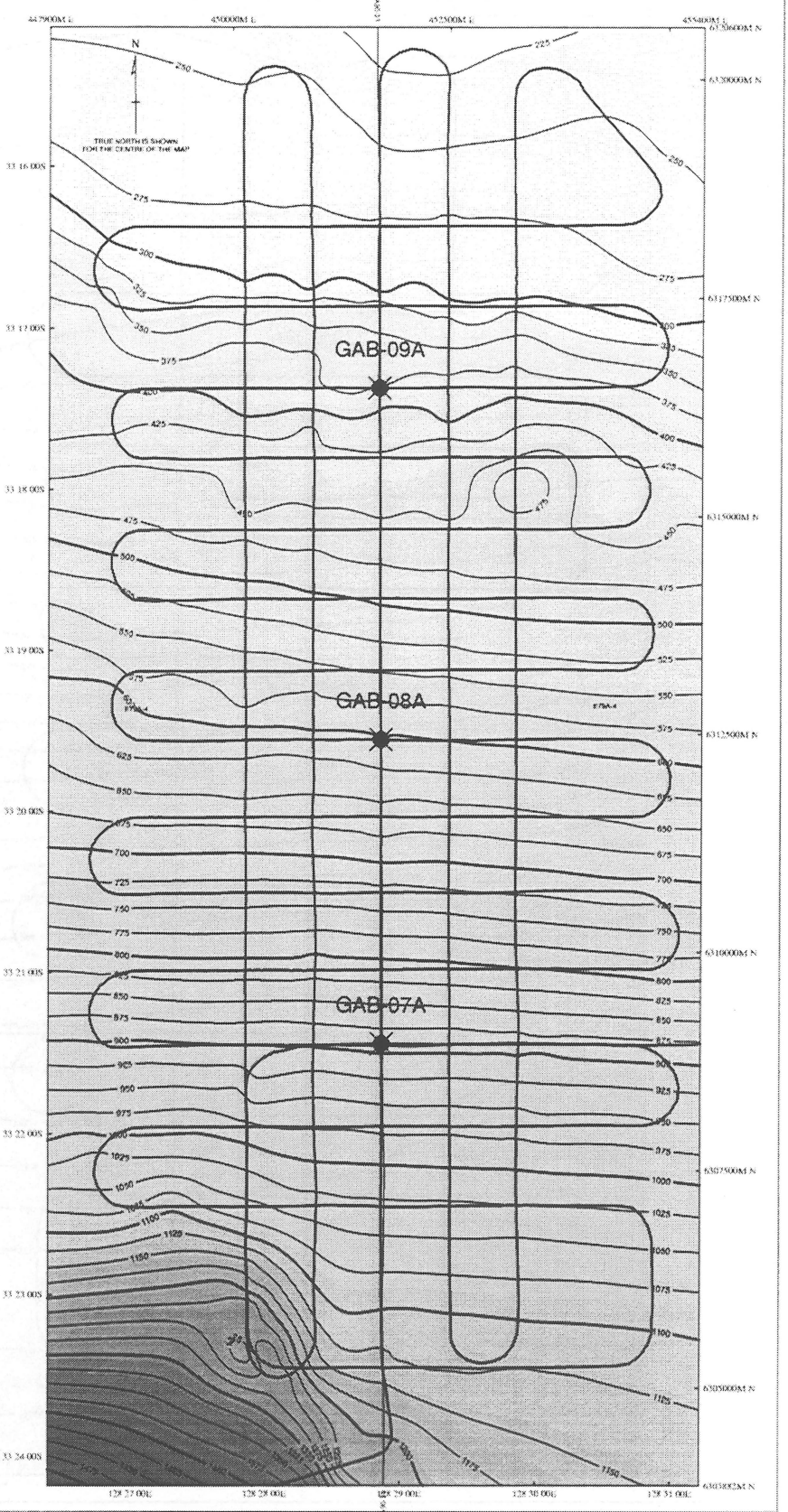
Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)
BATHYMETRY
(25 m contour interval)

ODP Sites GAB-07A/08A/9A



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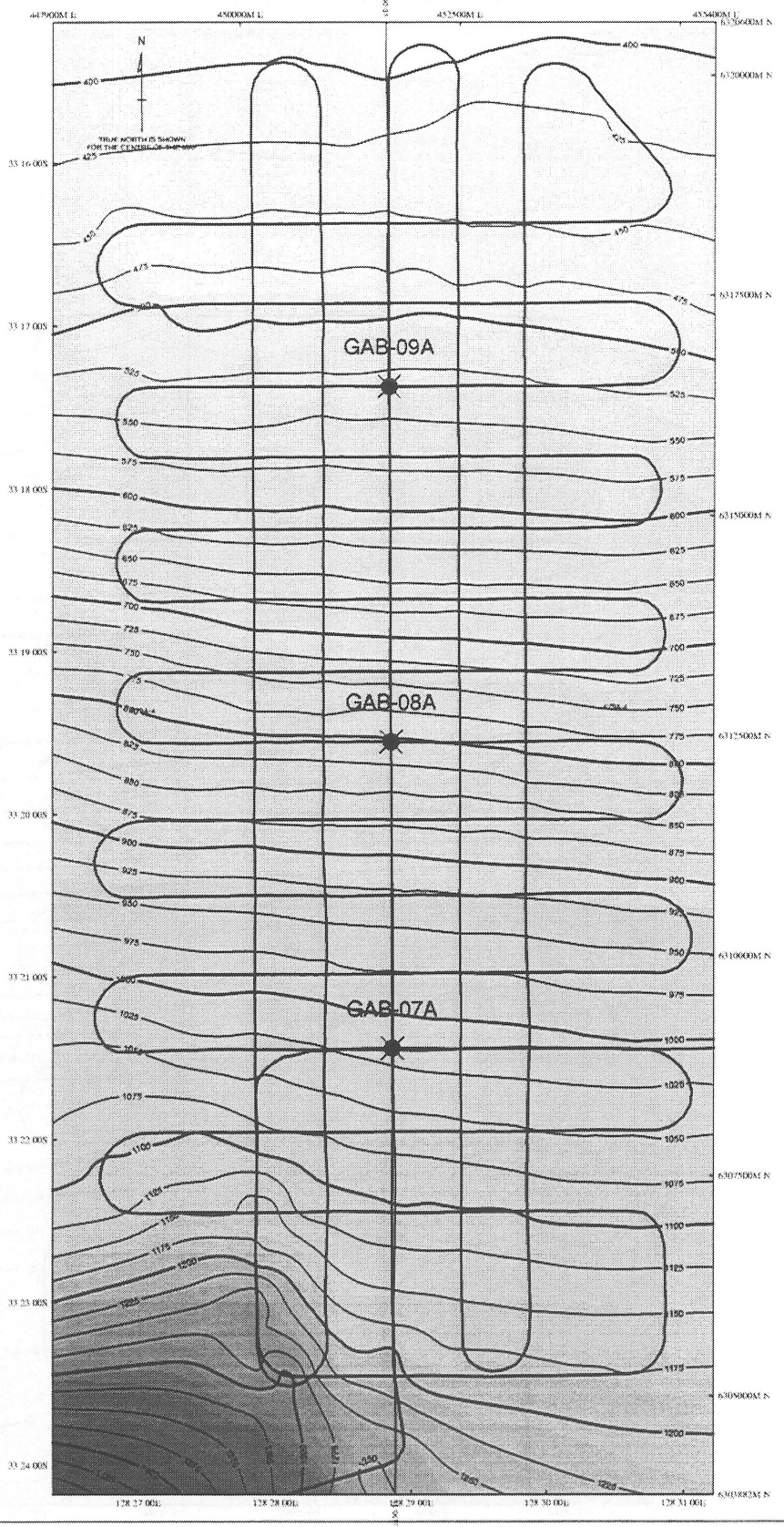
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO SEQUENCE 2 Horiz. A
(25 msec contour interval)

ODP Sites GAB-07A/08A/9A



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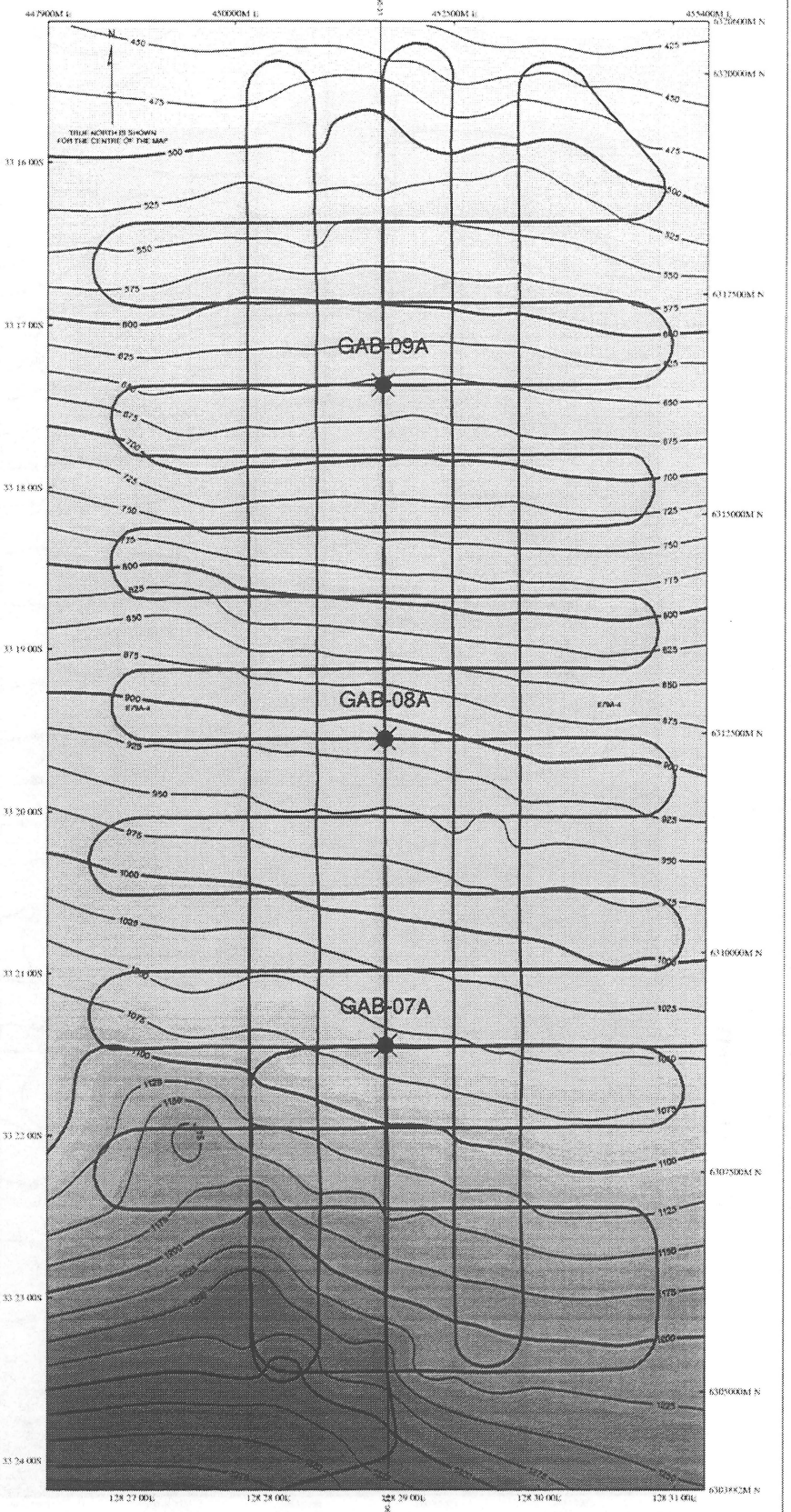
Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO SEQUENCE 2 Horiz. B
(25 msec contour interval)

David A. Ivory

ODP Sites GAB-07A/08A/9A



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Eucla Basin - ODP leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

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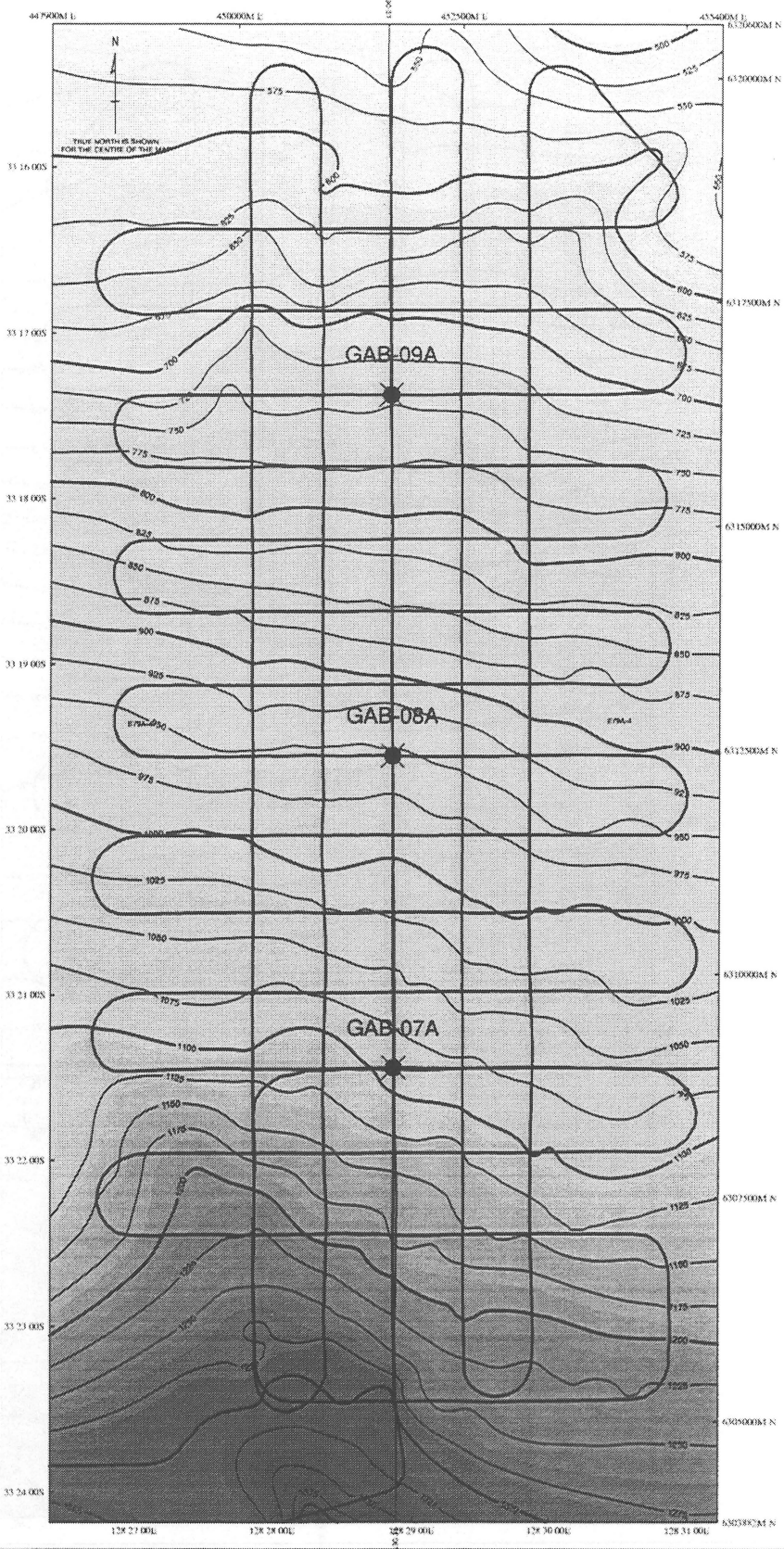
ODP Sites GAB-07A/08A/9A



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KILOMETRES

MILES

Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

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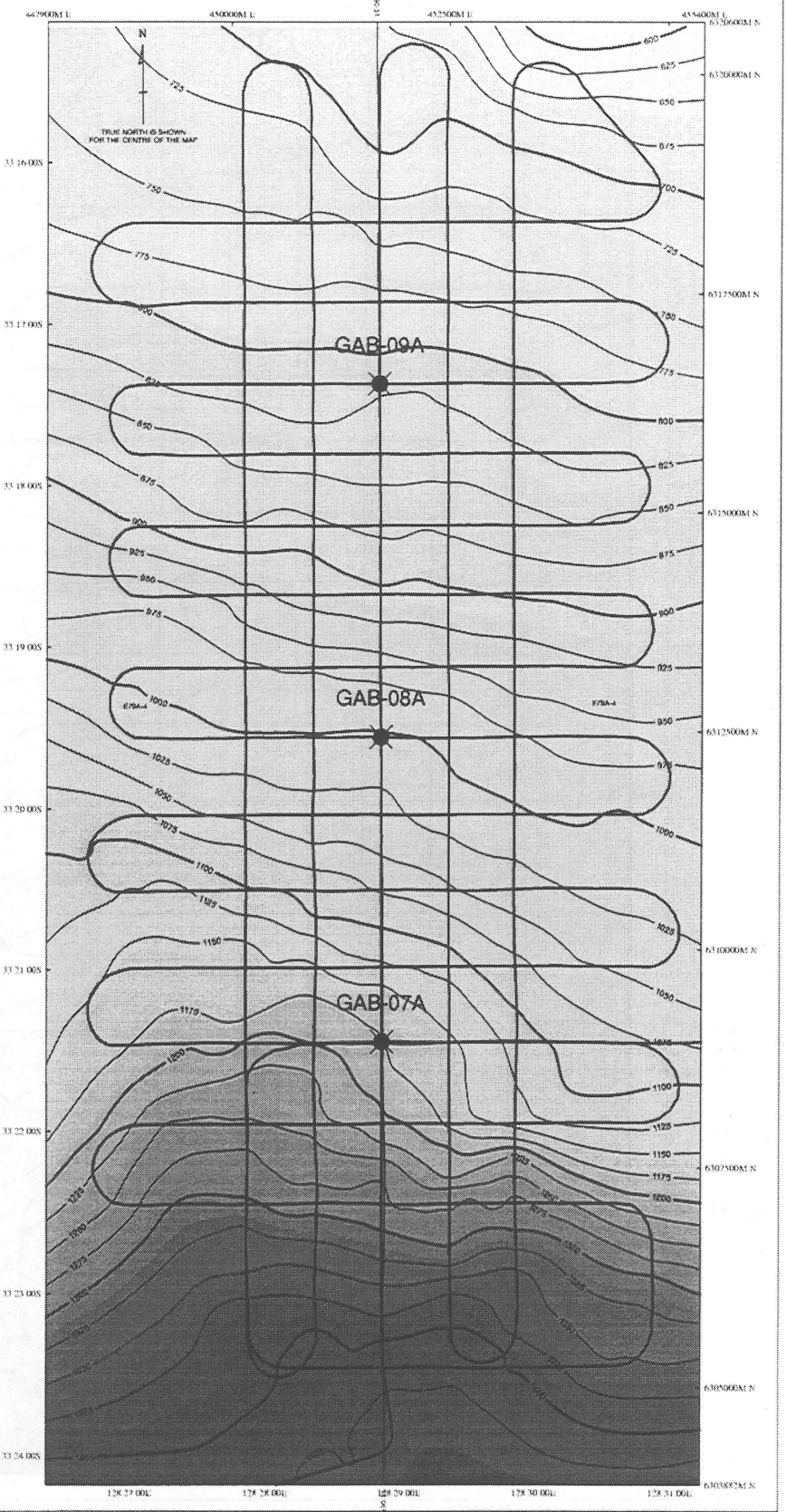
ODP Sites GAB-07A/08A/9A



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Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

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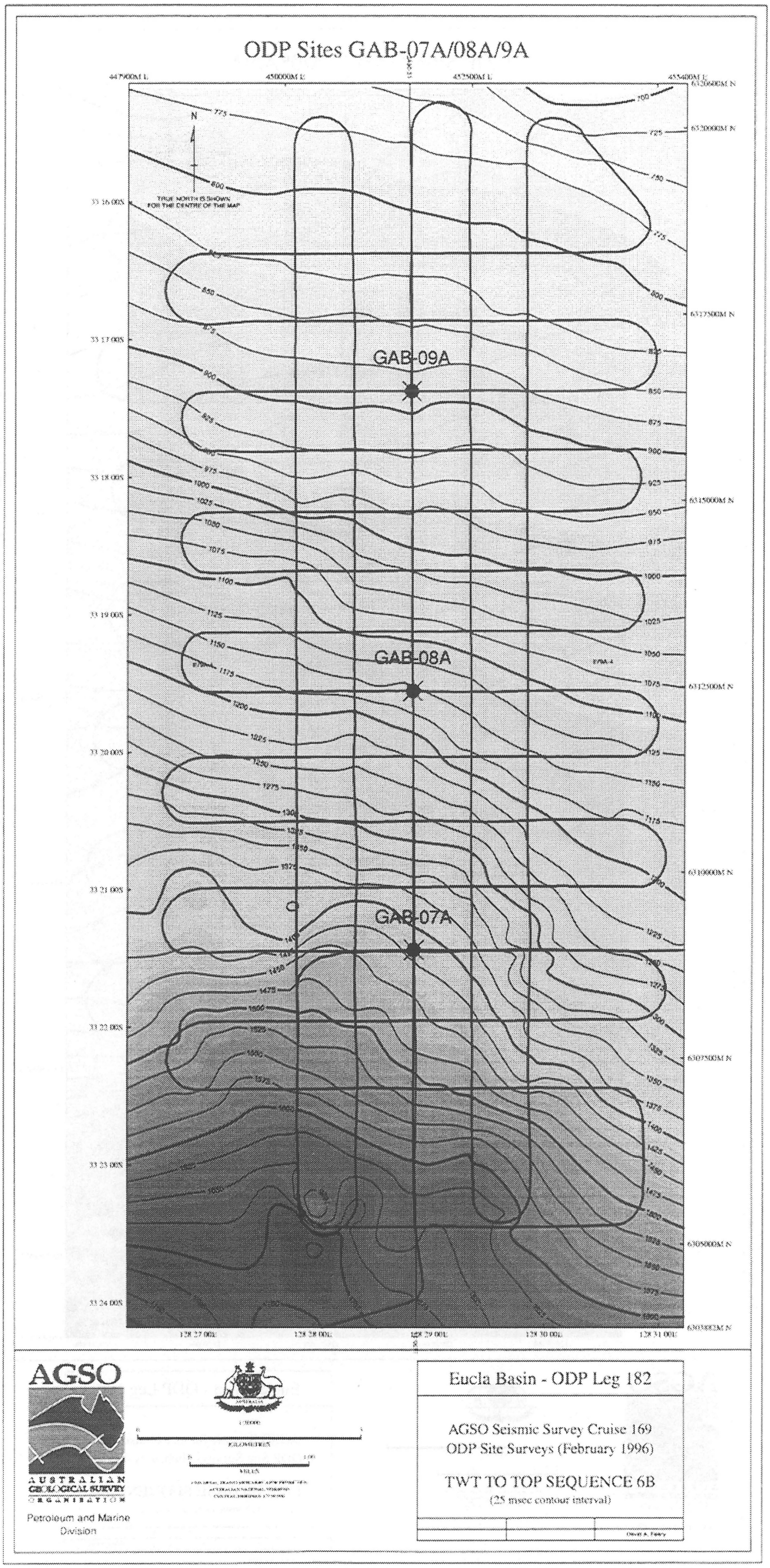
ODP Sites GAB-07A/08A/9A
GAB-09A
GAB-08A
GAB-07A
TRUE NORTH IS SHOWN FOR THE CENTRE OF THE MAP
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Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)
TWT TO TOP SEQUENCE 6B
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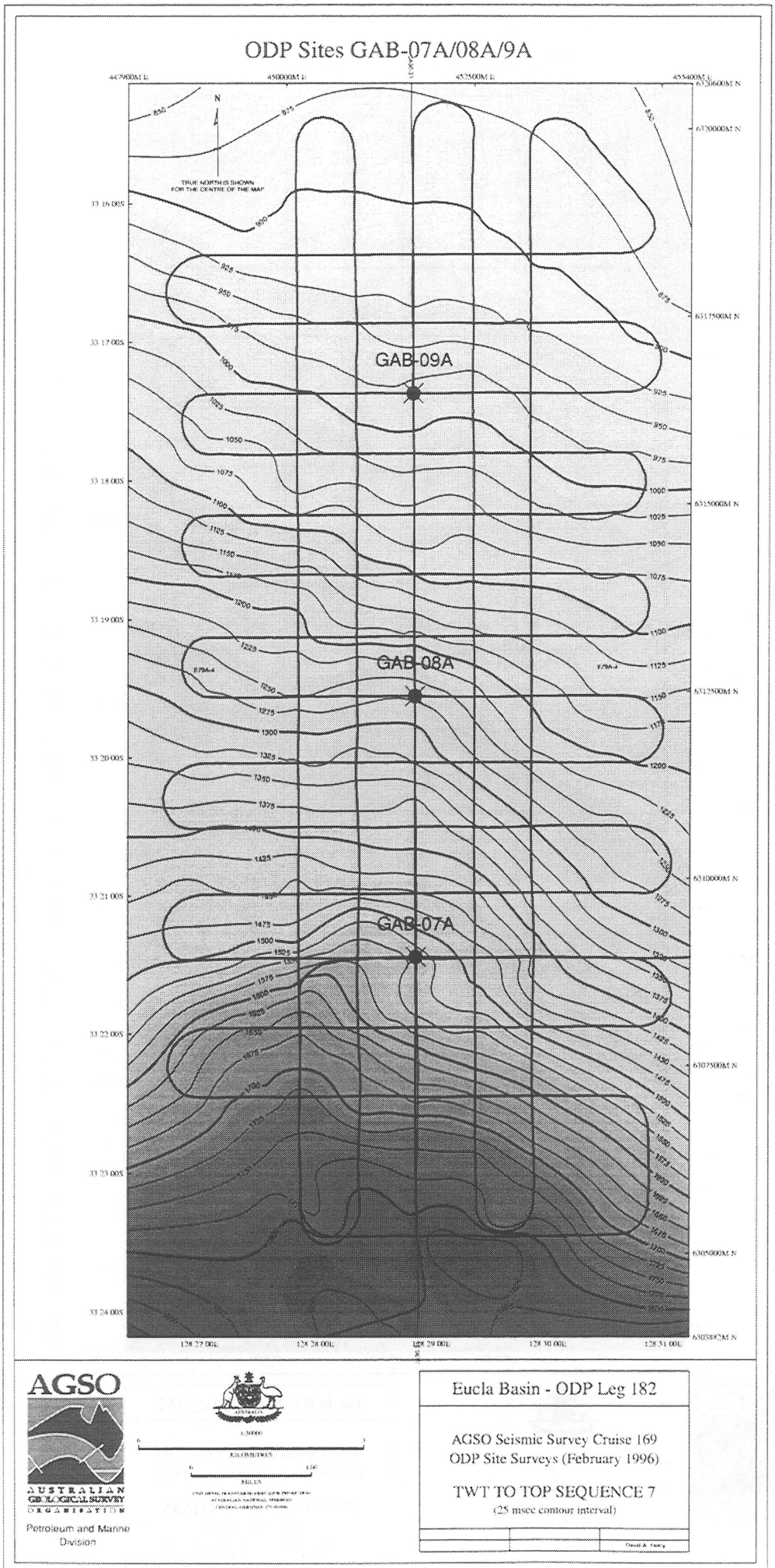
ODP Sites GAB-07A/08A/9A
GAB-09A
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TRUE NORTH IS SHOWN FOR THE CENTRE OF THE MAP
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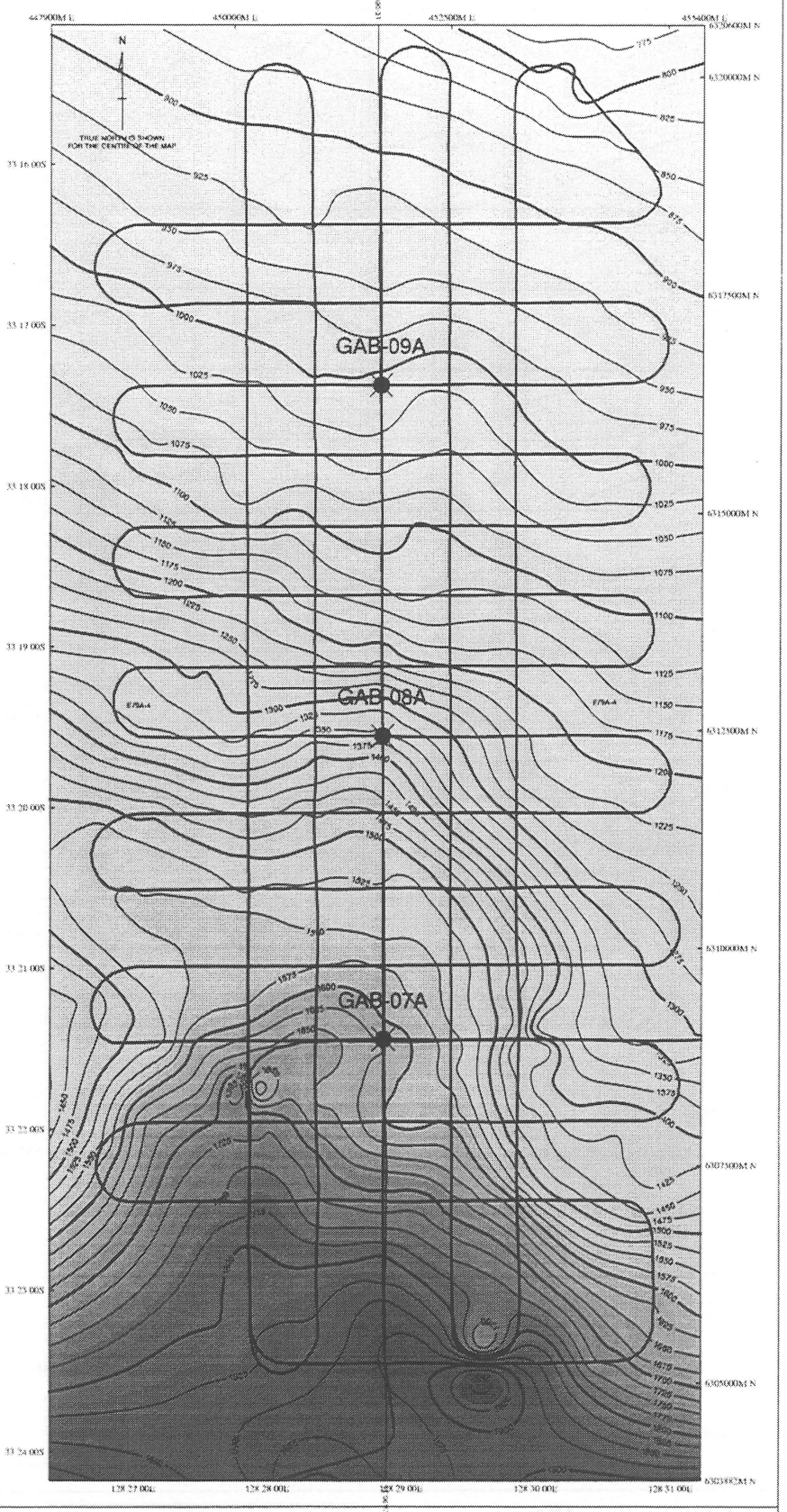
Eucla Basin - ODP Leg 182
AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)
TWT TO TOP SEQUENCE 7
(25 msec contour interval)

ODP Sites GAB-07A/08A/9A



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KILOMETRES

MILES

Eucla Basin - ODP Leg 182

AGSO Seismic Survey Cruise 169
ODP Site Surveys (February 1996)

TWT TO ?BASE TERTIARY
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