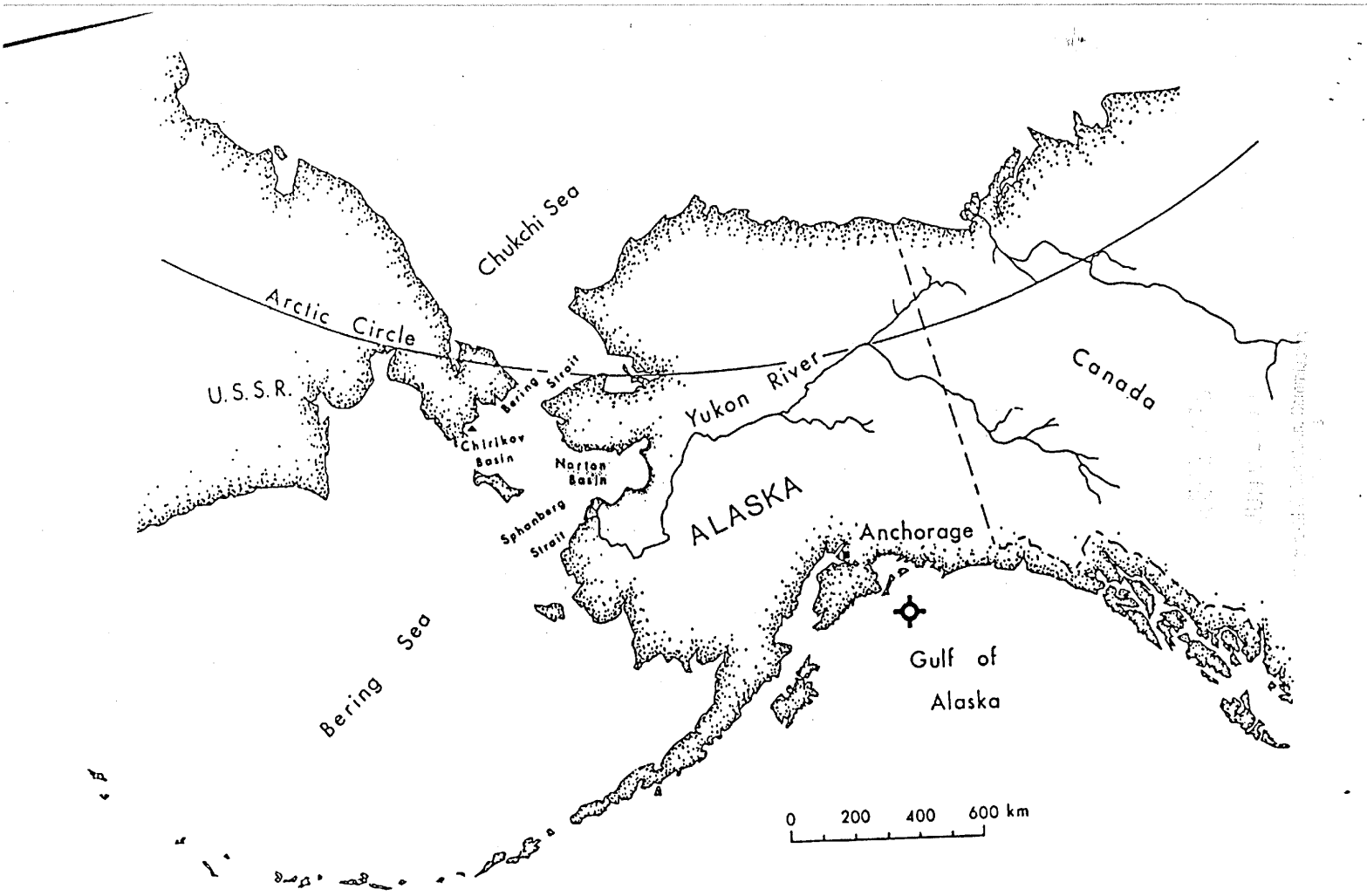

LOCATION OF TENNECO MIDDLETON ISLAND #1

January 25, 1984

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PALYNOLOGICAL ANALYSIS OF TENNECO
MIDDLETON ISLAND #1
59°24'33.15"N - 146°15' 37.59"W
GULF OF ALASKA

I have completed study of 130 palynology preparations from the Tenneco Middleton Island #1 well. Exclusively of ditch cuttings, these samples covered the interval from 240-12,002 feet. Palynomorph recovery was generally good in the Neogene, gradually deteriorating with depth, until good biostratigraphic control was lost at about 9,100 feet; fair control and reasonable recoveries continued to T.D. at 12,002 feet. Palynological data from 122 additional slides (prepared in 1975) was also integrated into the study.

Eighty-nine taxa (pollen and spores, dinoflagellates and fungal spores) were recovered and utilized in graphic analysis of the well. Taxa stratigraphically out of place through caving and reworking were reasonably common; caved material was primarily of Miocene age while reworked taxa were mostly Cretaceous. Elimination of these taxa and graphic analysis of the remainder produced the following relative age determinations:

460'	Top of Pliocene (projected)
2,275'	Top of Upper Miocene
3,620'	Top of Middle Miocene
4,960'	Top of Lower Miocene
5,630'	Top of Upper Oligocene
6,810'	Top of Lower Oligocene
9,000'	Top of Upper Eocene
9,670'	Top of Middle Eocene
10,340'	Top of Lower Eocene
10,880'	Top of Paleocene?

Since correlation of the lower Paleogene in this well is by a projection of the line of correlation, the possibility exists that T.D. was in sediments of Lower Eocene rather than Paleocene age.

No significant unconformities were detected in the well, although a "weathered" zone around 9,300 feet may represent a brief nonmarine erosional episode. This may correlate with the TE3 regressional sequence of Hardenbol and Berggren (1977).

Visual kerogen thermal maturation levels were pregeneration or early

generation to about 6,900 feet and early peak oil (early gas) at T.D. It appears that even deep in the well expulsion phase was never reached. Nearly all samples were of the mixed kerogen type, usually dominated, however, by micrite, wood, cuticle fragments and other structured elements (see attached sheets). These thermal maturation levels are in general agreement with our in-house vitrinite reflectance values (T.E. Hemler memo of 9/2/83).

In general, the depositional environment of the Tenneco Middleton Island well was marine or marginal marine to T.D. with only brief episodes of nonmarine deposition/erosion.

The first 16 samples, of Plio-Pleistocene age, are effectively barren. The first productive sample (1,680') is in marginal marine sediments of Lower Pliocene age. Sediments become increasingly marine with depth and by 2,850 feet palynology samples show a rich and diverse dinoflagellate flora. Coaly particles from this interval should probably be considered detrital.

Samples from 3,355-3,880 feet suggest a shallower, marginal marine to brackish environment. Fungal spores suggest that intermittent swamps may have existed.

By 3,930 feet conditions had again become marginal marine and remained so to about 4,780 feet. Reworked Cretaceous taxa are common in this interval. A brief nonmarine episode is suggested at around 5,460 feet, although by 5,540 feet sediments are again marine. Similar relatively shallow water conditions continue to 8,750 feet, at which point a brief brackish or swampy interval is suggested.

At 8,920 feet sediments are again marine and predominently continue so to T.D. Brief nonmarine periods are suggested at 9,380 feet, where the organic material appears "weathered", and at 10,380 feet where the recovery of palynomorphs is very sparse. Caved Neogene taxa (primarily Miocene) are common in this interval.

Although abundance decreased and preservation deteriorated with depth, the deepest sample (12,002' T.D.) still produced a lower Tertiary age assemblage of pollen, spores, fungals and dinoflagellates with no indication that the Mesozoic had been penetrated.

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GRAPHIC CORRELATION OF TENNECO MIDDLETON ISLAND #1 AGAINST THE ALASKA COMPOSITE STANDARD