ID 2545

INTERPRETATION OF SEISMIC SURVEYS

CONDUCTED IN PERMIT B. R 40.BL.

ADRIATIC SEA - ITALY

PHASE II - SEISMIC DETAIL

for

SUNLITE OIL COMPANY LTD.

by

INTERNATIONAL GEOPHYSICAL CONSULTANTS LTD.

Calgary, Alberta

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TABLE OF CONTENTS

	PAGE NO.
ABSTRACT	1
GEOLOGICAL CONSIDERATIONS	
General	3
Quaternary - Pliocene	4
Basal - Miocene Reflection	6
Cretaceous	7
RECOMMENDATIONS	7
APPENDIX I	
Seismic Velocities	
APPENDIX II	
Seismic Data Quality	
APPENDIX III	
Water Depths	
REFERENCES	

LIST OF ILLUSTRATIONS

Bound with text

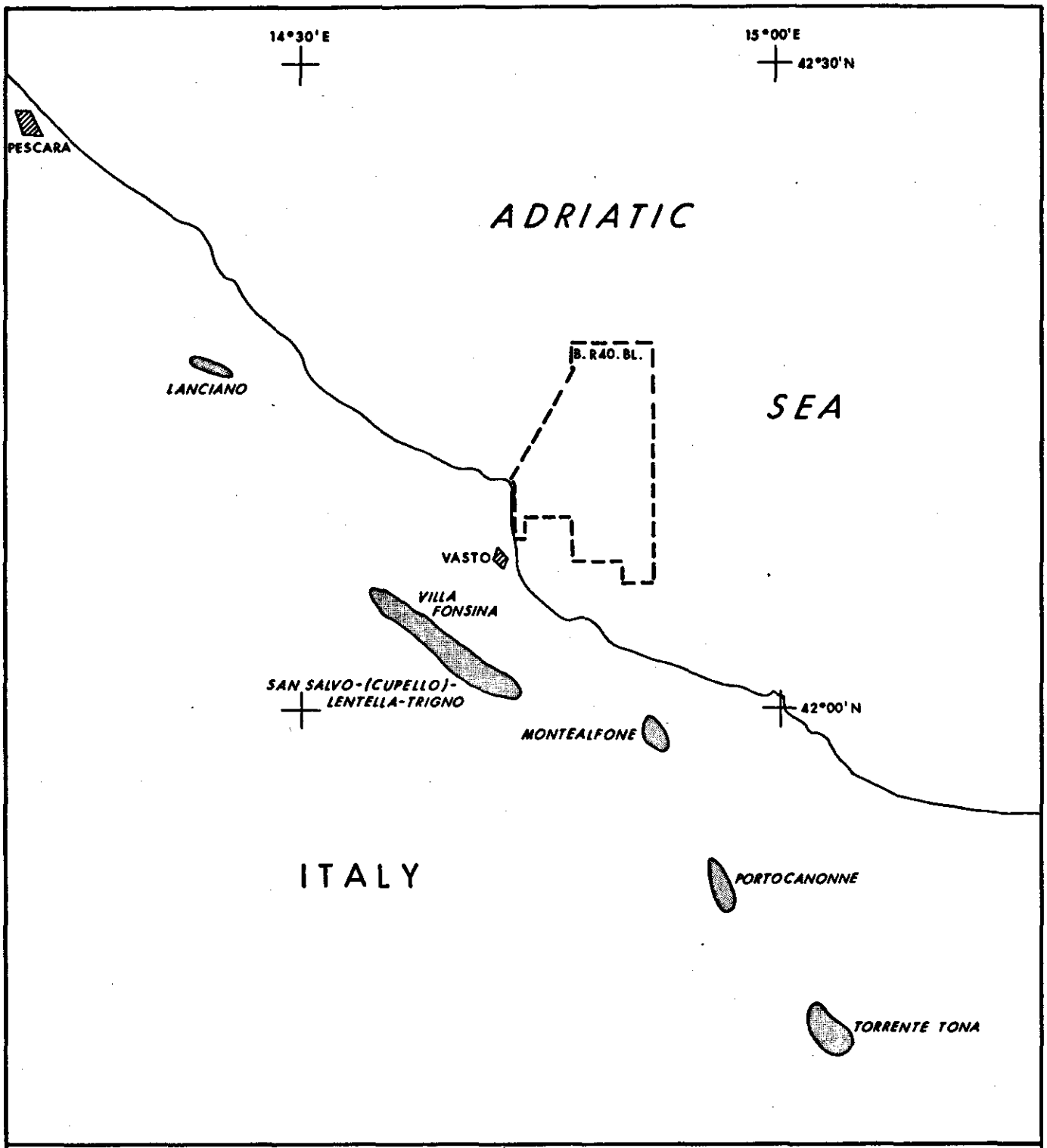
INDEX MAP	Figure 1
CROSS-SECTION A-A' (Line BBS-9)	Figure 2
TIME-DEPTH FUNCTIONS	Figure 3

Map Box

	Map No.
Water Depths	1
Horizon A (Phantom) - Within Quaternary (TIME)	2
Horizon B (Phantom) - Within Pliocene (TIME)	3
Horizon C - Base Pliocene (TIME)	4
Horizon D - Basal Miocene Unconformity (TIME)	5
Horizon E (Phantom) - Within Cretaceous (TIME)	6
Horizon A (Phantom) - Within Quaternary (DEPTH)	7
Horizon B (Phantom) - Within Pliocene (DEPTH)	8
Horizon C - Base Pliocene (DEPTH)	9
Horizon D - Basal Miocene Unconformity (DEPTH)	10
Horizon E (Phantom) - Within Cretaceous (DEPTH)	11

Reduced seismic record sections for

Lines 1, 1 ext., 2,3,4,5,6,7,8,9,
10,11,12,13,14, 16 with
mapping horizons identified.



LOCATION MAP
PERMIT B. R40. BL.
FOR
SUNLITE OIL CO. LTD.

DATE : AUG. 1972
FIGURE 1

GAS FIELD
SCALE-1:500,000

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ABSTRACT

An integrated seismic interpretation was made of current detail seismic data and data from a previous survey in Permit B. R 40. BL, Zone B, Adriatic Sea, Italy.

Five horizons were mapped in both time and depth. These levels are color-coded on the enclosed sections as indicated below:

Horizon A	:	Within Quaternary (Phantom)
Horizon B	:	Within Pliocene (Phantom)
Horizon C	:	Base Pliocene
Horizon D	:	Basal Miocene Unconformity
Horizon E	:	Within Cretaceous (Phantom)

In addition, a water depth map is submitted.

Within the Pliocene, the data do not show continuous seismic horizons and the resultant map, Horizon B, is a "Phantom Horizon."

A major fault, downthrown to the southwest, cuts across the southern part of the concession, with a structurally high trend existing immediately to the north of the fault. From this high trend, well-defined regional northeast dip is present to the northern concession boundary at all levels, broken up by irregular high and low features on the Basal Miocene Unconformity and deeper. South of this high trend, southwest dip is seen at the Pliocene level to the southern limit of shooting; except in the far southeast concession corner, where Line 11 terminated before definite southwest dip was established.

The critical direction of closure on the main trend is to the southeast, but all levels deeper than Quaternary show either some southeast dip closure, or closure against the major fault.

The shallowest mapping horizon, which we have called "Within Quaternary", shows continuous northeast dip throughout the permit, with a slight curvature of contours over the main structural axis.

The deepest level mapped, a phantom horizon within the Cretaceous, shows similar structure to the Basal Miocene Unconformity, but accentuated.

GEOLOGICAL CONSIDERATIONS

General

The closest gas field which has been publicly described is the Cupello-San Salvo gas field, located onshore 18 kilometers SSW of Permit B. R 40. BL. This field was brought in as a Pliocene-Miocene discovery in 1957-58. (Carissimo, et al).

Two types of traps are present in this field. The lower pool is in porous Miocene limestone, resting unconformably on the Upper Cretaceous. A cycle of erosion followed deposition of the Miocene lime, with Lower Pliocene being deposited on the Miocene erosion surface. The Lower Pliocene is entirely shaly, except for limestone breccia at its base, implying transgressional deposition.

Towards the end of the Lower Pliocene, significant normal faulting occurred in this area of Italy, resulting in horst and graben type structures. The Miocene pool in the Cupello-San Salvo field rests on one of these horst blocks, with the controlling fault downthrown to the northeast.

After another erosion cycle, Middle and Upper Pliocene and Quaternary deposition occurred as alternating sands and shales. The sands shale-out updip to the southwest, forming the second type of trap. A number of these interfingers of sand are productive. Contemporaneous to the sand-shale deposition, an allochthonous blanket, which gradually extended over the entire area of the field, was deposited from the west.

In studying the seismic data, particular attention was devoted to the section within several hundred milliseconds above the Basal Miocene Unconformity reflection, where Pliocene production would occur.

Quaternary - Pliocene

Three horizons have been mapped from the seismic data. No reflections are continuous for any appreciable distance, and the upper two horizons have been mapped as "phantoms".

Discontinuous seismic data are usually caused by one of two factors; either reflections are weak and seismic noise intermittently obscures events which would carry under more ideal conditions; or the stratigraphy itself changes, causing reflections to come and go. In this case, it is believed that the discontinuous nature of the data truly represents beds which change laterally over short distances, either in facies or thickness.

Horizon A is believed to be within the Quaternary, based on its shallow depth in the southern part of the permit. This horizon shows continuous north east dip, with a slight curvature of contours over the main structural axis. Above this layer, all events dip more or less conformably to the northeast.

Horizon B, presumed to be within the Middle Pliocene, is of considerably more interest. This phantom shows a high trend lying immediately to the north of a major fault, downthrown to the southwest, which cuts the Basal Miocene Unconformity. The shape of this feature is very similar to the structural configuration in the Middle-Upper

Pliocene in the Cupello-San Salvo field, except that in Permit B. R 40.BL. the graben lies to the southwest of the structure rather than the northeast.

The PP-1 well, in the adjacent block to the west, lies along the high trend, while the VM-1 well lies on its northern flank. The log from the VM-1 well was not available for study when the seismic interpretation was made, but it is reported that non-porous sands were encountered.

Seismic data at the Horizon B level are of a discontinuous nature, indicating that the geologic column in the Middle Pliocene consists of an alternating sand-shale sequence, with many local variations in thickness of the individual members. From the clarity of the data, allochthonous material does not appear to be present within the permit area.

Horizon C is either Base Pliocene or within the lower Pliocene. This event, which is only slightly shallower than the Basal Miocene Unconformity, does not show the irregular shape in the northern part of the permit which are shown by the Basal Miocene Unconformity and Cretaceous horizons, because most of the irregular "low" areas seen on the Basal Miocene Unconformity were locally filled before deposition of the "C" formation. The infilled material can be seen readily on Line 1 ext.,Shotpoints 40 to 45, and Line 16, Shotpoints 45 to 55, immediately above the Basal Miocene reflection.

Basal Miocene Reflection

The most outstanding seismic event occurring on the data is a reflection representing a pre-Tertiary erosion surface, identified in mapping as the Basal Miocene Unconformity.

A well-defined major fault exists at this level in the southern part of the prospect, downthrown to the southwest. In the south-eastern corner of the permit, the fault splits into two faults, with the more major in the north and a fault of lesser magnitude in the south. The major anticlinal trend follows the northern, upthrown, side of the fault system.

A subsidiary anticline trends in a northeast direction from the main trend, roughly following Line BBS-9. There is a culmination along this trend at Shotpoint 40, Line BBS-9, which could be prospective in the Mesozoics, but does not offer attractive Tertiary possibilities because the lowermost stages of Pliocene deposition have buried the feature under regional northeast dip. The trend is either an old Pre-Tertiary feature, with no Post-Cretaceous movement, or an erosional remnant.

On the initial seismic program submitted to Western Geophysical, an additional NW-SE line was requested south of Line BBS-14 to tie in all data south of the fault. This line could not be shot because of shallow water, and the line-to-line correlations south of the fault are uncertain.

Cretaceous

No continuous reflections can be mapped below the unconformity and the horizon presented is again a "phantom". In this case, however, the discontinuous nature of the data is believed due to weak seismic reflections being over-ridden by noise, rather than the discontinuous quality of the geologic strata themselves. Also, we can say with a high degree of certainty that faults are present which have not been detected because of the weak seismic data. The map must be considered only marginally valid because of poor data quality.

No evidence is seen on the seismic data for Cretaceous subcrops against the unconformity. Structurally, the "E"-level shows similar configuration to the Basal Miocene Unconformity, but accentuated.

RECOMMENDATIONS

Interpretation of the data shows that the PP-1 well has been located down-plunge on a long Pliocene high associated with a Mesozoic horst block. Since the PP-1 well has been reported to be a marginal gas producer, and the VM-1 well is reported to have tight Pliocene sands*, a Pliocene gas accumulation may be present between the two wells.

The Pliocene gas play is partly stratigraphic, since little is known of local porosity variations in the Pliocene sands. The best location for an initial wildcat test is at Shotpoint 16, Line BBS-10.

* Personal communication from Mr. Lazlo Sikabonyi, 1970, undocumented.

This point is very slightly to the north of the structural axis at the "B" level, but is axial on all deeper horizons. Additionally, it lies at the intersection of the major NW-SE trend mapped at all levels and the Pre-Tertiary trend extending roughly along Line BBS-9. Water depth at this point is 56 feet. ~ 18 mt.

No additional seismic work is recommended to further define the Tertiary beds or Basal Miocene Unconformity. However, if future advances in seismic data acquisition or processing will permit better definition of the Pre-Tertiary section in the area, then additional seismic work may be considered to evaluate Mesozoic possibilities.

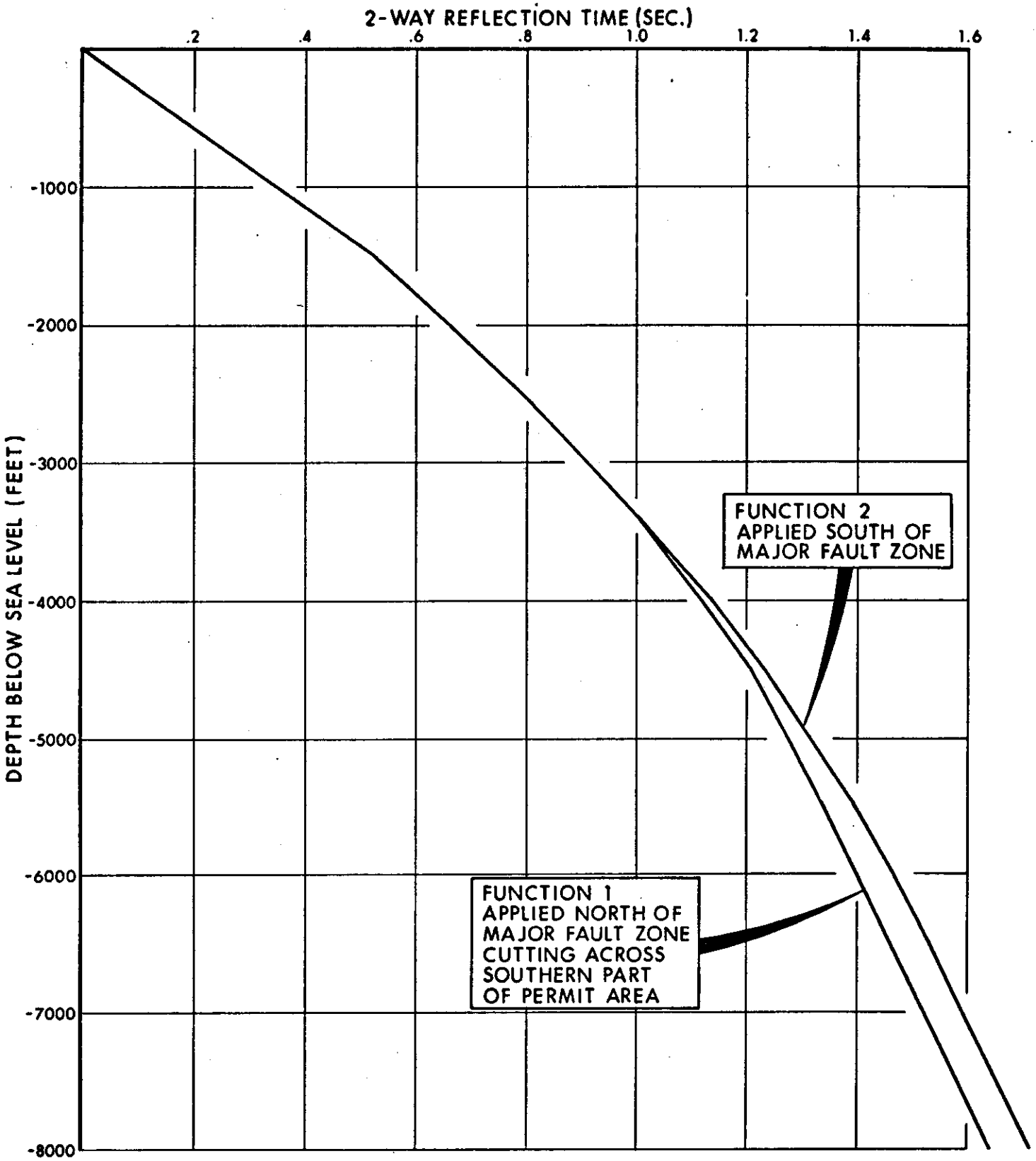
John Pflueger

September 25, 1972.

APPENDIX I

Seismic Velocities

The time vs. depth curves used to convert the time maps are shown in Figure 3. Velocities used to construct this chart were determined from the velocities used for data processing on the most recent survey. Before application of the velocity function, the water layer was replaced by material having a velocity of 6000 ft./sec.



TIME DEPTH FUNCTIONS
ADRIATIC ZONE B - PERMIT B. R40. BL
FOR
SUNLITE OIL CO. LTD.

DATE: AUG. 1972
FIGURE 3

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APPENDIX II

Seismic Data Quality

Three other seismic surveys extend into the area, as follows:

1965 ELF (shot by CGG)
1967 ELF (shot by CGG)
1967 AGIP (shot by GSI)

Data from these surveys were used in a previous study (Pflueger, 1970), but have not been included in the current interpretation because of their inferior quality. ?

Two surveys were integrated into the submitted report, the most recent survey, by Western Geophysical Co. of America, totalling 74 miles, and the 1970 Blue Star survey, by Geophysical Service International, 36 miles.

Although both sets of data are adequate, the GSI sections are superior, probably through better processing techniques. The seismic sources were also different, but we do not believe this had a significant effect on the final data.

Western used an array of EPR propane-oxygen sleeve exploders as the seismic source, with 2 x 2400% processing, deconvolution before and after stacking. GSI used airguns for energy, with 2 x 1200% processing, deconvolution after stacking only.

A correction of -.020 seconds was applied to the GSI data to correct to the Western data.

APPENDIX III

Water Depths

A bathymetric map is presented as Map 1, contoured in feet.

The sea floor slopes gently to the northeast, reaching a depth of 280 feet at the northeast corner of the permit. At Shotpoint 16, Line BBS-10, water depth is 56 feet.

REFERENCES

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"Petroleum Exploration by AGIP MINERARIA and New Geological Information in Central and Southern Italy from the Abruzzi to the Taranto Gulf"; from Proceedings World Petroleum Congress, pps.267-289, year unknown.

Pflueger, J.;

"Interpretation of Seismic Surveys conducted in Permit 137, Adriatic Sea - Italy"; for Blue Star Petroleums Ltd., 1970.