Return original before **May 15, 1988** to Technical Program Chairman Donald L. Paul, SEG 1988 Annual Meeting, P.O. Box 702740, Tulsa, OK 74170-2740; or street address: 8801 So. Yale, Tulsa, OK 74137.

Title The Seismic Stratigraphy and Facies of a Transitional Continental Rise, Offshore Ireland

Author(s) and company affiliation D. Bradford Macurda, Jr. and H. Roice Nelson, Jr.

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SUMMARY

The continental rise in Porcupine Basin, offshore Ireland, is a product of a complex association of sedimentary processes. Interactive seismic stratigraphic and facies analysis of these deposits in present water depths of 600 to 1500m has established the relative role of each process.

The eastern quarter of the continental rise is dominated by submarine canyons which originate in the rise itself. The east-central portion of the rise was deposited by distal turbidites. A large gravity slide dominates the westernmost quarter of the basin. A large submarine fan prograded into the west central part of the rise from the north.

Dewatering has caused faulting which extensively disrupts the continuity of the reflectors in the central portion of the basin. No single process can be invoked to explain the origin of the rise. Lithofacies predictions and potential reservoir, source, or seal properties must be based upon an understanding of the role of each process in time and space.

INTRODUCTION

The continental rise is a transitional environment at the base of the continental slope. Here one finds both erosional and constructional features. The relative roles of downslope transport versus horizontal contour currents or vertical settling from suspension are important in evaluating the sand prone nature of deep water sediments. The continental rise of the north-central Porcupine Basin, Offshore Ireland is an example of the wide variety of processes which operate in this environment. Seismic stratigraphic and facies analysis of this environment has established the relative role of these processes.

CONTINENTAL RISE SEDIMENTATION

The Plio-Pleistocene sediments in the north-central portion of Porcupine Basin exceed 800 milliseconds in two way travel time (greater than 1200m). Present water depths range from 500 to 1500m. The Plio-Pleistocene is divisible into eight seismic sequences which display a wide variety of erosional and constructional features. The eastern part of the study area is dominated by a large submarine canyon system. The updip termination of these canyons is in the rise environment. They deepen downdip. The submarine canyons of the largest system merge downslope into a large central depression which has no known outlet. Large levies flank some of the canyons; the comparative length of the reflectors can be used to estimate stratal continuity. The occurrence of older erosional canyons within the Plio-Pleistocene emphasizes that retrograditional slope failure has been a recurrent process associated with regional lowerings of base level.

The western part of the study area is dominated by a large area in which there has been extensive downslope transport by gravity sliding. The reflectors steepen toward the head of the rotational fault scarp in the west. The fault surface extends 25km downdip. It effects an area over 20km in the strike direction. The downslope transport is accommodated at the toe of the slide by peculiar mounded deposits which if viewed in isolation, could resemble a submarine fan. Since there has been no sorting of these sediments by turbidity currents, the reservoir potential is poor and the features are a seismic pitfall.

Immediately east of the slide is a large mound, nearly 15km across, which downlaps to the east and west. Internally it's seismic facies suggest the distal portions of a submarine fan. The sediment source was to the north and transport was parallel to the basin axis. Little sediment was contributed to the Celtic Shelf to the east.

The diagenetic history of the Plio-Pleistocene is recorded by a series of keystone-shaped faults which converge at the base of the Plio-Pleistocene. They represent a series of faults caused by dewatering. They interrupt the continuity of the strata. At a reservoir scale this would cause a serious disruption of reservoir continuity. This type of phenomenon is common in deep-water sediments. The recognition of the disruption caused by the dewatering is critical in the proper processing of the seismic data, predicting the lithofacies, and estimating the sand prone potential of the sediments in the continental rise.

CONCLUSIONS

The fine grained sediments of the continental rise of north-central Porcupine Basin were a product of several depositional processes. Deposition was very episodic, probably a result of late Plio-Pleistocene sea level changes. Traction currents probably deposited most of the sediments. These resulted from unconfined turbidites or overflow from submarine channels. Large erosional and constructional channels routed sediments in

the eastern part of the basin. Sediments were transported downslope by gravity sliding in the west. A distal submarine fan prograded in from the north. Deposits were subsequently modified by extensive compaction. The continental rise is thus a product of the complex interplay of traction currents, slides, submarine canyons, submarine fans, and compaction. Each is dominant in a different area. The result is a complex mosaic of lithofacies and depositional environments.

FIGURE CAPTIONS

Figure 1. Large gravity slide in western part of Porcupine Basin.

Figure 2. Toe of large gravity slide in western part of Porcupine Basin.

Figure 3. Distal portion of submarine fan in west-central portion of Porcupine Basin.

Figure 4. Faulting caused by dewatering of Plio-Pleistocene sediments, east-central portion of Porcupine Basin.

Figure 5. Submarine canyon, eastern portion of Porcupine Basin.

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Program Information

Please list the authors in the order they should appear on the abstracts. Indicate with an asterisk **(*) which author will present the paper.**

Title of paper: The Seismic Stratigraphy and Facies of a Transitional Continental Rise, Offshore Ireland

Major subject area? Sequence Stratigraphy

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Areas of Professional Interest and Other Information: Seismic Stratigraphy, Seismic facies Analgsis, Paleontology, depositional processes, depositional environments, and the evolution of basins

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Poster Paper Questionnaire

This year, for the first time, an award will be given for the Best Poster Paper presentation at SEG's 1987 Annual Meeting in New Orleans. As part of the 1988 Technical Program, poster papers will be on display from Monday morning, October 31st through Thursday morning, November 3rd. Authors of these papers, however are required to be at their exhibits **only** during scheduled times (approximately 2½ hours) for presentation and discussion. Abstracts of poster papers are included in the Technical Program Abstracts volume.

To aid the committee in organizing poster paper sessions, please indicate your preference below.

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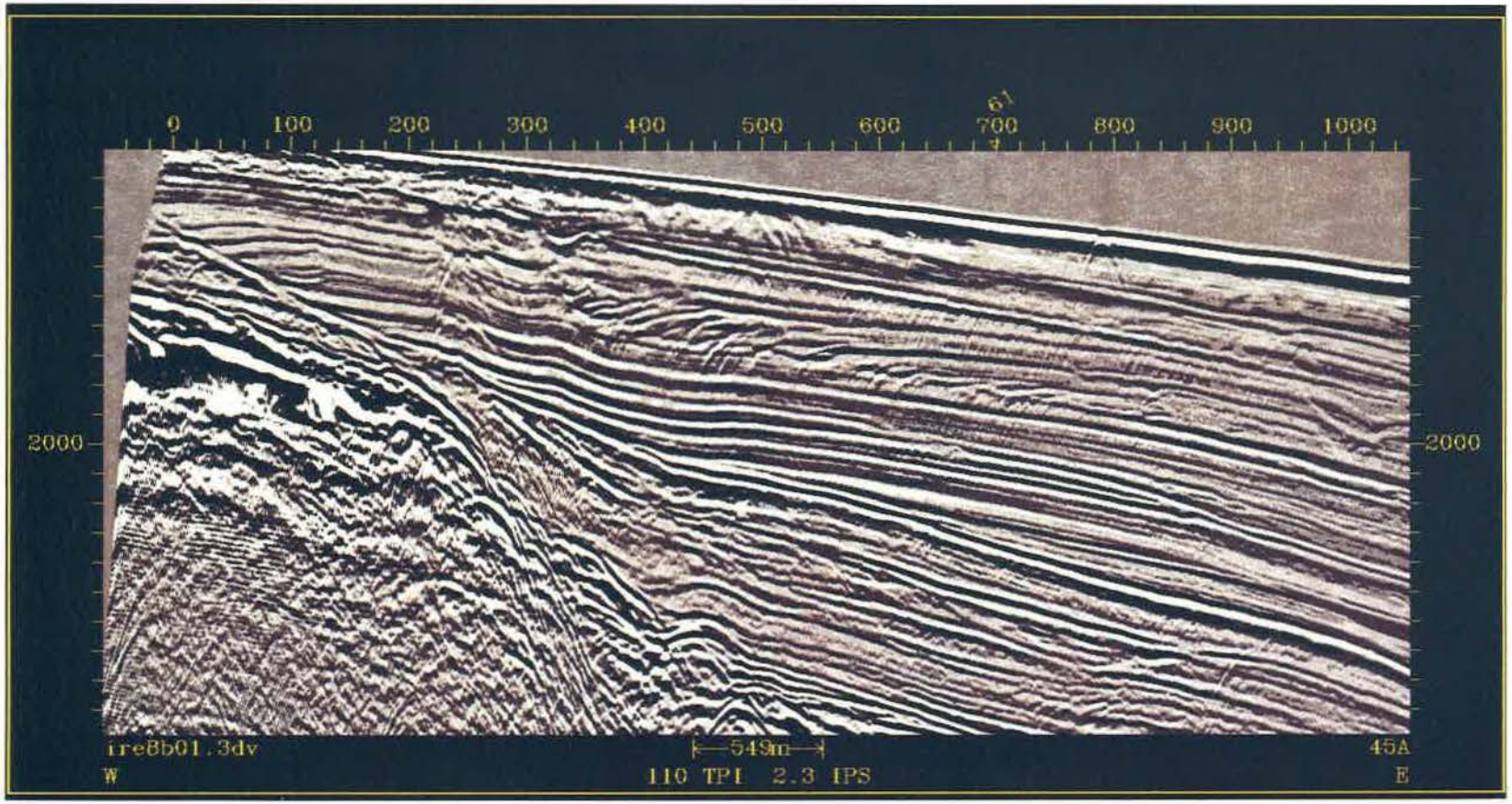
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FIGURE 1

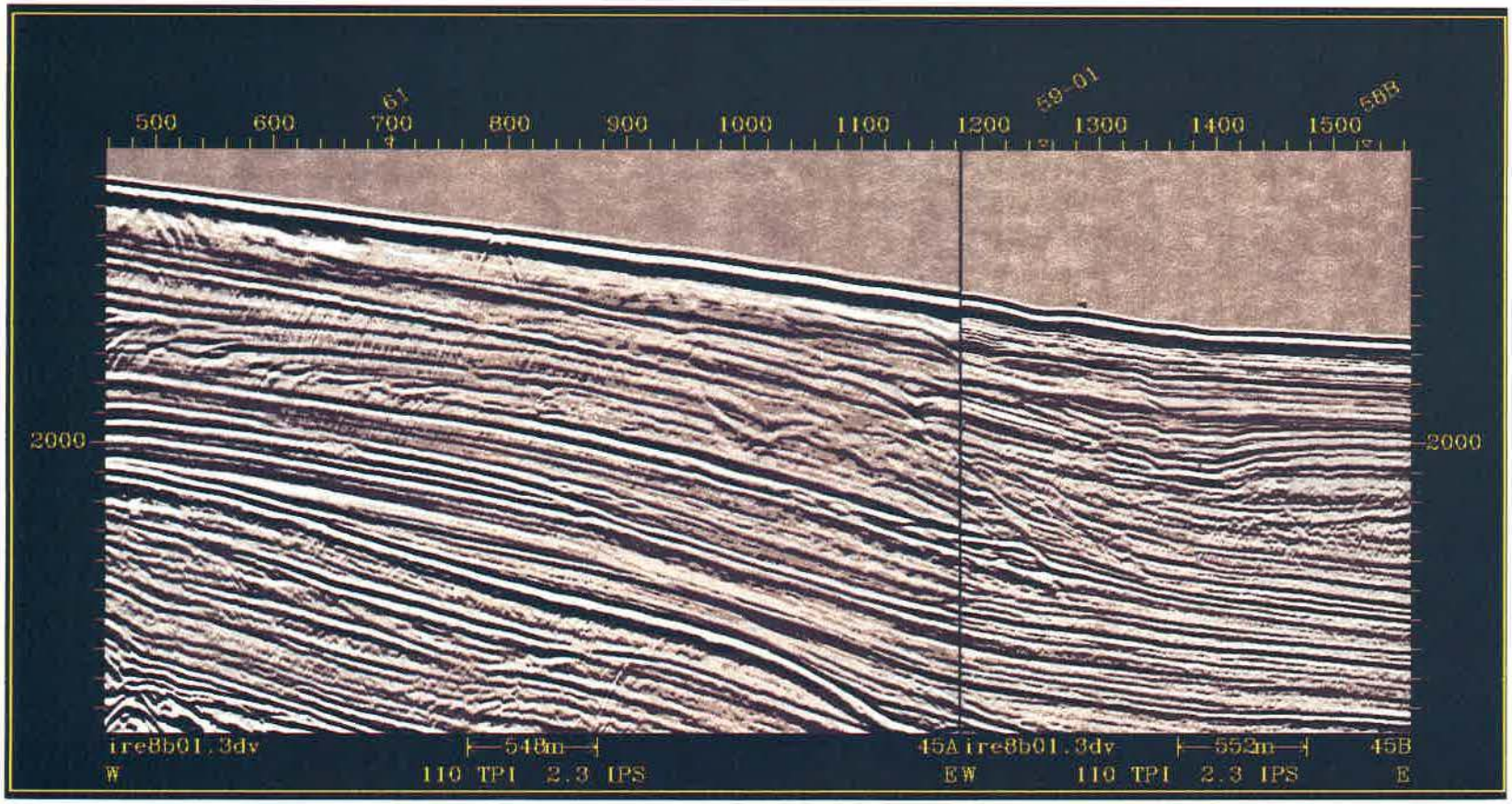
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FIGURE 2

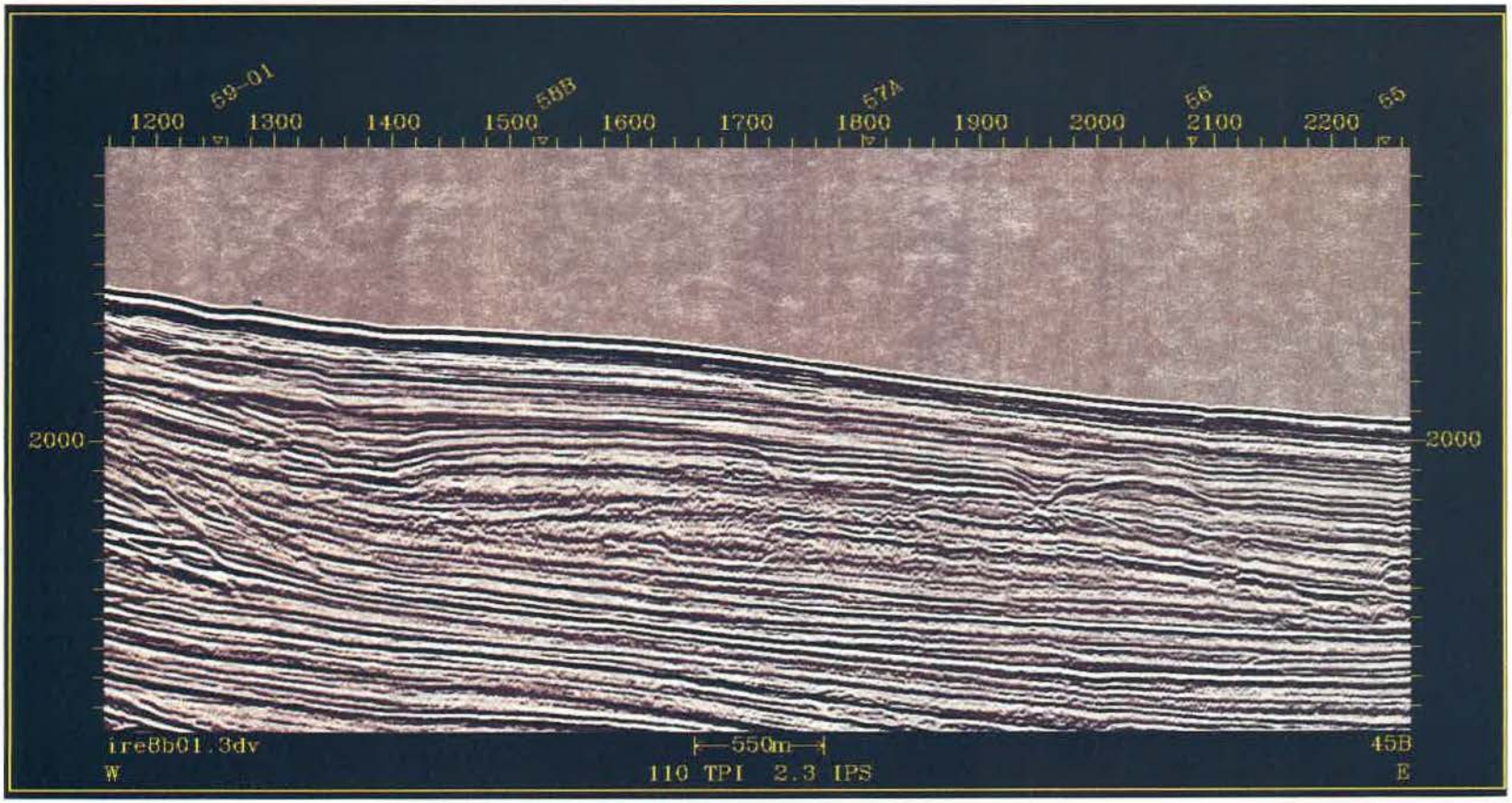
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FIGURE 3

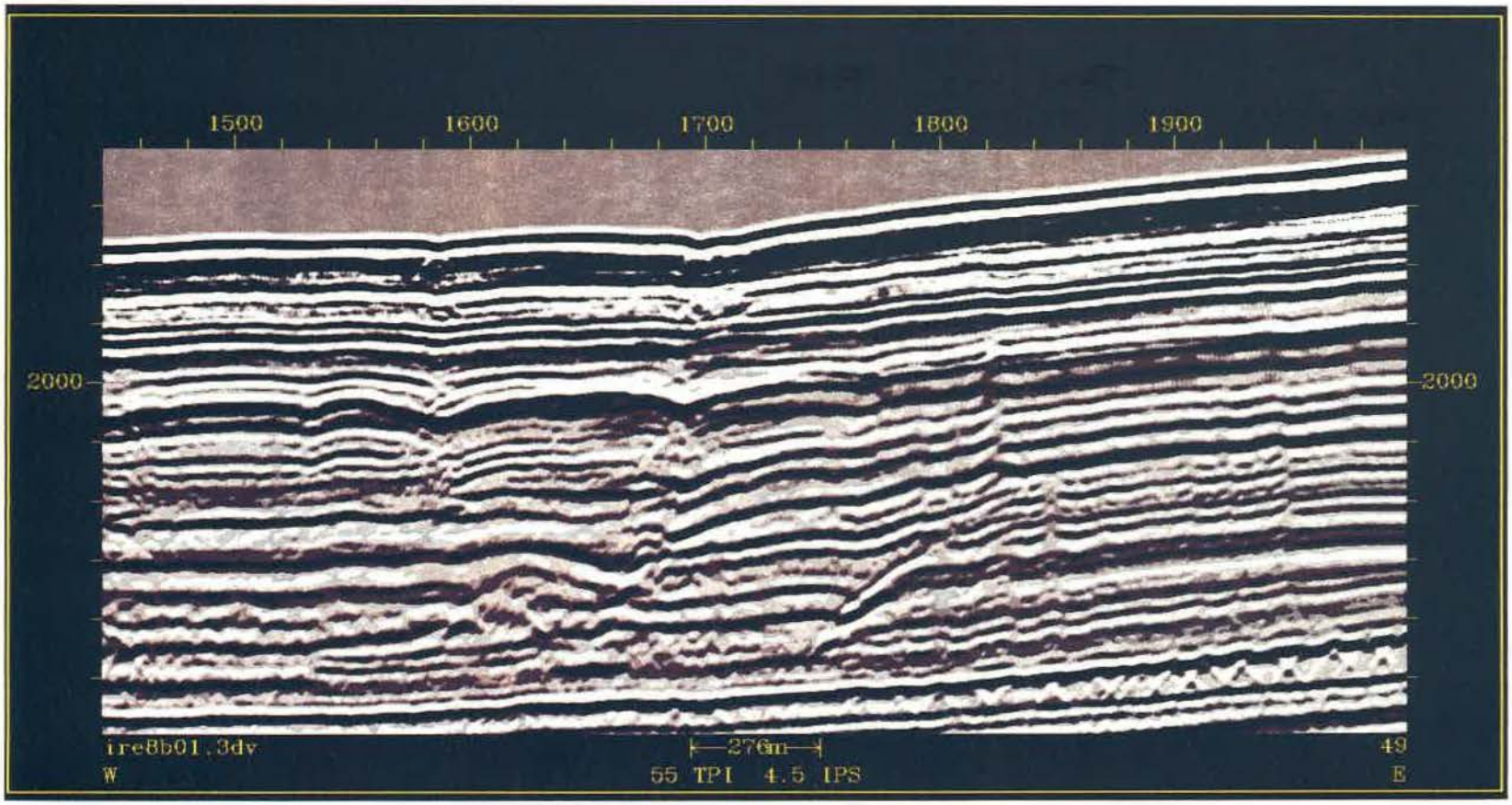
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FIGURE 4

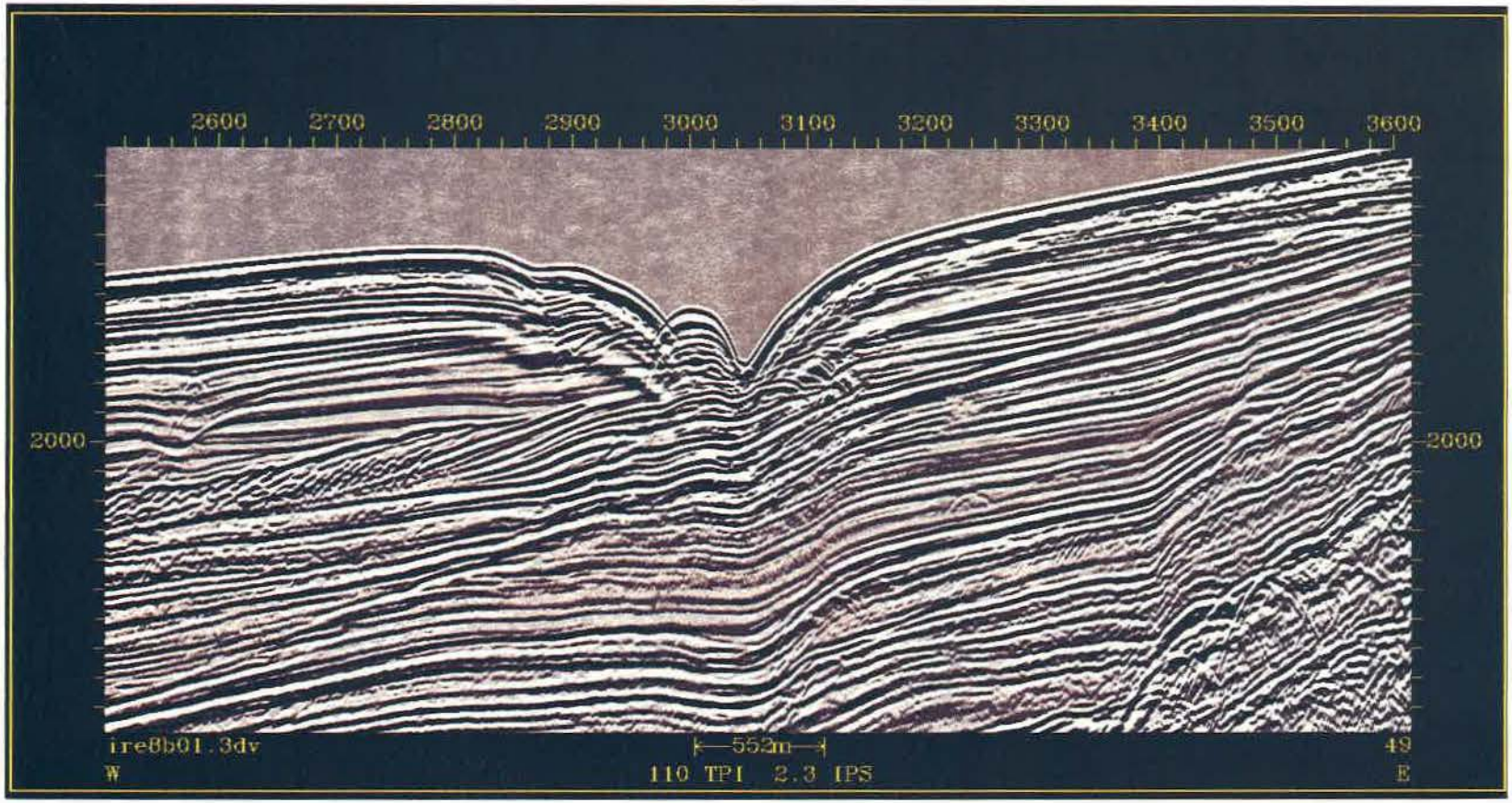
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FIGURE 5.