



P - 202

Reprocessing to Delineate Sub Surface Feature of Shahjahanpur-Amir Nagar Area of UP

Vinod Kumar¹, M.Singh¹, USD Pandey², Kunal Niyogi¹
vinod6kumar@ongc.co.in

Summary

Data acquired in Shahjahanpur- Amir Nagar area during Field season 1993-94 is having different type of acquisition problems like more number of reverse traces, improper offsets and predominant random/coherent noise affecting the processed out put. These lines were taken for reprocessing and efforts were made to rectify these anomalies which resulted remarkable improvement in the section.

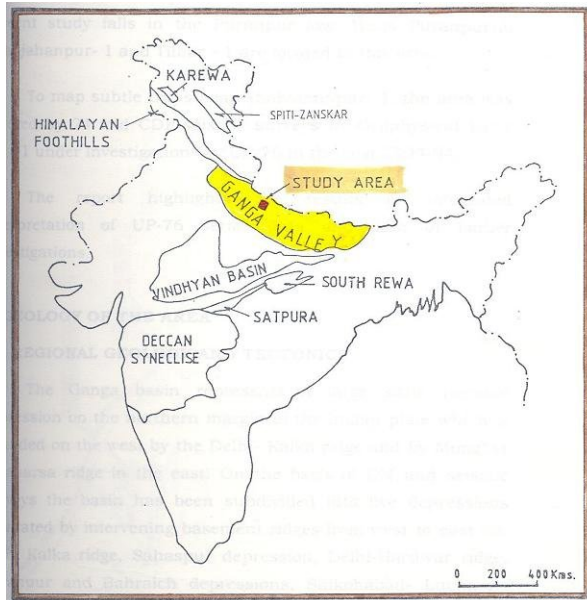


Figure: Index Map showing area of study

Introduction

Geophysical Party of Frontier Basins have acquired 24/48 fold data in Shahjahanpur- Amir Nagar area of Uttar Pradesh during field season 1993-94 with the objective to

map structure, fault closure and pinch out/termination of sand bodies.

The area of study is a part of Sarda depression of Ganga Basin. The Sarda depression is bounded by Chandausi ridge in the West and Faizabad ridge in the East. It is further divided in to Puranpur low, Sitapur low etc based on interpretation of geoscientific data.

The area of study falls in the Puranpur low. The Puranpur depression is considered to be more prospective for hydrocarbon with oil and gas shows in wells drilled. Exploration till date could not establish commercial oil accumulation. Reprocessing of few lines were taken up to delineate subsurface features to enable greater confidence to the interpreter.

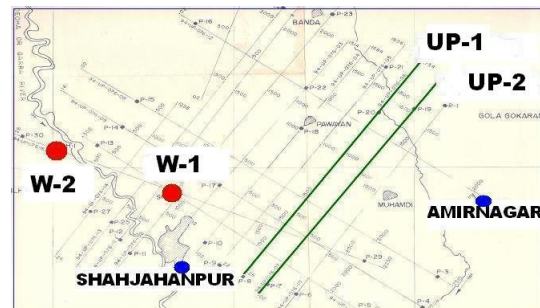


Figure: Location Map of the area

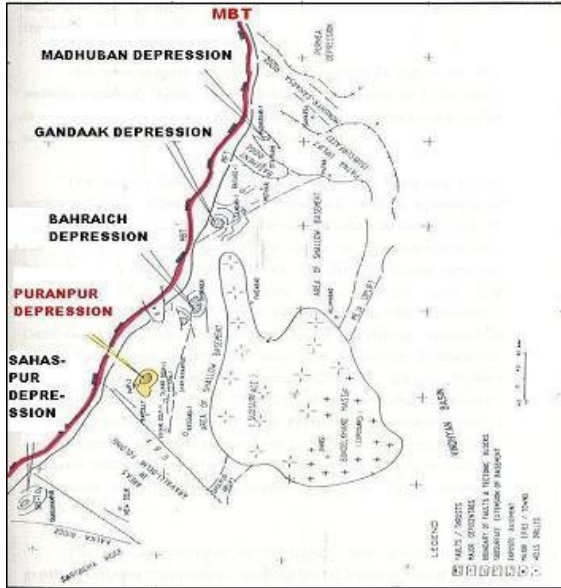


Figure: Tectonic map of the Ganga Basin

Brief Geology of the area

The Indo-Gangetic plain lies between two tectonic zones namely thrust and faulted Himalayas in the North East and ancient Deccan peninsula in the South and South East. The compressional stress that caused the uplift of Himalayas would naturally have caused the folding and faulting of the sediments in the basin. The basin has its strike parallel to the general trend of the Himalayas. The basement apparently dips towards North and North East. The Geological and Geophysical survey indicated that the Ganga Basin can be divided into four major sub basins viz. Sahaspur Depression, Sarda depression, Gandak depression and Purnea depression separated by Chandausi, Faizabad, Mongher-Saharsa subsurface ridges respectively.

The tertiary section in Puranpur depression forms a gently dipping homocline ranging in thickness from nearly 1800 m in the Shahjahanpur area to about 3200 m in the north near Puranpur area.

The area is covered by a thick blanket of alluvium. The nearest exposed rocks are Siwaliks in the north of Indo-Nepal border, Bundelkhand granitoid Massive and the Vindhya in the south west and south near Jhansi and Karauli.

Stratigraphy for wells drilled in Puranpur Low

	W-1	W-2
Formation	Depth(m)	Depth(m)
Alluvium	GL-430	GL-520
Upper Siwalik	430-990	520-755
Middle Siwalik	990-1709	755-1718
Lower Siwalik	1709-1843	-

Acquisition Parameters

a) Recording Parameters

1. Pre amp. Gains : 36 dB
2. Sampling rate : 2 ms.
3. Low cut filter : 12 Hz
4. High cut filter : 180 Hz
5. Notch : IN (50 Hz)
6. Record Length : 5sec.
7. Recording Format : SEG-B
8. Recording Density : 1600 BPI

b) Field Parameters

1. Shooting pattern: Symmetrical
Split-Spread
2. No. of Channels : 96
3. Foldage : 24
4. Group interval : 50 m
5. Shot interval : 100 m
6. Near offset : 200 m
7. Far offset : 2550 m

c) Source Parameters

1. Source type : Dynamite
2. Charge size : 1.5 Kg
3. Shot hole depth : 30 m
4. Source Pattern : Single

d) Receiver Group Parameters

1. Sensor type : SM-4
2. Natural Frequency : 10 Hz

Data quality

The data quality in general is fair to good having predominant pre shot noise. The data is also found to be contaminated by spiky traces which were edited manually, affecting overall output quality.

An overall improvement in Seismic imaging is achieved, but due to certain constraints of input data quality, desired improvement could not be achieved on some profiles. On



some profiles proper foldage is not achieved due to skipped shot points. A lot of cultural noise is present in the data deteriorating the data quality.

Preprocessing

Static Correction supplied by party was checked thoroughly and corrected where ever there was error in the calculation.

Most of the records were having appreciable number of noisy traces, reverse traces along with pre shot cultural noise. The presence of surface / near surface generated noises and cultural noises were found to affect the data. The dominant noise types identified in the area are:

- i) Ground Roll
- iii) Cultural Noise.

Manual editing was done to remove bad traces whose contribution was negligible. Reverse traces were identified and corrected for polarity. In some of the records the first break was not recorded correctly as shown in the figure. Efforts were made to correct the first break which resulted better alignment. Frequency analysis of raw data was carried out to optimize the broad band filter. A broad band filter was applied to suppress some of the coherent/random noise. These efforts improved the processed output.

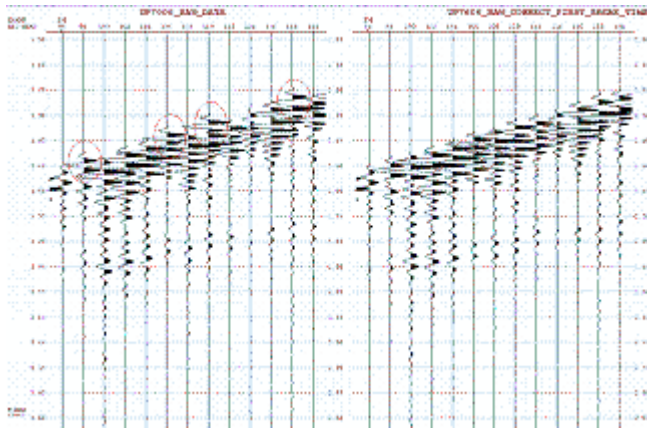


Figure: Recorded first Break Figure: Corrected first break

Data Processing

Reprocessing job was taken up with the objective to improve S/N of the data over earlier processed data. A comparison was made at each and every stage of processing. Intensive test processing was done to optimize the processing parameters. Interaction with interpreter helped in improving the processed out put. The processing steps along with processing parameters are given in table I.



Fig Post Stack Migration UP-1 (Earlier processed)

For comparison purpose Post Stack Migration was carried out along with Pre Stack Migration during reprocessing.

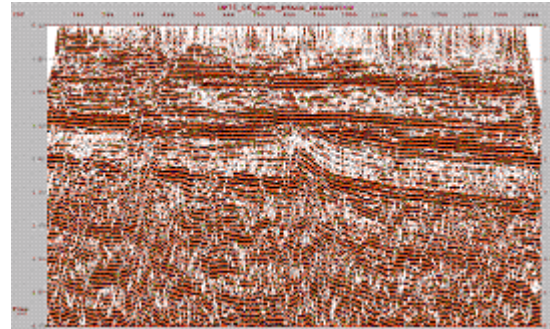


Fig. .Post Stack Migration UP-1 (Re processed)



Figure: Final Stack UP-2 (Earlier processed)

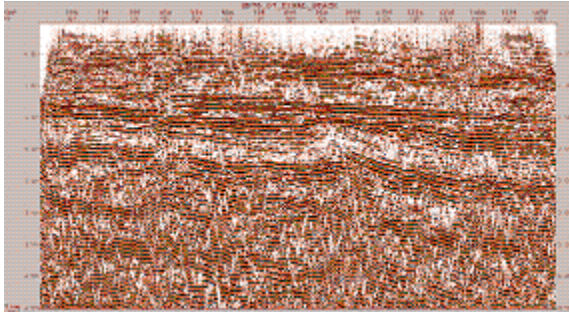


Figure: Final Stack UP-2 (Re processed)

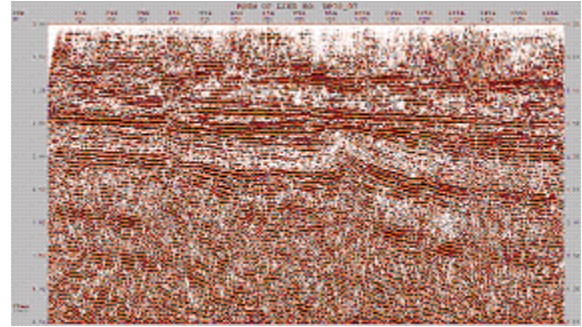


Figure: Pre Stack Time Migration UP-2 (Re processed)

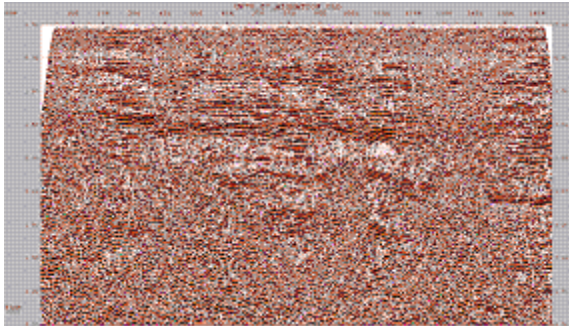


Figure: Post Stack Migration UP-2 (Earlier processed)

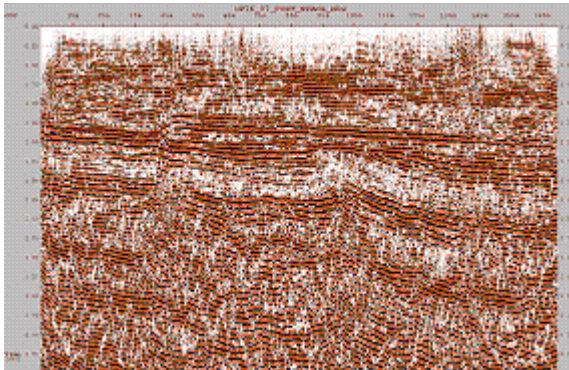


Figure: Post Stack Migration UP-2 (Re processed)

Table-I

Processing Work flow

1. SEG-Y to focus format conversion
2. Trace header update with spread geometry (Merging of seismic data with Geometry).
3. Field static application
4. Trace editing/polarity reverse of reverse trace – interactive
5. Spherical div. correction : $V=1$, $T=1.8$
6. Pre Stack Deconvolution : Predictive; Operator length 200 ms , Prediction Distance 12 ms, Pre whitening .01%
7. Trace Balancing
8. Trace editing – 2nd pass.
9. Velocity analysis at every 500 m
10. Residual static correction
11. Velocity analysis at every 500 m
12. Raw stack
13. Coherency
14. TVF
15. Final Stack
16. Post Stack Migration (for comparison)
17. Pre Stack Time Migration



Conclusion

Conditioning of data, manual editing, correction in first break, correction in polarity, velocity analysis at closer interval and fine tuning of processing parameters have resulted appreciable improvement in the processed output and the same was appreciated by the Basin Manager of Frontier Basins. The efforts put during processing have resulted out put where interpreter has greater level of confidence fulfilling the objective of reprocessing.

Acknowledgement

The authors place on record their sincere thanks to Director (E), ONGC for his kind permission to publish this work. The authors also express their sincere gratitude to Shri S.K Das Group General Manager, Head GEOPIC for kindly consenting for this project and for his keen interest in the project. Thanks are also due to all the members of frontier Basin group for fruitful discussion and suggestions for improvement of processed out put.

Views expressed in this study are solely of the authors only and do not necessarily reflect the views of ONGC.

References

A G Pramanik et al (1996): Ganga Basin -Geologic Evolution and Hydrocarbon Prospectivity

Dr.S.K Das, Rakesh Kumar (2000) -Integrated Geoscientific evaluation of tertiary and pre tertiary sequences in Sarda Depression, Ganga Basin.

J.S Hansi et al (1998)-Integrated Interpretation of Geophysical and Geological data Shahjahanpur-Amir Nagar- Singhi area UP,Ganga Basin.