Egyptian Geophysical Society
EGS Journal, vol. 4, No. 1, 43-55 (2006)

RESERVOIR 3D SLICING AND CUT OFF OF ABU ROASH PAY ZONES IN TIBA AREA, NORTH WESTERN DESERT, EGYPT

M.M. Gadallah *, T.E. Heiba, **, N.H. El-Gendy, **, E.A. El-Hangour, **

* *Geology Dept., Faculty of Science, Zagazig University.*
** *Geology Dept., Faculty of Science, Tanta University.*

قطف وتشريح ثلاثي الأبعاد لنطاقات أبورواش الخازنة بمنطقة طيبة، شمال الصحراء الغربية، مصر

الخلاصـة: استخدام الطرق العادية لتمثيل المعاملات البتروفيزيائية في بعدين لاتعطي فكرة جيدة لفهم خواص الخزان الغير متجانس ومتعدد الطبقات. هذه الطرق العادية لم تشارك بصورة جيدة في تحديد امتداد الخزان ومقدرته علي صيد البترول. إن تمثيل الخزان في الأبعاد الثلاثة يساعد في تقديم صورة واضحة ودقيقة لمواصفات الخزان بما يدعم رؤية الجيولوجيين ومهندسي الأنتاج في تحديد مواقع جديده لحفر آبار منتجة.
تم استخدام طريقة Linear interpolation لإضافة قيم جديدة بناءا علي القيم المعلومة السابقة واللاحقة لهذه القيمة في التدرج المنتظم وذلك لرسم الشكل ثلاثي الأبعاد. يهدف هذا البحث إلي دراسة خواص خزان نطاقات أبورواش المنتجة في منطقة طيبة بالصحراء الغربية في الأبعاد الثلاثة. لقد أوضحت نتائج دراسة القطفات والتشريح ثلاثي الأبعاد للخواص البتروفيزيائية لنطاقات أبورواش وجود الهيدروكربونات بكميات معقولة بإتجاهات الجنوب الشرقي والجنوب والغرب لمنطقة الدراسة.

ABSTRACT: *Conventional presentation of the petrophysical parameters in 2D can not elaborate understanding the characterization of highly heterogeneous and multilayered reservoirs. Consequently, these conventional methods do not precisely contribute towards a better understanding of the reservoir continuity and hydrocarbon trapping mechnism. Reservoir 3D-slicing offers a clear insight scanning and a good explanation of reservoir behavior. Therefore, it gives excellent information for geologists and production engineers to determine where they can drill the exploitation wells. 3D block reservoir is drawn using linear interpolation. Linear interpolation is used to estimate values of unknown points to cover the plotted area.*
The objective of this paper is a study of the reservoir characteristics of Abu Roash pay zones in Tiba area, north of Western Desert in three dimensions. The results deduced from the interpretation of the reservoir slicing and cut-offs of the studied petrophysical parameters indicate that the hydocarbons are found in considerable quantities at the Southeast, South and West directions.

INTRODUCTION

The study area is located in the northeastern part of the Western Desert, between latitudes 29° 40̀ and 30° 25̂ N and longitudes 29° 15̂ and 30° 25̂ E, east of Qattara Depression. It covers about 8695 Km^2. (Fig.1). Well log data are used in consequence steps to evaluate the hydrocarbon potentialities of Abu Roash Formation.

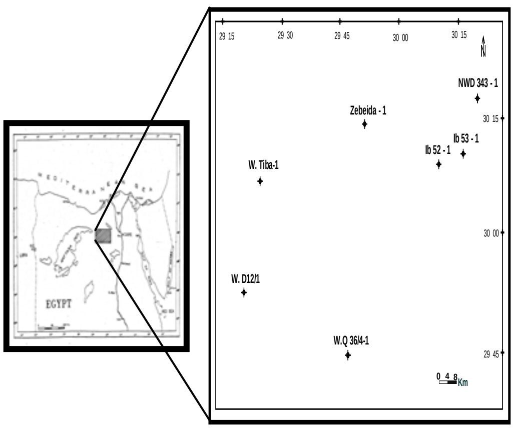

Fig (1) Location map of the studied wells, Tiba area, North Western Desert.

The study wells are W.D 12-1, W.Tiba-1, Zebeida-1, NWD343-1, Ib52-1, Ib53-1 and W.Q 36/4-1 wells. The available well log data are dual laterolog, microspherically focused log, gamma ray, density, neutron, sonic, caliper and composite logs.

The stratigraphic column of the north Western Desert is thick and includes most of the sedimentary succession from Pre-Camberian basement complex to Recent. The interested horizon in this paper is Abu Roash Formation (Fig. 2). Abu Roash Formation is mainly a sequence of limestones with interbeds of shales and sandstones. It conformably rests on Bahariya Formation. It has been divided into seven units "A" to "G", "A" being the highest. Units "B", "D" and "F" are relatively clean carbonates, while units "A", "C", "E" and "G" contain variable amounts of detrital material. Abu Roash Formation in Tiba area is represented by the members from A to G. In the study area, the thickness of Abu Roash Formation varies from the maximum value of about 3658 ft. in well W.Q 36/4-1 to the minimum one of about 1219 ft. in well W.Tiba-1. The aim of this paper is to analyze the collected well log data of Abu Roash pay zones in Tiba area, to use the geostatistical technique (Linear interpolation) to construct the 3D reservoir model for clear insight picture of the petrophysical characteristics of Abu Roash reservoir, to clarify the variation of the reservoir parameters in the three dimensions and to give a better understanding about petroleum exploration, production, management and development.

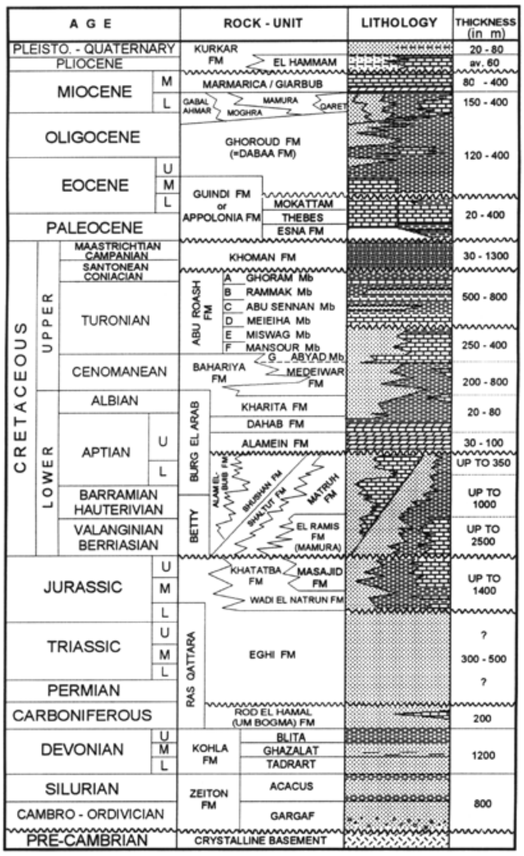

Fig (2) Generalized Litho-Stratigraphic Column of the Northern Western Desert

METHODOLOGY

The available well log data are the wireline logs which involve, the logs of gamma-ray, spontaneous potential, resistivity (Dual laterolog and Microspherically Focused Log), neutron, density and sonic. These well logs are digitized by converting field analog prints into digital data, data gathering in one file, data confirmation, environmental corrections, and data base normalization. After that well log analysis are carried out using LOGANAL program.

Shale volume (V_{sh}) is used to estimate the shale effect on log responses and, if needed to correct them to the clean formation responses. Numerous methods have been developed to indicate the presence and to estimate the content of shale. The used method in this study is gamma-ray method. The

Dresser Atlas, 1979 equations are used to calculate shale volume as follows;

$I_{GR} = (GR_{log}-GR_{min})/(GR_{max}-GR_{min})$

and $V_{sh} = 0.33\ (2^{2*IGR}-1)$

porosity logs are affected differently and independently by shale, lithology and hydrocarbons in pores spaces. Consequently total porosity can be calculated from different porosity logs (sonic, neutron and density) as follows,

$\phi_s = (\Delta t_{log} - \Delta t_{ma})/(\Delta t_f - \Delta t_{ma})$,

$\phi_n = \phi$

$\phi_d = (\rho_{ma} - \rho_{log}) / (\rho_{ma} - \rho_f)$

while the effective porosity is calculated using this equation;

$\phi_e = \phi_t - (V_{sh} * \phi_{sh})$.

The water saturation of the studied formation is determined using Archie, 1942; Poupon and Leveaux, 1971; and Clavier et al., 1977 models. The hydrocarbon saturation (S_h), movable and residual hydrocarbons are calculated according to these equations;

$$S_w + S_h = 1, \quad S_h = S_{hr} + S_{hm},$$

$$S_{hr} = 1 - S_{xo}, \quad \text{and} \quad S_{hm} = S_h - S_{hr}$$

The net pay thickness determination is calculated using these cut offs (more than 10% effective porosity, less than 35% shale volume and less than 50% water saturation). The bulk pore volume is calculated using equation of Petcom, 1997 (BPV $=\phi*$ h), while the oil in place indicator is calculated using this relation of Petcom, 1997 OIP = BPV *(1-Sw).

METHOD OF INTERPOLATION

Interpolation is the process of adding new values (at gridded or destination points) based on known values of the surrounding points (at control or source points). Interpolation is the process of estimating values at a set of points that are arranged in a regular pattern (3D matrix) which completely covers the studied area or reservoir model.

Linear Interpolation is calculating the missing values by using the first and last valid values. It finds the values in the destination zone based on their location within the cells of the source zones. The value is linearly interpolated to the destination data points using only the data points at the vertices of the cell (or element) in the source zone(s).

The following options are available:

Source Zones: Select the zone or set of zones to interpolate from (that is, the zone(s) with the source data). In the 2D Cartesian plot type, these zones must be IJ-ordered or FE-surface. In the 3D Cartesian plot type, the source zones must be IJK-ordered or FE-volume.

Variables: Select the variables to interpolate. By default, all variables (other than those assigned to the X-, Y-, and Z-axes) are interpolated. Interpolating fewer variables can speed up the process.

Destination Zone: Select the zone to interpolate into. This zone may be of any structure type including I-ordered. Except for the variables assigned to the axes, data in the destination zone will be overwritten.

Outside Points: Select what to do with points that lie outside the source-zone data field. Two options are considered:

Constant: The default sets all points outside the data field to a constant specified value.

Do not Change: Preserves the values of points outside the data field. Do not Change is appropriate in cases where one interpolation algorithm inside the data field, and another outside it are used.

Constant Value: Enter the constant value to which all points outside the data field are set. This value is enterable and used only if outside points is set to constant.

When you click compute, Tecplot interpolates values for every variable except the X-, Y-, and Z-coordinate variables. If this is not what you want, you may use the variables menu to select the specific variables to interpolate. You cannot, however, interpolate the X-, Y-, and Z-coordinate variables since these are used to determine locations used in linear interpolation. Linear interpolation ignores the IJK-mode of IJK-ordered destination zones. All data points in the destination zone are used in the interpolation. The IJK-mode of the source zone(s) must be volume in the 3D Cartesian plot type.

Linear interpolation is an approximating function value $f(x)$ with $x1<x<x2$ from the known function values $f(x1)$ and $f(x2)$. The process can be expressed according to the following equation (Davis, 1986):

$$f(x) = ((x2-x)f(x1)+(x-x1)f(x2))/(x2-x1)$$

When only the values at the interpolation nodes x1, x2,…..xn. Apiecewise linear function can be defined by interpolation.

RESERVOIR 3D SLICING

The geophysical conventional presentation of the petrophysical parameters such as the two dimentional methods can't elaborate understanding the characterization of a highly heterogeneous and multilayered reservoir. Consequently, these conventional methods don't precisely contribute towards a better understanding the reservoir continuity and hydrocarbon trapping mechanism. On the other hand, the 3D-slicing illustrates the change of the petrophysical parameters in three dimensions; X, Y & Z. So, the 3D-slicing tomography overcomes these problems for the shale volume, effective porosity, net pay thickness, formation water saturation, total, residual and movable hydrocarbon saturation, bulk pore volume and oil in place. It offers a clear insight scanning and a good explanation of the rapid changes in the reservoir behavior. Therefore, it gives excellent information for production geologists and engineers to determine where they can drill. However, the reservoir 3D slicing & cut-offs are used to obtain the imaging reconstruction of the reservoir characterization clarifying the change of the petrophysical property in three dimensions X, Y, Z. This property is achieved through interpolation method.

The final result of interpolation of the reservoir parameters, in the three dimensions X, Y and Z, is constructed of 3D-model for each parameter. Each of these models gives an additional insight to the data. It may be helpful to color these models or use a gray-scale effect. The model is illustrated on a cartesic coordinate system with X, Y and Z axes. The north direction is represented in the direction of Y-axis. The 3D-slicing of the generated models and varying degrees of cut-offs are used to show the variation and distribution of the studied reservoir parameters in varying modes and sets of planes. The first set is the vertical X planes showing the variation vertically parallel to the Z-axis and laterally parallel to the Y-axis. The second set is the vertical Y-planes, illustrating the variation vertically parallel to the Z-axis and laterally parallel to the X-axis. The third set is the Z planes showing the lateral variation in both the X and Y directions. The reservoir cut offs identify the favourable places for the selected cut off of the reservoir properties. The results of well log analysis parameters are tabulated. The interpretation of the reservoir tomography of the shale volume, effective porosity, net pay thickness, total hydrocarbon saturation, residual hydrocarbon saturation, movable hydrocarbon saturation and oil in place are explained for Abu Roash Formation as follows:

Reservoir Tomography for Shale Volume

Figure (3) illustrates the reservoir tomography for shale volume of Abu Roash pay zones in Tiba area. The exterior view of the reservoir (Fig. 3A) represents the outer faces; the top, the front and the left side faces. In the top face, the shale volume increases from the northeast to the westward, where the minimum and maximum values are 8% and 40%, respectively. In the front face, the maximum value (40%) is recorded in the northwest at the boundaries with the top face, while the minimum value (4%) spreads in the middle of the southern half. In the left side face, the highest value is 40% at the north portion of the face that it decreases gradually to 4% at the left center of the southern part of the face. Figure (3B) illustrates the change of shale volume with X-direction. It shows the general increase of shale volume from the right plane (VII) towards the left plane (I). The minimum value (4%) is common in all seven planes especially at the lower parts of these planes. The maximum value recorded in these seven planes is 40% at the uppermost of the plane (I). The variation of shale volume in Y-direction (Fig. 3C) portrays that the shale volume decreases toward the left, where the minimum value of 4% is common in the south of planes (I, II&III). Figure (3D) exhibits the vertical variation of the shale volume with Z-direction. In this figure, the minimum value of 4% is almost present at north and southeast of the planes (IV and VI). The maximum value (40%) is observed only at the west of the uppermost plane. The shale volume cut offs (Fig. 3 E, F, G&H) illustrate that the cut off value < 35 % is the prominent proportion allover the formation except apart of the western side of the top face. The shale volume of Abu Roash Formation is convenient for hydrocarbon potentialities.

Reservoir Tomography for Effective Porosity

The 3D-slicing of the effective porosity (Fig. 4) illustrates the reservoir tomography for effective porosity of Abu Roash pay zones in Tiba area, north Western Desert. In the top face, (Fig. 4A) it shows that the effective porosity increases from the north toward the south side, it begins from 5% up to the maximum value of 22 %. In the front face, the effective porosity values increase from the southwest (8%) to the center of the western side (26%). The variation of the effective porosity with X-direction (Fig. 4B) reflect the increasing of the values toward the eastern part of the reservoir (plane VI) in which the effective porosity reaches 24% and to the southern side of the other planes. The maximum value is 26% and the minimum value is 5%. Figure (4C) represents the change of the effective porosity with Y-direction. The maximum value (26%) is recorded in the western sides of the middle planes (planes; V, VI&VII) and at the eastern sides of planes (I, II, III and IV) in the upper parts. While the minimum value of 6% is widespread in the extreme southern half of the planes (I, II, III & IV). The vertical distribution of the effective porosity with Z-direction is exhibited in Figure 4D. The largest value (26%) is presented at the outer sides of the plane (III) and at the western side of the lower part of the third plane. Figures 4 E, F, G &H expose the effective porosity cut offs. The effective porosity > 10% exists allover the formation zones, except the western portion of the lower members. While the effective porosity >15% is prevailed in the middle zones in addition to a part of the upper zone. The high effective porosity from 20% to 26% is found in the dispersed zones in the middle part of the formation.

Reservoir Tomography for Net Pay Thickness

Figure (5) illustrates the reservoir tomography for net pay thickness of Abu Roash Pay Zones in Tiba area, north Western Desert. The variation of net pay thickness (Fig. 5A) represents the block diagram of the reservoir with the outer three faces; the front face, the left side face and the top face. In the front face, the net pay thickness of the reservoir increases gradually towards the south. The greatest thickness recorded at the south is 240 ft. In the left side face, the net pay thickness increases gradually towards the southwest corner with 240 ft. On the other hand, the net pay thickness of the top face starting with 30 ft. at the northwest and ending with 320 ft. at nearly the northeast part. The reservoir tomography (Figures 5B, C&D) portrays the variation of net pay thickness in three directions. Figure (5B) exhibits the change of net pay thickness with X-direction. The net pay thickness increases from 20 ft. at the left (plane I) to 120 ft. at plane (VI). In the middle; the net pay thickness decreases from 120 ft. at the plane (VI) to 20 ft. at the left (plane I). In the lower part; the net pay thickness increases from 120 ft. at plane (VII) to 200 ft. at the plane (I). The maximum value of net pay thickness is recorded at the bottom of the first plane while the minimum value is encountered at the top of the last plane. The variation of net pay thickness with y-direction is illustrated in Figure 5C. The net pay thickness increases from left to right. Figure (5D) shows the change of net pay thickness with Z-direction. The net pay thickness increases towards the top, where the highest values are recorded at the southeast direction (at the plane I) and towards the bottom with the high value at the southwest of the plane VII). The net pay thickness cut-offs (Fig. 5E, F, G & H) have been carried out by four degrees of cut offs 100, 150, 200 & 250 ft., respectively. The net pay thickness < 100 ft. represent the major proportion of the total net pay thickness and exists in the different intervals at the north, northeast and northwest of upper, middle and lower parts of the formation. On the other hand, the values > 100 - < 250 ft. are represented by low quantities at the eastern, southeastern, southern and southwestern sides of upper, middle and lower members of the formation. Finally, the greatest values of net pay thickness, which vary from >250 to 320 ft. form the very little proportion in the upper zone at the northeastern side of the studied formation.

Reservoir Tomography for Total Hydrocarbon

The 3D-slicing of the total hydrocarbon saturation (Fig. 6) reveals that the reservoir tomography for the total hydrocarbon saturation of Abu Roash pay zones in Tiba area. The total hydrocarbon saturation in the front face decreases from 80% at the upper to the minimum value of 20% at the southwestern direction. In the left face, the total hydrocarbon saturation increases from 20% at the lower part to 65% at the center of the southern direction. The total hydrocarbon saturation in the top face increases from 30% at the northeastern direction to 65% besides it at the extreme northeast direction. Figures 6B, C&D show the internal slices dissecting the model in the X, Y and Z-planes, respectively. With X-direction, the total hydrocarbon saturation increases from left (plane I) to right (planes IV, V, VI), reaching the maximum value of 80% at the upper parts of these planes. With Y-direction the total hydrocarbon saturation increases from right to left. While with Z-direction the water saturation increases from the second member from top with value of 20% to

80% at the northwest of the sixth member. The total hydrocarbon cut offs (Fig. 6 E, F, G & H) exhibit that the total hydrocarbon cut offs >50%-80% constitute considerable proportions at the northwest, southwest, south and southeast directions of the upper formation members and little amounts in only one zone at west to southwest ward of the middle part.

Reservoir Tomography for Residual Hydrocarbon

Figure (7) illustrates the reservoir tomography for residual hydrocarbon of Abu Roash pay zones in Tiba area. The exterior view of the reservoir tomography (Fig. 7A) shows the changes in the residual hydrocarbon by three faces, the front face, the left face and the top face. In the front face, the residual hydrocarbon increases from the southwestern corner with value of 5 % to 40 % toward the northeast direction. In the left side face, there is a random distribution of the residual hydrocarbon showing that the minimum value (5 %) is encountered in the lower part of the face. It increases slightly reaching (28%) at the center of the southern half of the face. The variation of the total porosity with X-direction (Fig. 7B) exposes that the residual hydrocarbon increases towards the right side of the reservoir (plane VII), where the maximum value is 43 % at the north of upper portion of plane (VII). On the other hand, the minimum value (5 %) is recorded in all planes except plane (VI). Figure (7C) shows the change of the residual hydrocarbon in Y–direction, where it decreases from the right (plane VII) to the left (plane I). The maximum value (43 %) is detected in the northeast of the plane (I), while the minimum value (5%) is recorded in the upper middle to lower parts of all planes. Figure (7D) illustrates the residual hydrocarbon variation in Z-direction. The residual hydrocarbon records its highest values at the plane (II) reaching the maximum value of 40 % at the eastern side, while the minimum value (5%) is presented allover the plane (VI). Figures 7 E, F, G & H display that the residual hydrocarbon cut offs <10% form minor amounts in the central upper part and western direction of the lower part. While the residual hydrocarbon between 10%-20% represents the major proportions in the western direction of the upper, middle and lower parts**.** On the other hand, the high percentage of the residual hydrocarbons (>40%-43%) displays little residual hydrocarbon amounts in some upper formation zones at the northeast of the internal corner of X-Y planes.

Reservoir Tomography for Movable Hydrocarbon

The 3D-slicing of the movable hydrocarbon saturation (Fig. 8) shows a general increase of the movable hydrocarbon saturation of the zones towards the north direction. Figure (8A) illustrates the exterior view of the reservoir; it represents the block diagram of the reservoir with the front, the left and the top faces. The movable hydrocarbon saturation in the front face decreases from 40% at the center of the uppermost part to reach the minimum value 12% at the east direction of the middle part. In the left face, the movable hydrocarbon saturation decreases from 40% at the center towards the west direction to reach 12% at the southern part. The movable hydrocarbon saturation in the top face increases from 4% at the northeast to 40% at the northwest direction. Figures 8B, C&D show the internal slices dissecting the model in the X, Y and Z-planes, respectively. With X-direction, the movable hydrocarbon saturation increases from right (plane I) to middle (plane IV), reaching the maximum value of 40% at the upper part of plane IV. With Y-direction, the movable hydrocarbon saturation increases towards the center and right planes. In Z-direction, the movable hydrocarbon saturation decreases from the plane (II) at the top to the plane (VI) at the bottom. The movable hydrocarbon cut offs (Figs.8E, F, G, & H) enables us to deduce that the dominating movable hydrocarbon saturation ranging from 30% to 45% at both the center and the west direction mostly in the upper part. On the other hand, the movable hydrocarbon cut off < 20% represents minor amounts at the northwest corner of the upper member and at lower part of the left face.

Reservoir Tomography for Oil-in-Place (OIP)

Figure (9) shows the reservoir tomography of oil in place indicator of Abu Roash pay zones in Tiba area. The oil in place indicator is represented by the prismatic form of the reservoir with three faces (Fig.9A); the front face, the left side face and the top face. The indicator of the front face ranges from 0 ft. to 15 ft. In the left side face, the indicator increases from southeast at the top and northwest at the bottom of the bottom of the face to reach the highest value of 15 ft. at the center of the southern direction. In the top face, the oil in place indicator of the reservoir increases from o ft. at the southeast to 7 ft. at the northward. Figures 9B, C&D indicate the change of the oil in place indicator in three dimensions. Figure (9B) exhibits the increasing of oil in place indicator in the X-direction from right to left. The maximum value equals 15 ft. at the central part of the southern direction of plane (I). The variation of oil in place indicator with Y-direction is shown in Figure (9C) increasing from the left to right. The value of more than 6 ft. is recorded at the northeast and southwest parts of all zones. The dominating value of oil in place indicator in Figure (9D) decreases from plane (III) to plane (V). The distribution of the OIP parameter is indicated from the cut offs of this parameter at different degrees of cut offs, Fig. 9 E, F, G&H exhibit that the cut offs < 3ft. forms considerable amounts in the upper and middle parts of the formation. While the OIP cut off <12ft. represents the major quantities. On the other hand, the highest value of OIP cut off >12 ft. exists in very low proportions at the center of southern directions in only one zone of the middle part of the left face.

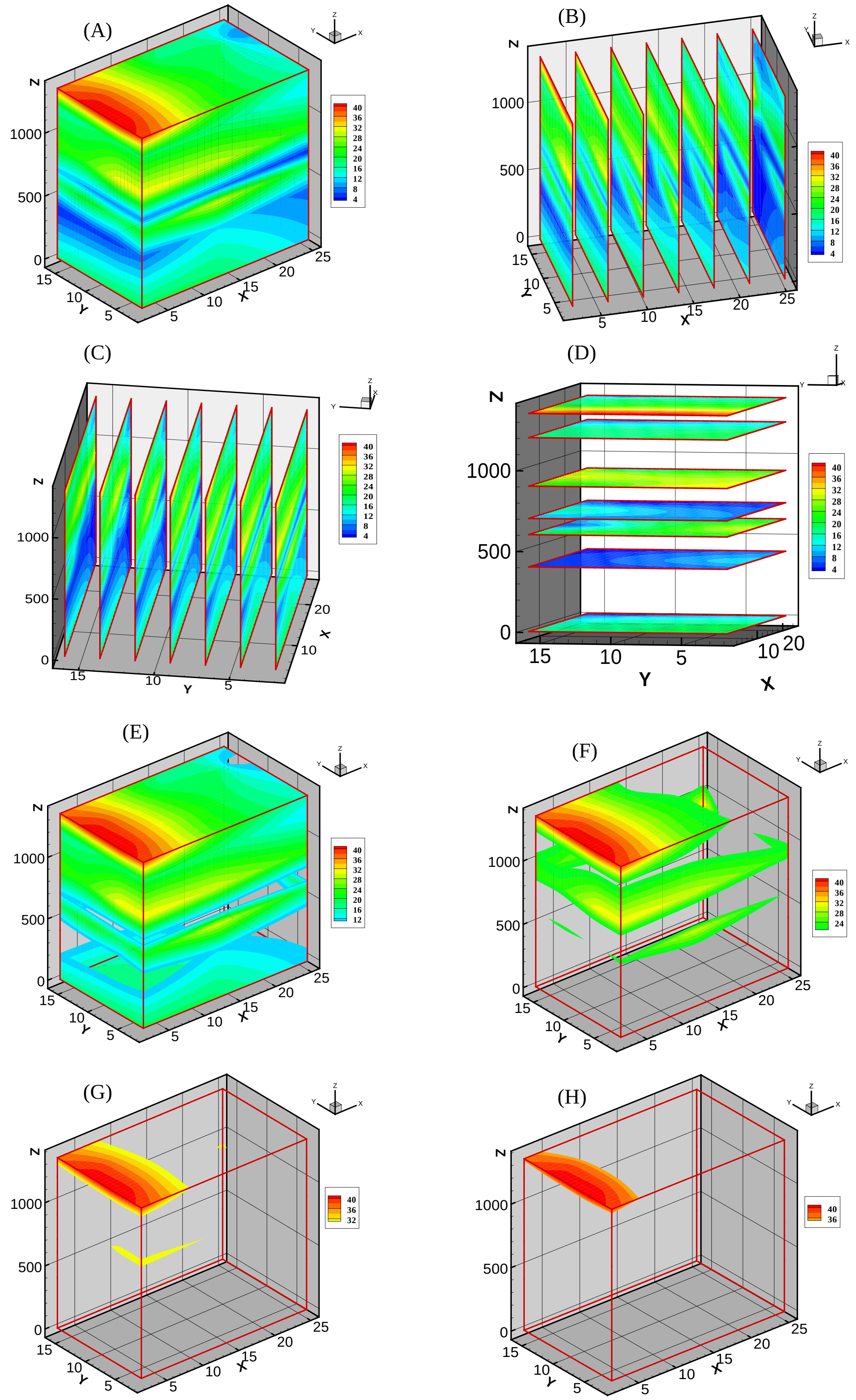

Fig (3) Reservoir 3D Slicing and Cut Off of Shale Volume (Vsh) of Abu Roash Formation in Tiba Area, Western Desert, Egypt.

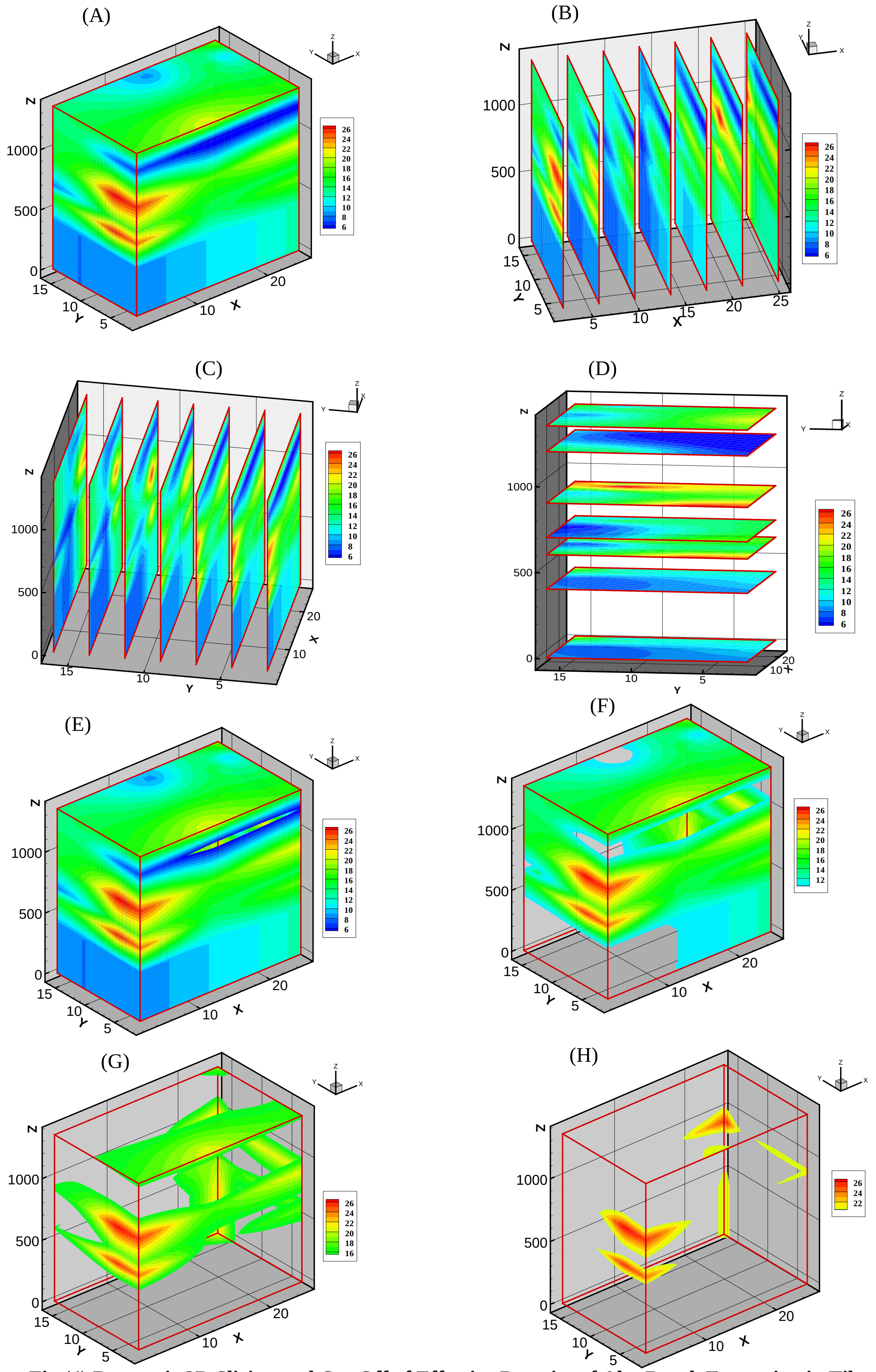

Fig (4) Reservoir 3D Slicing and Cut Off of Effective Porosity of Abu Roash Formation in Tiba Area, Western Desert, Egypt.

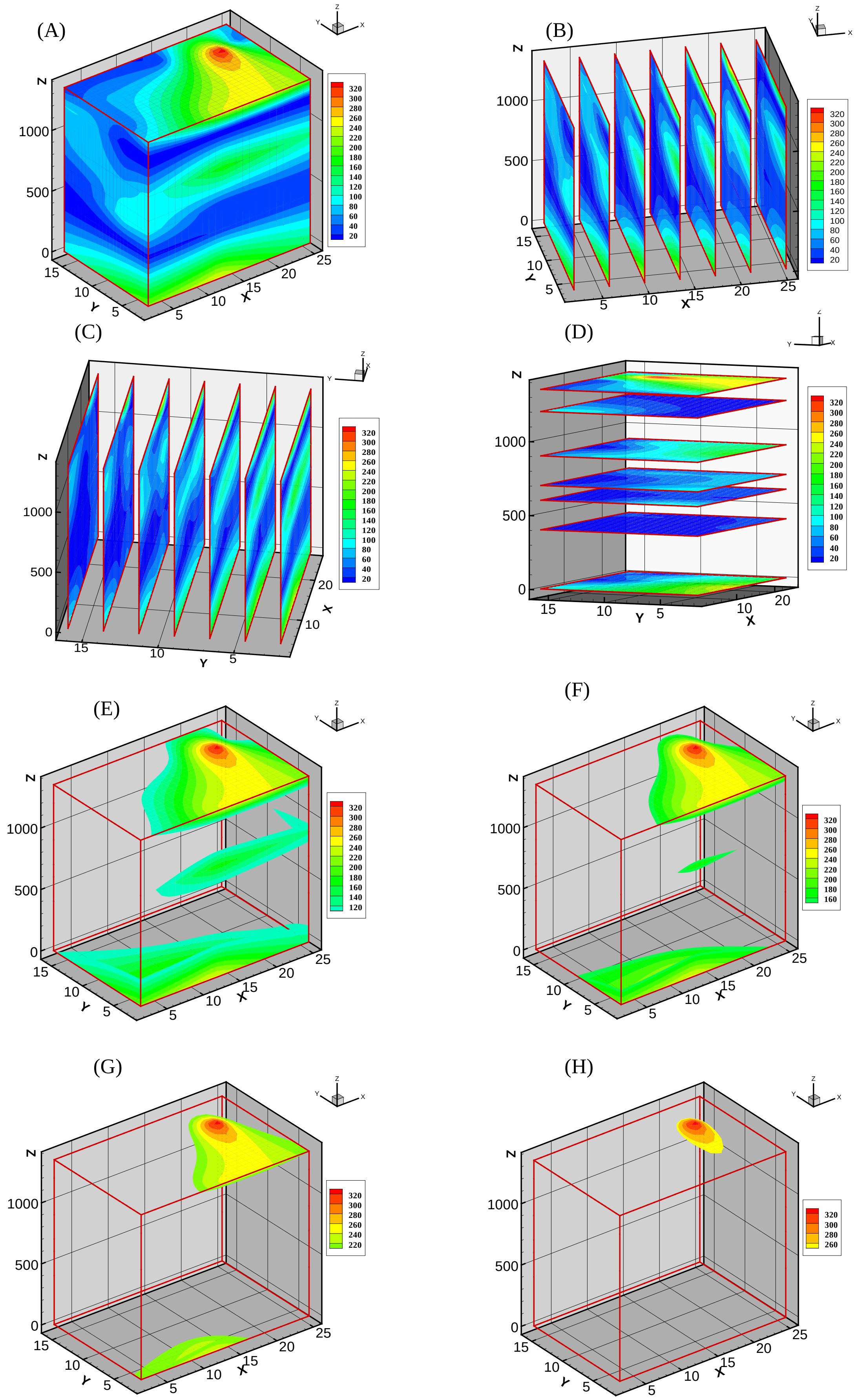

Fig (5) Reservoir 3D Slicing and Cut Off of Net Pay Thickness of Abu Roash Formation in Tiba Area, Western Desert, Egypt.

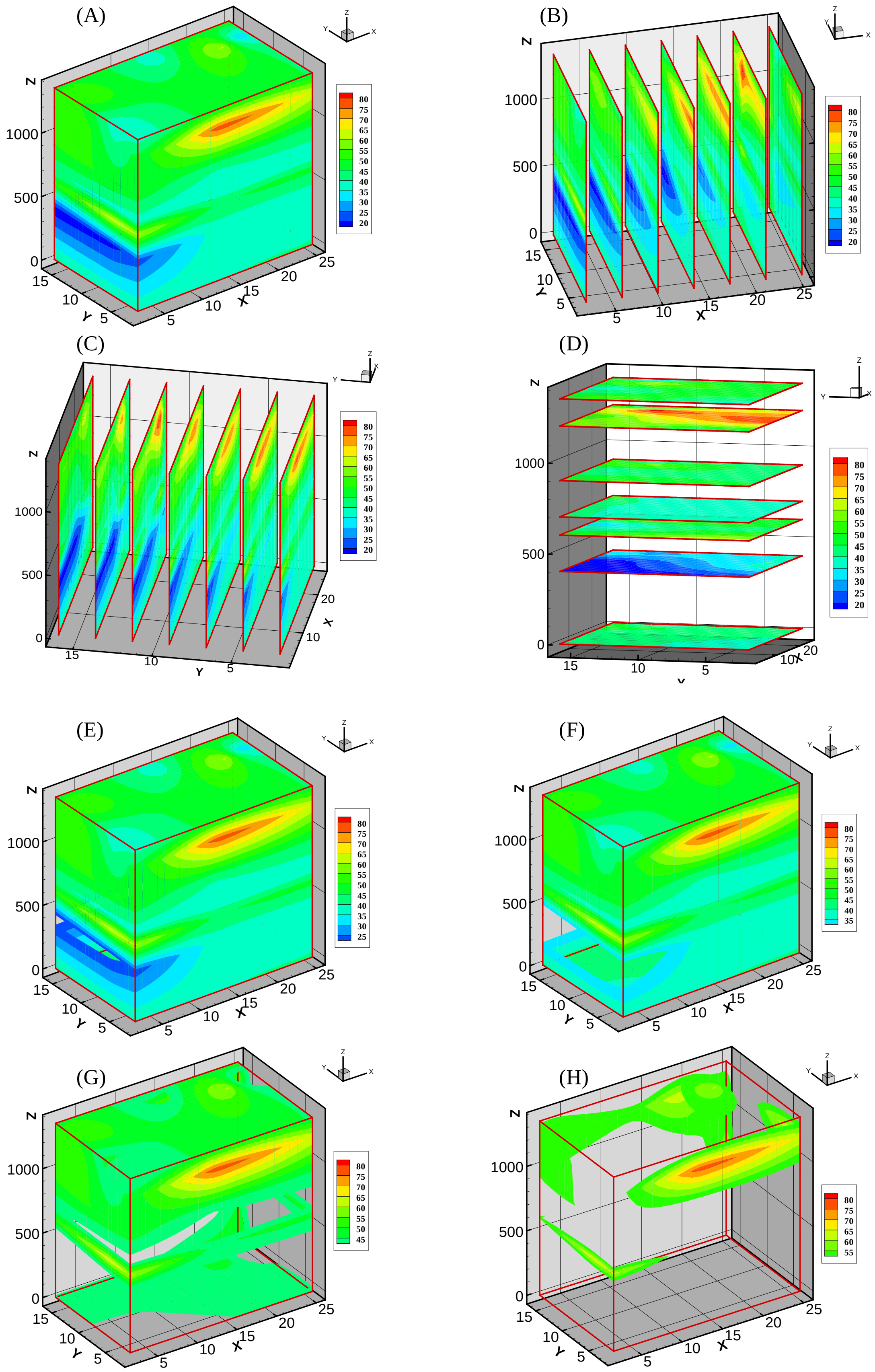

Fig (6) Reservoir 3D Slicing and Cut Off of Total Hydrocarbon Saturation of Abu Roash Formation in Tiba Area, Western Desert, Egypt.

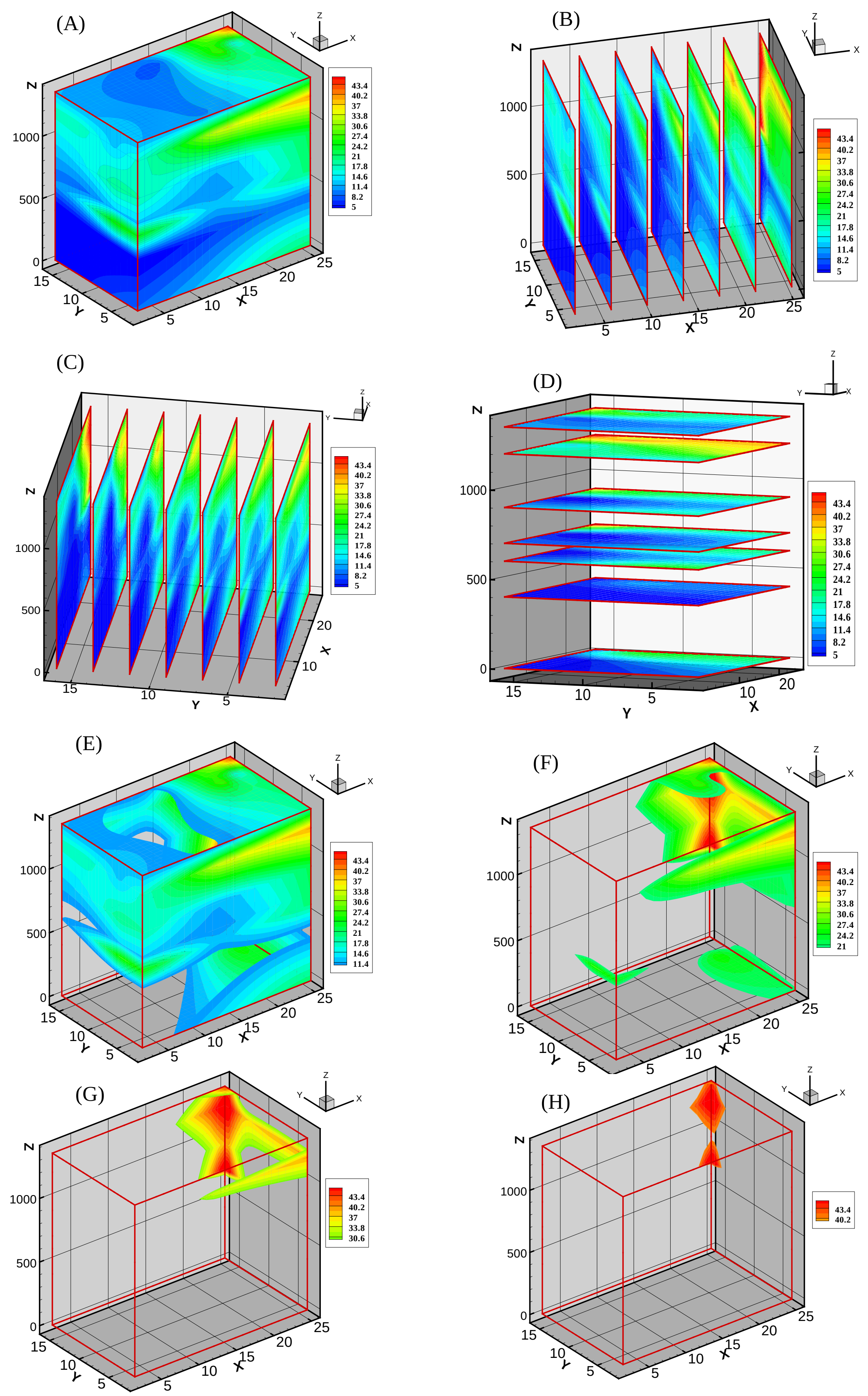

Fig (7) Reservoir 3D Slicing and Cut Off of Residual Hydrocarbon Saturation of Abu Roash Formation in Tiba Area, Western Desert, Egypt.

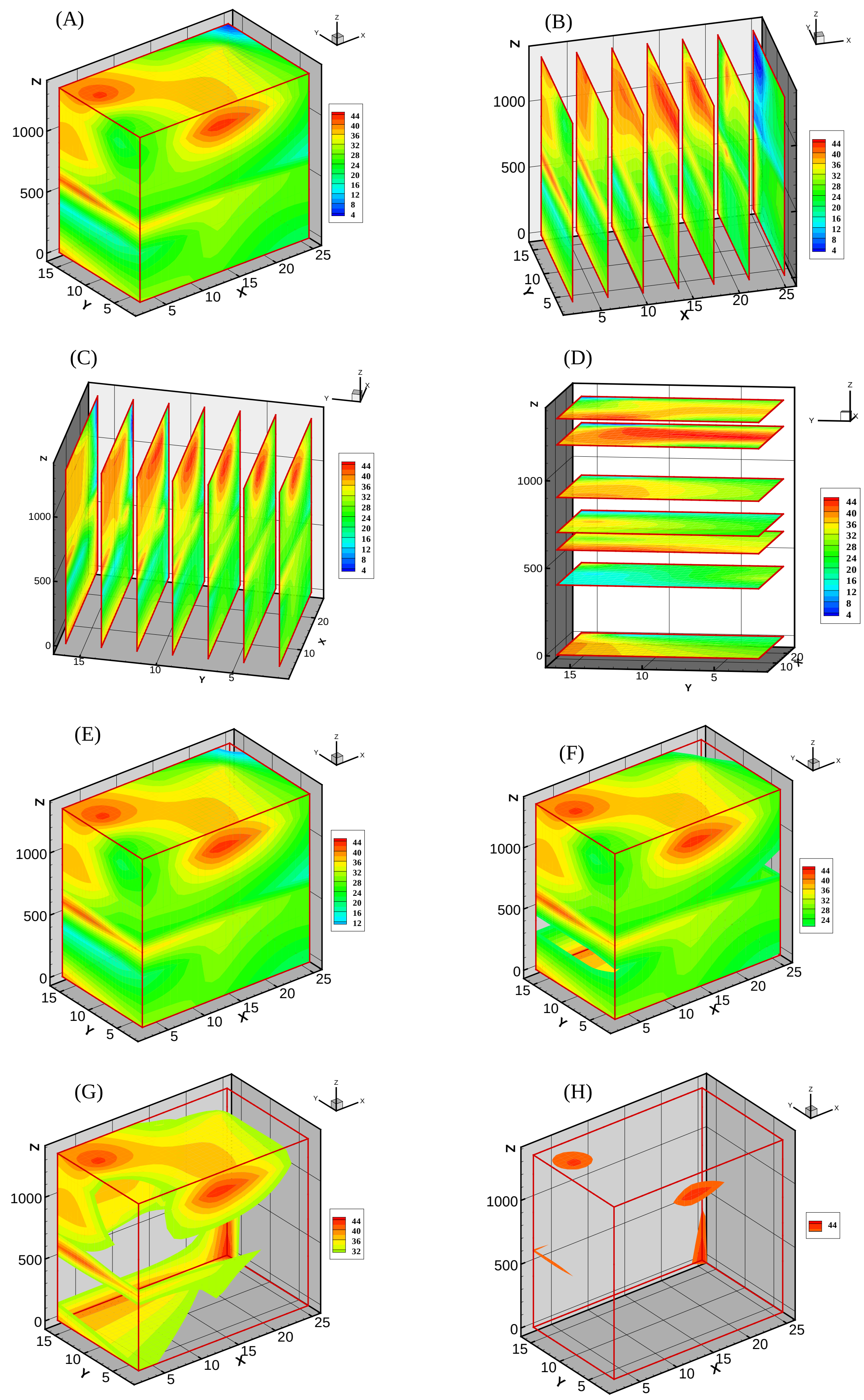

Fig (8) Reservoir 3D Slicing and Cut Off of Movable Hydrocarbon Saturation of Abu Roash Formation in Tiba Area, Western Desert, Egypt.

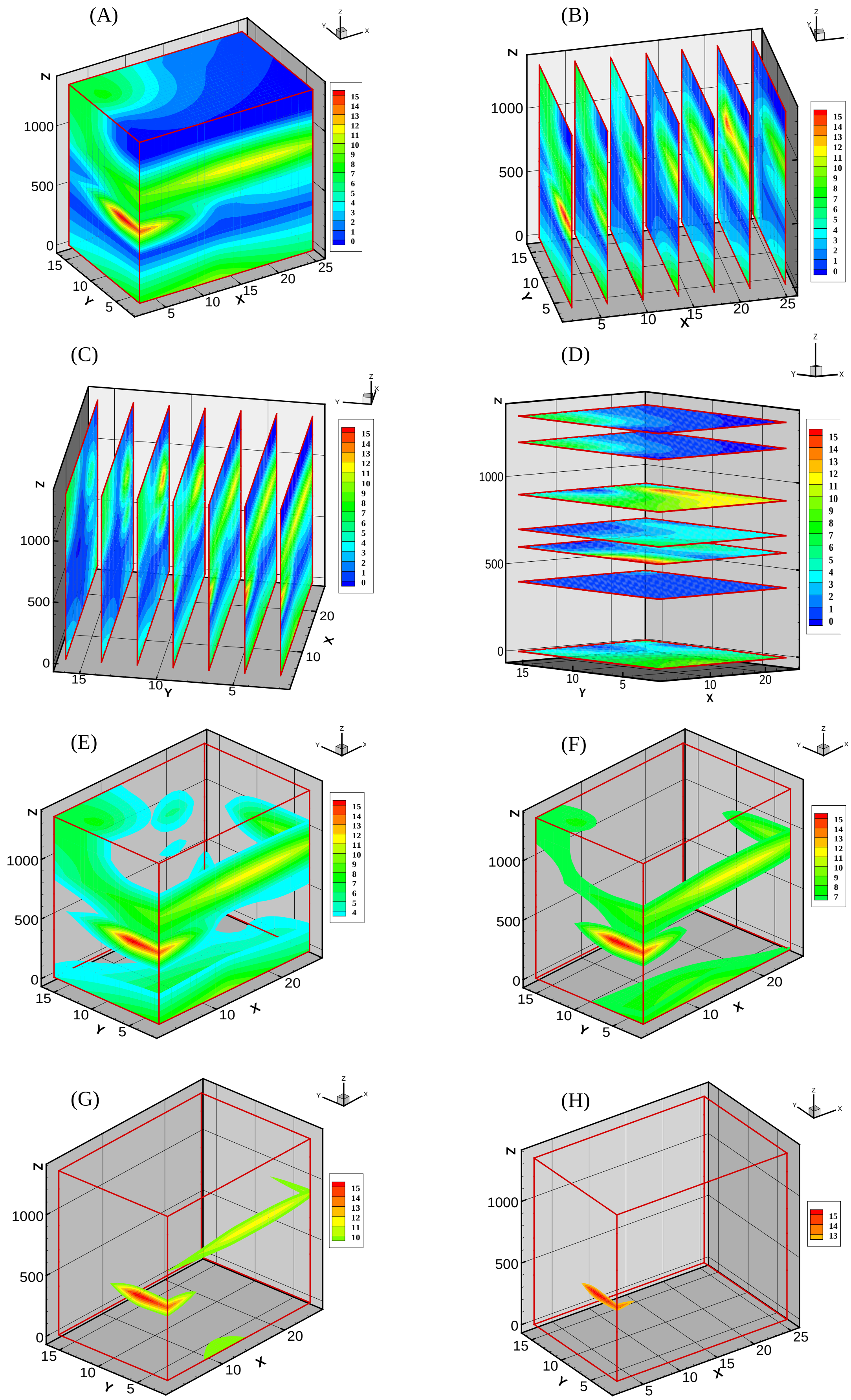

Fig (9) Reservoir 3D Slicing and Cut Off of Oil-in-Place of Abu Roash Formation in Tiba Area, Western Desert, Egypt.

So, from the presentation and interpretation of the 3D-Slicing of the reservoir characteristics of Abu Roash Formation it can be stated that the hydrocarbons are found in considerable quantities at the southeast, south and west directions of the middle upper to upper zones.

CONCLUSIONS

The results deduced from the interpretation of the reservoir slicing and cut offs of the studied petrophysical parameters of Abu Roash Formation zones revealed the following;

- The linear interpolation gives acceptable results and allows greater choice of parameter settings, which can suit particular situation and requirements.
- The possible identification of the reservoir in the inaccessible and /or lack of information areas.
- The study of the reservoir 3D-slicing and cut-off of net pay thickness, porosity, water saturation, bulk volume of pores and oil-in-place indicator of Abu Roash pay zones give clear insight about the distribution of reservoir parameters and hydrocarbon accumulations.
- Evaluating the variation of petrophysical parameters in x, y and z directions and cut-off of the Abu Roash reservoir clarify the imaging reconstruction of reservoir characterization.
- The visualization approach of Abu Roash reservoir in 3D improves the identification of promising areas for redevelopment and plan strategies for optimizing Abu Roash reservoir production.
- The conventional geophysical presentation such as the two dimensional methods can't elaborate understanding of the characterization of a highly heterogeneous and multilayered reservoir. Consequently, these conventional methods don't precisely contribute towards a better understanding the reservoir continuity and hydrocarbon trapping mechanism. On the other hand, the 3D-slicing overcomes these problems where it offers a clear insight scanning and a good explanation of the rapid changes in the reservoir behavior. So, it gives excellent information for geologists and production engineers to determine where they can drill the exploitation wells.

Reservoir tomography, varying degrees and cut-offs of the studied petrophysical parameters of Abu Roash Formation indicate that the hydocarbons are found in considerable quantities at the southeast, south and west directions.

REFERENCES

Archie, G.E. (1942): "The electrical resistivity logs as an aid in determining some reservoir characteristics". Trans. AIME, Vol. 146, pp. 54-62 .

Clavier, C.; Coates, G. and Dumanoir, J. (1977): "Theoretical and experimental bases for the dual water model for the interpretation of shaly sands". Trans., SPE Ann. Fall Tech. Conf.

Davis, J.C. (1986): "Statistics and data analysis in geology, John Wiley and Sons, New York. pp. 137-153.

Dresser Atlas (1979): "Log interpretation charts". Dresser Atlas Publication. 230p.

Petcom (1997): "PETCOM loganalysis, software manual" Petcom Software and Services, Petcom, Inc. Dallas, Texas, USA., 350 P. of clay content from logs". The Log Analyst, Vol. 11, No.6, pp. 18-25.

Poupon, A. and Leveaux, J. (1971): "Evaluation of water saturation in shaly Formation". SPWLA 12th Ann. Logging Symp.

Schlumberger (1984): "Well evaluation conference". Egypt, E.G.P.C., 102P.

Schlumberger (1995): "Well evaluation conference". Egypt, E.G.P.C., 57P.