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THESIS: Dynamic analysis of development of a deposit Oil Dashlari >>

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THE ABSTRACT

A theme given master degree of the dissertation is « the Dynamic analysis of development of objects of a deposit « Neft Dashlari ». The dissertation consists of introduction two chapters, conclusion and list of the used literature.

In introduction the necessity of realization of the dynamic analysis of a trade material is proved.

In the first part of work the brief history of development of a deposit « Neft Dashlari » is given, and also the hydrodynamic interrelations between separate objects (horizons, tectonically by blocks) and estimation of their influence on strategy of development of a deposit are shown. Alongside with revealing of a stage of development such analysis is necessary for carrying out (spending) for reception of sample given of one horizon or tectonically of the block. It precedes realization of the dynamic analysis of the trade data. At wrong division of a deposit on tectonically blocks, the horizons and allocation of a stage of development can be admitted (allowed) mistakes at the analysis of dynamics (changes) of the trade data that essentially will affect strategy of development and as result to loss of production of petroleum.

The definition interference between tectonically by blocks is traditional, the revealing of the reasons resulting (bringing) to interference requires (demands) realization special research, repair work, which promote long time of a stop of chinks. It results in loss of significant quantity (amount) of the extracted petroleum. In a number (line) of cases there is a necessity of drilling of new chinks. All this conducts to the large capital investments.

The technique of an estimation of communication (connection) is applied between separate tectonically by blocks under the current trade information, in particular, on volume taken of a liquid - petroleum and water, which allows with a high degree of accuracy to reveal borders of blocks.

For delimitation of stages of development of horizon is applied kinetic the equation Kolmogorova-Erofeyeva. Transformed by double logarifmik the equation Kolmogorova-Erofeyeva in a kind ln Iln (1 - h) I = f (ln t) represents three rectilin-

ear sites, thus the points of transition from one site on another correspond (meet) 1962 and 1975. Hence, for horizon SP the period 1956 - 1962 years. There corresponds (meets) to the first stage of development, period 1963 - 1975 years. - Second, and since 1976 till the present time - final third stage. The received data will well be coordinated to dynamics (changes) of the basic parameters of development of the given horizon.

In the second part of work the all-round analysis of dynamics (changes) of the current trade information will be carried out (spent). Dynamics (changes) monthly average given of selection of petroleum as a whole on NGDU is considered (examined) and the tendency of development of process of production are studied. Thus for realization of the analysis the method of evolutionary modeling allowing to receive of settlement meaning (importance) of production petroleum is used. The comparison of dynamics (changes) of production of petroleum to dynamics (changes) of working obtaining chinks has shown weak dependence of production of petroleum on fund of obtaining chinks. Further consistently analyzing the trade information the growth of production of petroleum is established at the expense of work gas lift of chinks. Is shown, that on work obtaining gas lift of chinks the essential influence renders both improvement of development (manufacture) of compressors, and selection of gas.

Applying a method of construction of dependence of production of petroleum from selection of gas for all NGDU as a whole, developed on faculty « Development and the operation of petroleum deposits » ASOA under the direction of the academician A.H.Mirzajanzade, is shown, that by regulation of selection of gas it is possible to establish a rational mode not only separate chinks, but also whole blocks.

By results of the dynamic analysis the conclusions and recommendations are resulted.

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INTRODUCTION

One of distinctive features of modern development of a petroleum and gas industry is increased a role of seawater areas in oil-gas to production. If in 1980 from sea deposits located on a continental shelf is extracted 650 mln. т. Petroleum and 250 mlrd. м3 of gas, now sea production reaches (achieves) 50 % of world (global) volume.

Intensive growth of consumption of fuel raw material, gradual exhaustion of resources of petroleum and gas in many countries of the world, appreciable decrease (reduction) of a gain were by the reason of the large interest to a problem of development of riches of a continental shelf of the seas and oceans, which area makes 7 % of the area of World (global) ocean.

However, the development sea oil-gas condensate of deposits is connected to the large difficulties both organizational, and tectonically technological character, that requires (demands) now complex decision of these problems.

In this connection the questions of the dynamic analysis of process of development sea oil gas of deposits allowing giving the recommendation for increase of efficiency oilgasrecovery without realization of a various sort of geology-technical researches, now are rather urgent.

1. Analysis of a condition of development of a deposit « Neft Dashlari ».

The deposit "Neft Dashlari" is located in the Caspian Sea, on distance of 110 km to east from Baku and on 50 km to a southeast from about. Pirallahi, located on northeast Apsheron of a peninsula. The deposit covers more than 12 км2 of the area (length of 6-7 km, width of 2-3 km).

The complex of breeds participating in a structure of a deposit "Neft Dashlari", is submitted from Koun (Eocene) up to Apsheron of adjournment (top Pliocene) inclusive.

In a number (line) fold the layers Productive thickness (KS) is exposed which by a narrow strip are bordered by breeds Akchagilian, and then Apsheron of circles.

The most investigated part of a cut (section) described by rich deposits of petroleum, is combined from sandy and clay breeds and consists of the bottom and top departments productive fold with allocation in them of retinues and horizons.

Productive fold, which general (common) capacity makes 2400 м, consists of retinues: Kalinian (KaS), Pre Kirmakinian (PK), Kirmakinian (KS), Post Kirmakinian (PoK), Break (SP), Balahanian, Sabunchi and Surahani

The study physico-lithologikal of the characteristic of productive horizons of a deposit was carried out (spent) under the analyses core, oilfield-geophysical researches and with the help of hydrodynamic methods.

On the basis of the analysis core were defined (determined) porosity, carbonate and granulometric, structure of breeds.

By methods of промыслово-geophysical researches of chinks were studied efficiency, permeability and hydro flowing of horizons.

The deposit represents complex (difficult) brahiantiklinarian fold. The axis fold is stretched from northwest on a southeast almost on a direct line, with an insignificant deviation (rejection) to a southwest in area of a dome. Length folds 11 km at width of 6 km. Almost on all length fold the axial surface has fall on northeast and only in area of far southeast immersing she (it) is inclined on a southwest. The corners of fall of a southwest wing vary within the limits of 36-44 hailstones, and northeast 25-50 hailstones. The increase of corners of fall of layers with depth on wings and peripheral parts fold is marked. As a whole fold has a regional inclination of layers from northwest on a southeast, the difference in marks of a roof KS on both pereclinarium reaches (achieves) 2800 m. The summary part fold is deeply dim up to bottoms KS.

Fold is complicated by numerous infringements. On southwest and northeast wings two longitudinal infringements, which are taking place through fold, are marked. On the basis of the available data it is possible to speak about presence of a plenty of finer cross infringements, which amplitudes decrease in a direction from longitudinal infringement and which divide (share) fold on 6 detached tectonically of blocks.

Upper the part fold is complicated injection of ancient breeds Kouna, Maykopa and Dytoma, past on a line of longitudinal infringement. Length injection 3,5 km, and maximal width of -4,5 km. near of contact of breeds injection and breeds. In productive is present mud of a volcano more thickly.

Thus, it is possible to note, that genetic fold " Neft Dashlari " concerns to a type diaprin fold, morphologic she (it) is inclined, asymmetric, and sharp.

The deposit " Neft Dashlari " is multilayers. All horizons and retinues industrial oil-bearing are Productive thickness (PT). At the same time, the distribution of petroleum on the area and on a cut (section) non-uniformly also has no a monolithic outline.

By results of search-prospecting works is established oil wearing of ten retinues. Let's note, that the majority of retinues are divided (shared) on some precisely allocated horizons by clay sections of different capacities.

All Productive thickness now is divided (shared) into 26 horizons, however not all horizons are submitted on all area and, besides they sharply differ on the capacity. Each object is submitted by a series alternating sand-field and clay layers of various capacity. Layers of clay within the limits of productive object are characterized by small capacities about 2-4 м and only sections between objects reach (achieve) 8-20 м and more.

Porosity of collector's changes on the average from 0,16 up to 0,29; permeability from 0,025 up to 0,376м км2.

The bed pressure changes in the large range not only on a deposit, but also even within the limits of one horizon. For example, in X horizon Balahanian of retinue this parameter is equal 1,63 MPa in III the block and 15,1 MPa in V the block. Pressure of saturation the specified objects are equal accordingly 2,67 and 13,26 MPa. The viscosity of petroleum changes in limits from 1,3 up to 13,0 MPa Ч С.

The deposit has entered industrial development in 1950.

For 01.01.2000 the residual taken stocks on a category A+B+C1 make 16,6 mln.т of petroleum and 707,0 mln.м3 of gas.

For 01.01.2000 the working fund makes 353 chinks: from them 38 work pumped, 308- gas lift and 7 - a deep-pump way of operation. The daily selection makes 1825,0 т of petroleum and 1636,7 м3 of water.

For 12 months of past year was selected 671,7 thousand т of petroleum and 41,5 mln.м3 of gas. From a beginning of development was selected 159,8 mln. т of petroleum: 68,8 mln. м3 of water and 12476,0 mln. м3 of passing gas.

In 1953 the water influence was begun. From a beginning of work in layers was pumped 260,9 mln.м3 of water. Current factor oil production has made 0,5.

Operating ratio from initial taken stocks - 0,91, rate of selection from residual taken stocks - 3,9 %.

1.1 Brief history of development of a deposit "Neft Dashlari".

Deposit "Neft Dashlari" - one of the petroleum areas located in the Caspian Sea. First open of a deposit - the chink №1 has entered operation 7. X1.1949г.fontan by a way with debit of petroleum 100 т/с at buffer pressure 3,6 MPa and diameter of the union of 6 mm.

The development of a deposit began in 1950г., and in February 1951 on a coast the first tanker with high-quality petroleum was sent.

The next years here, in difficult conditions of the high sea, was created unique sea oilfield.

The development of a deposit is carried out from hydraulic engineering structures - bridge and near bridge of platforms, on which all settles down oil field a facilities (economy). With the purposes of economy of metal the sectional obliquely -directed drilling with accommodation on one platform up to 24 chinks widely practices at a deviation (rejection) bottom of well from a vertical up to 2050 м and more.

The depth of the sea on water area of a deposit within the limits of the reconnoitered sites reaches 60 meters.

The deposit "Neft Dashlari" represents asymmetrical brahiantiklinal northwest - southeast liying, complicated by numerous explosive infringements, on which largest dismember her (it) on six tectonicall of blocks: I, Ian, II, III, IV and V. The structural card of a deposit " Neft Dashlari" is submitted in a fig. 1.1. The blocks, in turn, are dismembered on separate tectonically of a field.

The mode of operations of deposits is characterized as mixed - dissolved gas and water pressure. The homogeneous modes (water pressure, elastic water pressure, dissolved gas) are on occasions shown.

In an initial stage of development of the majority of deposits, owing to delay of application of processes of maintenance of bed pressure, the development ineffective of a mode of the dissolved gas was marked in comparison with others. The further development of a mode of the dissolved gas has stopped due to intensive pumping of sea water in a deposit, therefore in them the conditions rigid water pressure of a mode were created.

Let's note, that the high degree of extraction of petroleum from a layer at designing development suffices for achievement the arrangement injection of chinks behind a contour oil-bearing, on distance 150-200 м from him (it), with the purposes of preservation fold alkaline of bed water between front of a forcing and oil-bearing by a zone was provided, and at realization of the circuit of "cutting" of deposits - pumping in chinks of a "cutting" number (line) of sea water processed by superficial - active substances (PAF).

Apparently, the observance of the specified conditions is not obviously necessary if to take into account practical given about pumping of sea water in a deposit of a deposit "Neft Dashlari" /8/.

Since the first years of development and till the present time on a deposit "Neft Dashlari" the works on an establishment-limiting debit of chinks are conducted. With increase debit of chinks in conditions of a considered (examined) deposit interferes basically sand appear. However, at realization of necessary preventive measures the influence of this factor can sharply be reduced.

Due to the proved choice of system of development, application of methods intensification of production of petroleum, their constant perfection, on a deposit "Neft Dashlari" the high technological and technical and economic parameters were achieved.

On 01.01.2001г. From a deposit is extracted more than 160 mln. т of petroleum, and about 67 % is taken fontan by a way.

The regular analysis of development of horizons and introduction of measures on perfection of the projected system of development and processes of artificial influence have allowed on many deposits to reach (achieve) high oil recovery. Current factor oil recovery as a whole on a deposit on 01.01.2001г. Has made 0. 911 (at his (its) final meaning (importance) under the project 0.544).

The carried out (spent) special researches by definition oil recovery watered of sites of deposits specify on rather high them. The geophysical data received on chinks drilled on watered sites testify to it.

For the period of development 1950-1977 years. On a deposit "Neft Dashlari" drilled more 140 prospecting, 970 obtaining and 120 injection of chinks.

Are those in general condition, history of development and efficiency of processes of artificial influence on a deposit of a deposit "Neft Dashlari".

1.2 Hydro dynamical interrelations between separate objects (horizons, tectonically by blocks) and estimation of their influence on strategy of development of deposits

By development multilayers of sea deposits of petroleum and gas described by block by a structure, it is necessary to give the large attention to a complex of trade research works directed on an establishment of presence or absence to hydro dynamical communication (connection) between separate horizons and blocks. The necessity of reception of the authentic information about a hydro dynamical condition of a petroleum deposit is dictated to that in each concrete case of acceptance of the decision by development of a deposit there is a necessity of revealing of communication (connection) between industrial objects. So, for example, for increase of efficiency of a measure on maintenance of bed pressure by pumping of water at a late stage of development the elimination of outflow of forced water in the next objects is necessary to provide. On the other hand, the establishment of hydro dynamical interaction between objects, and also between operational chinks, can result in detection of stagnant zones, which development will bring in the significant contribution to volume of production of petroleum and by that can result in increase of factor oil recovery. In this connection, the researches directed on study to interrelation between tectonically by blocks and bushes of chinks maintaining different horizons, are rather urgent.

Complexity of a cut (section) of sea petroleum deposits, significant quantity (amount) geological and technology factors do not allow precisely to define (determine) borders of blocks, that results in wrong calculation of stocks of petroleum both on separate objects, and on all deposit as a whole.

It is known, that the system of development everyone tectonically of the block gets out on the basis of stocks of petroleum in the given block and rates of selection. In connection with specification of structure, that is carry tectonically of infringements, change both area of the block, and their stocks. It in turn influences rate of selection, volume pumping of water.

The specification of borders between separate tectonically by blocks is usually conducted on the already entered horizons. However, on the again entered horizons of a condition isolating separate tectonically of blocks can be broken for some reasons, which will result in interrelation between tectonically by blocks. For example, the specified communication (connection) can be shown in conditions of infringement of process of operation of separate bushes, chinks as out column of displays, defect of columns, infringements of technological modes of overhaul etc.

Thus, consideration interference tectonically of blocks, the revealing of the reasons resulting (bringing) to interference and development of the recommendations for their elimination, represents doubtless practical interest. For this purpose the repair work will usually be carried out (spent) special research which require (demand) at times long time, owing to a stop of chinks, and in a number (line) of cases and drilling of new chinks, at the same time irrational development of a petroleum deposit proceeds.

In this connection, with the purpose of operative revealing of interrelation between tectonically the blocks for whatever reasons, develop a technique of an estimation of communication (connection) under the current trade information, in particular, on volume effluent of a liquid of petroleum and water. If the given communication (connection) takes place, it enables to assume infringement of borders tectonically of blocks.

It is necessary to note, that during the decision of the given task all tectonically the block with the horizons is considered (examined) as separately taken object.

Thus the method of construction of self-organizing models (MPSM) is applied. This method is based on criteria of a method of the group account of arguments (MGUA) / 10 /. Thus the data on total monthly selections on blocks of a deposit "Neft Dashlari" were used.

In brief we shall result the theory of self-organizing models based on multiple-row of structure of acceptance of the decision /11/.

Multiple-row e of structure of acceptance of the decisions on a number (line) of heuristic criteria are the basic subject of study of a new direction of technical cybernetics named as heuristic self-organizing.

The principle of self-organizing as against the rigid determined systems provides such advanced multiple-row structure of acceptance of the decisions, at which in each of the subsequent decisions freedom of a choice of any decisions of the previous number (line) of selection is kept.

The given purpose is reached (achieved) by a method of construction of self-organizing models.

Principle of self-organizing and method, based on it, (him,) represent attempt of sharp increase of accuracy of mathematical modeling at the short period of supervision of process. The given method is intended to decide (solve) interpoliatinal of a task of technical cybernetics, to which the tasks of identification of structure and parameters of complex (difficult) objects by results of supervision of their work concern.

The given method assumes division of initial sample into training and verifying sequences. This division is carried out as follows:

1. The square average weighted on all "entrance" variable distance from each unit of interpolation (experimental point) up to some "central" point of sample of the initial data is defined (determined):

$$p\,2 = S\,[-m\,\frac{n\,(x\,ij - x\,i)\,2\;1\;m}{S\,(x\,ij - x\,i)\,2\;m\;i=1}], \quad " x\,i = \frac{1}{m}\,S\,x\,ij, \quad 1.1$$

$$j=1 \qquad i=j$$

Where m - number of units of interpolation in sample of the data;

x ij - numerical meaning(importance) i -й variable in j - unit of interpolation;

" X i - average meaning (importance) i - й variable.

2. Units of interpolation arranged on parameter so that in new numbering

$$P\,2 = p\,2j + 1 \quad (j = 1,2, \ldots .m)$$

3. The points with odd indexes form a training sequence (set G1),

And with odd - verifying (set G 2).

Depending on the put task the certain criterion of selections allowing in process partition, of numbers (lines) of gradually becoming complicated models to find and model optimum complexity gets out.

For reception of the most regular mathematical description as criterion of selection the criterion of a regularity is used

$$d\,2пр = \frac{1}{N} = S\,(j\,i - j^{*}i),\ 1.2$$

$$N\,пр\ i = 1$$

Where d - absolute mistake on a verifying sequence;

j i - meaning(importance) in i -й to a point on model i = 1,2, ... N;

j * - valid experimental meaning(importance) in the same point;

Nпр - number of points in a verifying sequence.

Than less mistake, the above regularity of model. The general (common) circuit of model of optimum complexity following (next). The complete description of object j = j (x1, x2, ...xn) is replaced with several numbers (lines) of the private (individual) descriptions.

The first number (line) of selection

$$Y1 = ¦\,(x1, x2),\ Y2 = ¦\,(xj, xk),\ \ldots..\ Ys = ¦\,(xi\ k\text{-}1, x\ k).$$

Thus the function ¦ (x i, x k) refers to as basic and is accepted linear:

$$¦\,(x\ i, x\ k) = a + b\ xk + c\ xi.$$

The second number (line) of selection

$$Z1 = ¦\,(y1, y2),\ Z2 = ¦\,(y2, y3),\ \ldots..\ Zp = ¦\,(ys\text{-}1, ys),$$

Where: p = C rs and т. д.

The complication goes discretely. In each number (line) the new members are added or the degree polinoma raises, or that and another occurs simultaneously.

Each private (individual) description is function only of arguments. Therefore factors of the private (individual) descriptions are easily defined (determined) on the data of a training sequence at small number of units of interpolation (first operation). From a number (line) in a number (line) of selection some number most regular variable is passed (missed) only. Further, accepting intermediate variable (the second operation) is possible to receive analogue of the complete description. Decisive circumstance is that the accuracy of the members and degree polinoma, determined on a separate verifying sequence at first grows, and then begins to decrease. To a minimum to criterion of selection also there corresponds (meets) required model of optimum complexity.

In the given work is used polinominal algorithm /10/. Polinominal algorithms conducting realization MGUA, are applied to realization of self-organizing at the decision of a task of search of optimum mathematical model described complete sedate polinomом, replaced number (line) of the private (individual) descriptions.

In the given algorithm the expansion of dimension of a vector of the initial data is supposed by addition to a vector X of some elementary functions 1/ x, Ц " x, 1/ Ц " x.

In case of presence them in required dependence we any more shall not receive their decomposition that enables to receive more compact and exacter mathematical description.

Sequence of accounts following (next). At the first stage is made k of the linear equations of regress:

$$Y_{1i} = a_{1i} Z_{1i} \quad (I = 1, 2, 3, k) \quad 1.3$$

$$Z_{1i} = x_i \quad (i = 1, 2, 3, \ldots \ldots \ldots k) \quad 1.4$$

The factors a_{1i} Z_{1i} for each equation (1.1) are calculated on the data of a training sequence

$$a_{si} = \frac{* o}{S_j z_{ij}}, \quad z_{sij} = z_{1ij} - \frac{i \text{ About } S1 \text{ o } 1}{* R_{jO} G1} S z_{1ij} \quad 1.5$$

$$j = j_j - \frac{0 \; 1 \; m}{R_j \text{ About } G1} S_j 1, \quad R = R_1 = \frac{}{2} \quad 1.6$$

For each model of the first approach(approximation) j (1) 1i the size d пр is calculated. On a minimum d пр the group most of "perspective" private(individual) descriptions about y1la (l=1,2, ... Г), where Г- freedom of a choice of the decisions is selected. For each and perspective decision of the first stage y (1) 1l the following cycle of operations is carried out.

Is made to the equations

(2)

$$y1l = a_{1i} Z (z) 1i \; (i = 1,2, \ldots . k) \quad 1.6$$

$$Z (z) 1i = z1e \text{ Ч } z 1i$$

Where z 1e - argument of the private(individual) description,

z 1i - argument, determined from expression 1.2

2. If the estimation d 2пр 1.2 for one (or several) models Y (2) 1i 1.6 has smaller numerical meaning(importance), than the estimation of models Y (1) 1e, is again made set of the private(individual) descriptions

$$Y (3) 1i = a_{1i} \text{ Ч } Z (3) 1i \; (i = 1,2, \ldots . k) \quad 1.7$$

$$Z (3) 1i = Z 31e \text{ Ч } Z 1i$$

Where Z (3) 1i - argument of model Y (3) 1e, having the least estimation.

The process of the directed complication of mathematical model (containing Z1e) at the first stage can repeat repeatedly. Finally from set of models Y (1) 1e, Y (2) 2e, ... Y (2) 1e the model, best in sense of a minimum d 2пр is selected.

3. The set of the generalized arguments of the second stage is defined(determined) which consists from k entrance variable 1.4 and k changing entrance variable with argument Z (r) 1e, present in model:

$$Z2i = Z1e \ (i = 1,2, \ldots \ldots k) \quad 1.8$$

$$Z2 \ (k + i) = Z1e \ Ч \ Z1i$$

Щ

4. Are under construction 2k of the decisions Y2i of the second stage Y2i = Y1e + a 1Ч z2i

Щ 0 0 1 R

$$z = z \ 2ij - bi \ y1ej; \ Z2ij = Z2ij - \text{---} \ S \ Z2ij \quad 1.9$$

R j=1

$$ai = \frac{1 \ R \ 1 \ R \ 0}{\text{---} \ S \ yi \ z \ 2ij \ \text{---} \ S \ y1ej - Z2ij}; \quad bi = \frac{}{}, \quad 1.10$$

R j=1 R j=1

1 R Щ 1 R

--- S Z2ij --- S Y21ej

R j=1 R i=1

Щ

Where Z2i - chosen corrected generalized variable for the following number(line) (from r possible(probable));

0

Z 2ij - centralized meaning(importance) generalized variable;

Y1ej - aproksimulated meaning(importance) of function of the previous number(line);

bi - factor ortogonalization generalized variable rather Y1ej (on a verifying sequence),

Factor a i is calculated separately on the data of a training and verifying sequence.

5. For each private(individual) description 1.9 is d2пр 1.2, then these estimations are compared. On a minimum of criterion of a regularity 1.2 at the second stage of complication of mathematical model the final choice of the decisions Y1y of the first stage among set of the perspective decisions Y (2) 11 (l = 1,2, ... Г) is defined(determined). On second, third and all subsequent stages the process of complication of mathematical model is similar to that was carried out(spent) on the first stage - choice of group of the perspective decisions and performance of items 1,2,3,4,5.

For an any stage the expression 1.4 accepts a kind:

$$Ys, i = Y\,s - 1, i + aizs, i\ i = 1,2, ..., 1.11$$

a the set of the generalized variable stage is defined(determined) by system

$$Zs, i = Z1, i$$

$$Zs, k+1 = Z1y\ Ч\ Z1i$$

$$Zs, 2k+1 = Z2y\ Ч\ Z1i\ (i = 1,2, ...k), 1.12$$

.....

$$Zs, (k-1)\ (k+1) = Z\ (s-1)\ y\ Ч\ Z1i$$

That is variable Zs, i are among set of a variable first stage Z1, i and all changing of a variable first stage with the generalized arguments present in model (S - 1) - го stage.

Having substituted 1.9 at 1.10, mathematical model of a stage of selection is possible to present as:

$$Y = C0 + C1Z1y + C2Z2y + ... + CsZsy$$

$$C0 = \frac{1}{s} [S\ Y1 - S\ (Ci\ S\ Ziyj)] \quad 1.13$$

R 1OG i=1 jOG

s

Ci = ai ' - S an ' bn

n=i+1

With the purposes of application and approbation of the offered technique MPSM the trade information on total monthly selections on blocks (I, II, III, IV, V) for the period January of December 1970- 1974r. (table 1.1 - 1.5) was processed. Let's note, that in the period 1975-1977years. by chinks entered into operation from drilling and returns in tectonically blocks, are revealed new oil-saturated horizons, the borders tectonically of infringements between blocks of a deposit " Neft Dashlari " are specified.

The consistently complex(difficult) functional dependences of the following kind were considered(examined):

QHI = QH I (Q bI; Q H II; Q b II; Q H III; Q b III) 1.14

QHII = QHII (QHI; QbI; QbII; QHIII; QbIII; QHIV; QbIV) 1.15

QHIII = QHIII (QHI; QbI; QHII; QbII; QbIII; QHV; QbV) 1.16

QHIV = QHIV (QHII; QbII; QbIV; QHV; QbV) 1.17

QHV = QHV (QHIII; QbIII; QHIV; QbIV; Qbv), 1.18

Where QHI; QHII; QHIII; QHIV; QHV - accordingly monthly total selections of petroleum from all horizons I, II, III, IV, V tectonically of blocks.

QbI; QbII; QbIII; QbIV; QbV - accordingly monthly total selections of water from all horizons I, II, III, IV, V tectonically of blocks.

The dependences 1.14, - 1.18 accordingly got out of the following reasons:

- I tectonically the block borders with II and III tectonically by blocks;
- II tectonically the block borders with I, III and IV tectonically by blocks;
- III tectonically the block borders with I, II and V tectonically by blocks;
- IV tectonically the block borders with II and V tectonically by blocks;
- V tectonically the block borders with III and IV tectonically by blocks and express essence of interaction between next tectonically by blocks.

As a result of data processing given in the tables 1.1 - 1.5, the following results were received:

- For I tectonically of the block:

$$QHII = a0 + a1\frac{QHIIIЦ}{QHIII}\frac{QbI}{QHIII} + a2 \frac{QbIII}{Ц} + a3\frac{QbI}{QbIIЦ} \frac{QHII}{Ц} \text{ ------ } 1.19$$

Where the factors have accepted the following meanings(importance): a0 =-2,22; a1=10-3; a2=10-5; a3 = 2,8Ч10-6.

It is necessary to note, that the given dependence is received on the basis of the information for the period 1.1970 - IV. 1973, on 40 supervision. Thus the maximal error has made 19,2 % at a measure of identity q (Q) = 0,931 and criterion of reliability W (Q) = 3,7, that there is more critical meaning(importance) Wкр = 2,6 at probability P = 0,95. Proceeding from conditions of adequacy the dependence well enough describes a considered(examined) file of the trade information. The given dependence was checked up on the subsequent variable interval (verifying sequence) for the period V.1973 - XII .1974 thus the maximal error has made no more than 22 % (see table 1.1).

- For II tectonically of the block:

$$QHII = a0 + a1\frac{QHI}{Ц}\frac{QbIII}{QbIV} + \frac{a2}{QbIII}\frac{a3}{Ц}\frac{QbII}{QbI} + a4\frac{QHIV}{QbIV}\frac{Ц}{QbIII} \text{ ---------- } 1.20$$

Where the factors have accepted the following meanings(importance): a0 = 2702; a1 = 0,11; a2 = 23108 Ч 104; a3 = 22927 Ч 104; a4 = 118280. The given dependence is received on the basis of processing the information for the same period. Thus the maximal error has made 17,4 % on the subsequent time interval

- 28,2 %. (see table 1.2) at a measure of identity q (Q) = 0,952 and criterion of reliability W (Q) = 4,1.

- For III tectonically of the block:

Ц QbI QbI QbV ___ QHV QHII QHI 2 QHIV QHV 2

QHIII = a0 + a1 -------- + a2 ---------- Ц QbI + a3 ------ Ц ------- + a4 ----------

----------, 1. 21

QHIII QHI QbII QbI QbI QbI 3 QbV 2

Where the factors have accepted the following meanings(importance): a0 = 90372; a1 = 2844 Ч 104; a2 = 157Ч104;

a3 = - 48; a4 = - 337. The maximal errors on the same time intervals have made accordingly - 22,2 % and 30,6 % (see table 1.3) at a measure of identity q (Q) = 0,933 and criterion of reliability W (Q) = 3,9.

- For IV tectonically of the block:

Ц QbII 1 QHV 1 QHII

QHIV = a0 + a1 ------- + a2 ------ Ц ---------- + a3 ------ Ц ----------, 1. 22

QHII QHII QHII QbV QbV QbII QbIV

Where the factors have accepted the following meanings(importance): a0 = 126067; a1 = 13744448; a2 = 1456856; a3 = 21259223. The maximal errors have made accordingly 17,0 % and 16,2 % (see table 1.4) at a measure of identity q (Q) = 0,964 and criterion of reliability W (Q) = 4,2.

- For V tectonically of the block:

_____ a2 QHIV Ц QHIIIQHIVQbV _____

QHV = a0 + a1QbVЦ QHIIIЧQHIV + ------- Ц ------ + a3 ---------- +

a4QbIII QbV Ц QHIIIQHIV, 1.23

QbV 2 QbIV QbIII QbV

Where the factors have accepted the following meanings(importance): a0 =-52178, a1=5,8Ч10-5, a2 = 19Ч1014, a3 = -26Ч 106, a4 = - 2,3 Ч 10 -10. The maximal errors have made accordingly 20,5 % and 14,1 % (see table 1.5) at a measure of identity q (Q) = 0,942 and W (Q) = 4,1.

Thus, MPSM allows to receive reliable enough models well describing a considered(examined) file of the trade information and proceeding from conditions of adequacy, they can be recommended for realization of hydro dynamical accounts in trade practice.

Interesting the question of research of influence of a vector of the entrance factors as a whole and separately in considered(examined) dependences on a resulting attribute is represented. The decision of this question will allow rationally to carry out(spend) technological measures on separate tectonically blocks, and also to develop them.

With this purpose the correlation analysis based on criteria MPSM was applied.

The essence of the given method consists in the following. Having two sequences N1 and N2 it is possible to receive two models Q1 and Q2 such as the found equations, each of which follows from training on N 1 and N2.

Shall write down criterion of a regularity MPSM model Q1, (received on training sequence N 1) on verifying sequence N2 as:

$$\Phi = \sum_{J=N1+1}^{N} (Qj - Q1j)\ 2\ 1.24$$

Choice most of "perspective" models we shall make with the help of criterion unbiased ness. The criterion unbiased ness is based on the analysis of the decisions:

$$\text{Псм} = \sum_{j=1}^{N} (Q1j - Q2j)\ 1.25$$

With the purpose of revealing interference of the analyzed factors, in the given work the universal criterion - regular criterion unbiased ness, having proper-

ties both criterion of a regularity is used, and criterion unbiased ness, and is defined(determined) as follows: Let criterion of a regularity of model Q2 on a sequence N1 will be:

$$\Phi 2 = \sum_{j=1}^{N} (Q1j - Q2j) \quad 1.26$$

Then the regular criterion unbiased ness (criterion of the consent) looks like:

$$\Phi = \Phi 1 + \Phi 2 \quad 1.27$$

The given criterion is meaningful both criterion of the consent, and criterion unbiased ness , decision, based on the analysis. And at the quite real assumption that the mistake of interpolation does not surpass a mistake electropoliation on new points of a verifying sequence (criterion of a regularity), that is at performance for model (1.24) and (1.26) following inequalities:

$$\sum_{j=1}^{N} (Qj - Q1j) 2 \; J \sum_{j=N+1}^{N} (Qj - Q2j) 2 = \Phi 1$$

1.28

$$\sum_{j=N+1}^{N} (Qj - Q2j) 2 \; J \sum_{j=1}^{N}, \; (Qj - Q2j) 2 = \Phi 2$$

It is easy to establish a parity(ratio) between the entered criterion Φ and criterion unbiased ness, based on the analysis of the decisions:

$$n_{CM} J 2\Phi \quad 1.29$$

At the above-stated way of splitting of experimental points on a sequence N1 and N2 (that is at such splitting, when the points of both sequences are equivalent in sense dispersion Q) inequality (1.29) practically always are carried out. Then from (1.29) and from an obvious inequality:

$$n_{CM} = \sum_{j=1}^{N} (Q1j - Q2j) 2 \; J \sum_{j=1}^{N} (Qj - Q1j) 2 + \sum_{j=1}^{N} (Qj - Q2j) 2 =$$

j=1 j=1 j=1

N N N N

S (Qj -Q2j) 2 + S (Qj - Q2j) 2 + S (Q2j - Qj) 2 + S (Qj - Qj 1) 2, 1.30

j=1 j=N, +1 j=N, +1 j=1

First two members in which right part are criterion Φ, the parity(ratio) (1.30) follows.

Thus, if the model is constructed by criterion Φ, she(it) is simultaneously regular with meaning(importance) of criterion of a regularity Φ or Φ2 and unbiased with meaning(importance) of criterion unbiased ness ncм J 2 Φ.

The criterion Φ is not normalized and for an estimation of correlation communication(connection) between variable, carrying casual character, it is more convenient to apply a parameter:

$$K = Ц\ 1 - \frac{\Phi}{\Phi\ \text{const}} \qquad 1.31$$

This parameter is analogue of the correlation attitude(relation), in which residual dispersion is replaced with regular criterion unbiased ness Φ 1, and dispersion on Φ const.

N N,

Φ const = S (Qj - Q1j) 2 + S (Qj - Q2j) 2 1.32

j=N, +1 j=1

Where Q1 - mathematical expectation of model,

Q1 - calculated on points of a training sequence N,

Q2 - mathematical expectation of model,

Q2 - calculated on points of a verifying sequence.

Thus, Φconst there is a meaning(importance) of regular criterion unbiased ness Φ1, received at exception of area taking MPSM all variable X,, except for identically constant X const..

It is necessary to note, that the correlation attitude(relation) based on regular criterion unbiased ness as against the usual correlation attitude(relation), residual dispersion S2 ост and general(common) S2y is equal:

$$K = Ц\ 1 - \frac{S2ост}{S2y}, \quad 1.33$$

Is a parameter nonpoliation, and regular predicting, extrapolation of communication(connection) / 16 /.

$$r\ ij = Ц\ 1 - \frac{Фij}{Фconst}, \quad 1.34$$

Where Ф ij - regular criterion unbiased ness of dependence:

$$Q = a\ (Xi) \quad 1.35$$

Фi const - regular criterion unbiased ness;

Фij - analogue residual dispersion S2;

Фi const - analogue general(common) dispersion S2y.

Proceeding from above-stated were processed take under consideration of dependence.

Results of accounts of the multiple and pair correlation attitudes(relations) (table 1.6) are resulted below. Thus, as it is visible from estimations of the pair correlation attitudes(relations) in all cases (behind exception III of the block) the rather essential communication(connection) between selections of petroleum of each of blocks with selection "actually" waters is observed. The analysis of estimations of the pair correlation attitudes(relations) shows also, that in the given time interval (I.1970г.-XII.1974г). The interrelation is observed:

1) between selections of petroleum III tectonically of the block and selections of petroleum (water) V of the block

2) between selections in II the block with total selection of petroleum and water with IV tectonically of the block.

The further geological-trade specifications of borders tectonically of blocks have shown, that a part of chinks which are taking place in V the block concern to III to the block (is specified by trade researches in 1975r.), and the part of chinks from IV of the block to II tectonically to the block (is specified in 1978r.).

Thus, the method of construction of self-organizing models (MPSM) has allowed to find dependences such as - total selection of petroleum researched tectonically of blocks - petroleum and water from the next blocks.

The given method in a combination to the analysis of estimations of the correlation attitudes(relations) between selections of petroleum and water allows to establish presence interference between blocks. It, in turn, enables rationally to adjust selection of a liquid at operation of these blocks.

This method can also be applied to construction of dependence of total selection of petroleum and water with the next chinks, which are included in one group.

Actual and settlement meanings(importance) of production of petroleum on 1 tectonically to the block

The table 1.1

Deposits "Neft Dashlari"

Years	months	Production of petroleum		error of %
		Actual	Settlement	%
1	2	3	4	5
1970	I	3340	3526	5,2
	II	2654	2616	1,4
	III	3514	3301	6,1
	IV	2841	2502	11,9
	V	3171	2595	18,2
	VI	2654	2509	5,5
	VII	1805	2150	16,0

	VIII	2155	2174	0,9
	IX	2140	1852	13,4
	X	2220	1963	11,7
	XI	2040	1772	13,1
	XII	2012	1980	1,6
1971	I	1697	2028	16,3
	II	1528	1786	14,4
	III	1927	2117	9,0
	IV	1742	1797	3,1
	V	1799	2043	11,9
	VI	1681	1886	10,9
	VII	1832	2003	8,5
	VIII	1734	2004	13,5
	IX	1707	2113	19,2
	X	1682	12017	16,6
	XI	1433	1510	5,1
	XII	1545	1655	6,6
1972	I	1333	1249	6,3
	II	1280	1204	5,9
	III	1361	1328	2,4
	IV	1207	1100	8,8
	V	1333	1397	4,6
	VI	1269	1345	5,6
	VII	1301	1592	18,3
	VIII	1326	1612	17,7
	IX	1261	1425	11,5
	X	1330	1624	15,0
	XI	1402	1641	14,5
	XII	1442	1534	6,0
	I	1322	1486	10,3

1973	II	1227	1005	18,1
	III	1300	1318	1,3
	IV	1190	1245	4,4
	V	1448	1192	17,7
	VI	0 1312	1150	12,3
	VII	1218	970	20,3
	VIII	1035	1035	0
	IX	692	853	18,9
	X	882	923	4,4
	XI	984	841	14,5
	XII	705	859	17,9
1974	I	747	865	13,6
	II	744	656	11,8
	III	762	677	11,1
	IV	672	616	8,3
	V	647	742	12,8
	VI	542	697	22,2
	VII	579	729	20,5
	VIII	578	705	18,0
	IX	556	711	21,8
	X	516	648	20,4
	XI	504	520	3,1
	XII	515	465	9,7

Actual and settlement meanings(importance) of production of petroleum on II tectonically to the block of a deposit "Neft Dashlari"

The table 1.2

Years	months	Production of petroleum		error of %
		Actual	Settlement	%
1	2	3	4	5
1970	I	70325	69898	0,6
	II	61872	58464	5,5
	III	67382	73191	7,9
	IV	62223	69985	11,1
	V	63649	72498	12,2
	VI	66706	64848	2,7
	VII	62584	52835	15,5
	VIII	61833	62897	1,6
	IX	58472	58964	0,8
	X	60330	61078	1,2
	XI	59073	59222	0,3
	XII	62651	62651	6,4
1971	I	63263	54626	13,6
	II	56589	53560	5,3
	III	61522	56906	7,5
	IV	57575	54756	4,9
	V	61037	54869	10,1
	VI	57642	53983	6,3
	VII	58196	55808	4,1
	VIII	57557	56285	2,2
	IX	59306	55445	6,5
	X	53467	53525	0,1
	XI	46837	45951	1,9
	XII	48449	52474	7,7
	I	42701	48160	11,3
	II	40554	47522	14,7

1972	III	42689	48577	12,1
	IV	39802	44501	10,6
	V	45481	45743	0,6
	VI	45868	44057	3,9
	VII	49748	42257	15,1
	VIII	49417	40818	17,4
	IX	46775	40757	12,9
	X	46619	43159	7,4
	XI	48688	41710	14,3
	XII	48257	44008	8,8
1973	I	45364	43288	4,7
	II	39888	43959	9,3
	III	43881	42606	2,8
	IV	40536	41535	2,4
	V	40980	44484	7,9
	VI	40750	42657	4,5
	VII	37663	42311	11,0
	VIII	38969	41041	5,0
	IX	37868	36743	3,0
1973	X	35606	36713	3,0
	XI	34589	39612	12,7
	XII	36058	38983	7,5
1974	I	35687	38752	7,9
	II	30694	41719	26,4
	III	37964	38302	3,4
	IV	34568	36600	5,6
	V	47453	34072	28,2
	VI	38106	36920	3,1
	VII	36641	35462	3,2

	VIII	41963	34650	17,4
	IX	41168	35176	14,6
	X	40363	33699	16,5
	XI	35511	35250	0,7
	XII	35563	38061	6,6

Actual and settlement meanings(importance) of production of petroleum on III tectonically to the block of a deposit "Neft Dashlari"

The table 1.3

Years	months	Production of petroleum		error of %
		Actual	Settlement	%
1	2	3	4	5
1970	I	36482	39149	6,8
	II	32679	35931	9,0
	III	36794	37627	2,2
	IV	37687	38244	1,5
	V	37606	38912	3,4
	VI	39700	42795	7,0
	VII	43542	43865	0,7
	VIII	45471	43108	5,2
	IX	41565	41497	0,2
	X	47976	42044	12,4
	XI	46090	42084	8,7
	XII	48511	43896	9,5
	I	46063	44180	4,1
	II	39064	41848	6,7
	III	43760	43062	1,8
	IV	43233	41468	4,1

	V	46079	43415	5,8
1971	VI	43978	41665	5,3
	VII	41934	41696	0,6
	VIII	44826	41635	7,1
	IX	43163	42917	0,6
	X	39656	38978	1,7
	XI	37855	34362	9,2
	XII	40585	35358	12,9
	I	38327	36377	5,1
	II	36625	35238	3,8
	III	40339	35965	10,8
	IV	37934	34753	8,4
1972	V	38710	37463	3,2
	VI	36437	37642	3,2
	VII	36306	38898	6,7
	VIII	35772	39983	10,5
	IX	34475	39700	13,2
	X	33370	37854	11,8
1972	XI	30169	38758	22,2
	XII	31245	38501	18,8
	I	29826	34274	13,0
	II	29207	29268	0,2
	III	31680	31932	0,8
	IV	26730	28839	7,3
	V	28266	27398	3,1
1973	VI	26552	28410	6,5
	VII	28124	24525	12,8
	VIII	21183	30526	30,6
	IX	21825	30574	28,6
	X	22429	25785	13,0

	XI	23939	21497	10,2
	XII	24142	27907	13,5
1974	I	27063	27593	1,9
	II	26700	20667	22,6
	III	33092	25507	22,9
	IV	33390	28351	15,1
	V	34951	31001	11,3
	VI	37004	36151	2,3
	VII	37177	36731	1,2
	VIII	37797	33745	0,1
	IX	38529	38339	0,3
	X	35313	35863	1,5
	XI	30739	30722	0,05
	XII	27012	28066	3,8

Actual and settlement meanings(importance) of production of petroleum on IV tectonically to the block of a deposit " Neft Dashlari "

The table 1.4

Years	months	Production of petroleum		error of %
		Actual	Settlement	%
1	2	3	4	5
1970	I	84809	83888	1,1
	II	71602	82649	13,4
	III	80237	82791	3,1
	IV	77441	80401	3,7
	V	80541	80106	0,5
	VI	79029	78147	1,1
	VII	83754	79359	5,2

	VIII	85983	77230	10,1
	IX	78903	77966	1,9
	X	83171	76673	7,8
	XI	81911	79147	3,4
	XII	76598	79936	4,2
1971	I	73983	81810	9,5
	II	67071	75224	10,8
	III	72943	77325	5,7
	IV	68550	76511	10,4
	V	71462	76519	6,6
	VI	66591	74297	10,4
	VII	64427	74285	13,3
	VIII	63179	71884	12,1
	IX	62256	73790	15,6
	X	61662	68224	9,6
	XI	60160	67976	11,5
	XII	64991	68791	5,5
1972	I	57976	66104	12,3
	II	58206	64871	10,3
	III	67027	66375	1,0
	IV	64469	69219	6,9
	V	70038	74316	5,8
	VI	72175	77560	7,0
	VII	75581	78525	3,7
	VIII	81510	77732	4,6
	IX	81013	77508	4,3
	X	83570	72295	13,5
	XI	76280	78623	3,0
	XII	75402	78378	3,8

1973	I	81638	72724	10,9
	II	74977	74015	1,3
	III	84854	72387	14,7
	IV	82546	68472	17,0
	V	81467	74213	8,9
	VI	74333	73486	1,1
	VII	75998	71161	6,4
	VIII	76179	72600	4,7
	IX	74922	73125	2,4
	X	75664	71499	5,5
	XI	73385	72294	1,5
	XII	74357	73497	1,2
1974	I	69507	68790	1,0
	II	66000	69138	4,5
	III	73056	64913	11,1
	IV	66932	69353	3,5
	V	66377	68902	3,7
	VI	62142	72207	13,9
	VII	60973	71349	14,5
	VIII	59835	66630	10,2
	IX	59419	70930	16,2
	X	62311	68625	9,2
	XI	62153	63728	2,5
	XII	60504	56146	7,2

Actual and settlement meanings(importance) of production of petroleum on V tectonically to the block of a deposit " Neft Dashlari ".

The table 1.5

Years	months	Production of petroleum		error of %
		Actual	Settlement	%
1	2	3	4	5
	I	380117	355952	6,4
	II	349381	349452	0,02
	III	384249	341146	11,2
	IV	370775	350104	5,5
	V	384293	345002	10,2
	VI	366174	345452	5,7
	VII	375155	362770	3,3
	VIII	368599	403206	8,6
1970	IX	362695	366921	1,2
	X	363065	395115	8,1
	XI	360927	392358	8,0
	XII	361528	392620	7,9
	I	380070	388003	2,0
1971	II	343504	350541	2,0
	III	382374	384534	0,6
	IV	369026	399238	7,6
	V	375798	391734	4,1
	VI	376643	358528	4,8
	VII	364889	350012	4,1
1971	VIII	371751	375295	0,9
	IX	359858	354470	1,5
	X	355246	337996	4,9
	XI	347403	325016	6,4
	XII	366559	346830	5,4
	I	675514	660840	2,2
	II	636453	565606	11,2

	III	653836	650117	0,6
	IV	635292	570583	10,2
	V	632428	606890	4,0
1972	VI	598711	564273	5,8
	VII	594562	533673	10,2
	VIII	579942	614940	5,7
	IX	571233	624674	8,6
	X	580686	576874	0,7
	XI	568337	530353	6,7
	XII	549443	546398	0,6
	I	272988	324183	15,8
	II	247062	310630	20,5
	III	258996	320390	19,2
	IV	269892	300892	10,3
	V	280118	301183	7,0
	VI	272790	284814	4,2
1973	VII	282554	283846	0,5
	VIII	279195	259680	7,0
	IX	271250	264310	2,6
	X	275510	242176	12,1
	XI	260539	266277	2,2
	XII	269132	266508	1,0
	I	269551	267961	0,6
	II	238617	277638	14,1
	III	260366	269150	3,3
	IV	246472	250940	1,8
	V	250645	248653	0,8
	VI	242252	239516	1,1
1974	VII	240712	243641	1,2
	VIII	235847	262464	10,1

	IX	227312	242158	6,1
	X	220828	238489	7,4
	XI	212894	234240	9,1
	XII	214438	216377	0,9

Results of accounts of the multiple and pair correlation attitudes(relations) on the data

Deposits " Neft Dashlari "

The table 1.6

Tectonically. Block	Q^1_n	Q^1_b	Q^2_n	Q^2_b	Q^3_n	Q^3_b	Q^4_n	Q^4_b	Q^5_n	Q^5_b	*Coif. Correla-tions*
Q^1_n		0,72	0,46	0,44	0,33	0,11					0,86
Q^2_n	0,10	0,32		0,85	0,05	0,00	0,82	0,81			0,98
Q^3_n	0,31	0,20	0,16	0,00					0,81	0,78	0,97
Q^4_n			0,26	0,04				0,86	0,36	0,05	0,92
Q^5_n					0,24	0,22	0,28	0,16		0,89	0,92

1.3 Forecasting selection of petroleum in view of definition of stages of development.

Allocation of stages of development on a basis kinetically of model Kolmogorov-Erofeyev.

The objective analysis and forecast of parameters of development of petroleum deposits is a major means for regulation of its(her) condition and behaviors ensuring rational extraction of resources.

The long experience of development of petroleum deposits has shown necessity of allocation for this process of a number(line) of stages essentially(much) differing as on character of dynamics(changes) of the basic parameters, and distribution,

connected to it,(him,) of material forces and means for production. In particular, for vicissitude of study of the given development it is offered, from the point of view of dynamics(changes) of production of petroleum, to subdivide a history of operation of deposits into four stages. Features of the specified stages (durations, the levels of selections etc.) in many respects define(determine) the current and final technical and economic parameters of development, in this connection, vicissitude it should comprehensively be taken into account both at designing, and during realization of systems of development of objects.

First of all, the revealing of the basic laws inherent in various stages of development, assumes objective enough and exact differentiation of separate stages at the analysis of dynamics(changes) of development. The division of dynamics(changes) of development of deposits into four stages can be considered for today most standard. Let's result the characteristics of these stages.

The first stage (development of operational object) is characterized basically drilling of a fixed capital of chinks, development of system of maintenance of bed pressure and growth of production of petroleum at small (B=1-5 of %) watering of extracted production.

The second stage (maintenance of the achieved maximum level of production of petroleum) is characterized by a rather stable high level of production of petroleum, increase watering of production by the end of the period and, accordingly, at initial fontan a way of operation, transition of a part of obtaining chinks to the mechanized way of operation.

The third stage (significant decrease(reduction) of production of petroleum) is characterized progressing water fuelling of production, decrease(reduction) of a level of production of petroleum, translation of a significant part of fund of chinks on the mechanized way of operation, leaving of some part of chinks from working fund.

The fourth stage (finishing) is characterized low, slowly decreasing levels of production of petroleum, high watering of all chinks and production, extracted from object.

The first and second stage, during which the basic part of stocks is selected, and the rather high rates of selection of initial taken stocks are kept, form the basic period of development.

The third and fourth stage appropriate to fall of production of petroleum, make the late period of development.

For considered(examined) horizon SP (IV of the block) deposit "Neft Dashlari" (fig. 1.2) the period of slow decrease(reduction) of a level of production of petroleum is absent, and the third stage is on late - finishing development.

Pointed of a rule(situation) are substantially reflected in accuracy and productivity used now of methods of mathematical modeling and the forecast of dynamics(changes) of parameters of development.

For allocation of borders of stages of development in the given work the opportunity of the description of process oil-recovery by analogy with kinetically of the chain ramified chemical reactions developing on the basis of own power resources is considered.

The depth of course of such reactions c (t) is the basic parameter of development of process and is defined(determined) as:

$$c(t) = 1 - N(t) / N0 \quad 1.36$$

Where N0 - initial quantity(amount) reagent in a liquid phase;

N (t) - number reagent in the liquid phase, which has stayed to the moment t.

According to the equation Kolmogorov - Erofeyev, the depth of course of chemical chain reaction c to the moment of time t is equal / 3 /:

$$c = 1 - \exp(- K\,0\,tq) \quad 1.37$$

At the description of process of production of petroleum analogue c (t) will be factor oil-recovery h (t) and the expression 1.37 can be written down so:

$$h(t) = 1 - Q(t) / Q0 \quad 1.38$$

Where Q0 - initial balance stock of petroleum in a deposit;

Q (t) - residual to the moment of time t a taken stock of petroleum in a deposit (or

h (t) = Qн.нак/ Qзап, where Qн.. нак - saved selection of petroleum from a layer, Qзап - taken stock of petroleum in a deposit).

Accordingly, for dynamics(changes) of factor oil-recovery we shall have the equation:

$$h = 1 - \exp(- K0\ t\ q)\ 1.39$$

Is indicative, that statistical analogue kinetically of the equations 1.37 and 1.39 is widely used in the theory of reliability of systems the function of distribution Veybulla

$$Fx(t) = 1 - \exp(- l0tq),\ 1.40$$

charakterize probability of failure(refusal) of an element during the period of tests t.

Density of distribution of probability looks like:

$$¦ x(t) = dFx / dt = al0\ t\ a\text{-}1 \exp(- l0ta),\ 1.41$$

Where the size l = al0ea-1 - "factor" (failure rate) - is the important characteristic of distribution Veybulla.

The typical function of failure rate in the theory of reliability and, in particular, in statistical distribution Veybulla, has U- the figurative form. Last corresponds(meets) to three " to the periods of life " of mechanical devices: a site of decreasing failure rate - period "development" or " of early failures(refusals) ", site of constant failure rate - " of normal operation ", and site of increase of failure rate - period of "deterioration" or "aging".

The comparison of the specified statistical laws of mechanical systems to development and vicissitude of process of development of petroleum layers also specifies an opportunity of realization of the certain analogies. As is known, the idealized structure of dynamics(changes) of production of petroleum represents " a classical trapeze ", in essence conterminous with the form of function of failure rate. Accordingly I the stage, when there is drilling, an arrangement of a deposit, input of chinks in operation and, hence, increase of selections of petroleum, can reflect the period "burn-in"; II the stage described by the maximal and relative stable pro-

duction of petroleum, answers the period " of normal operation ", and III and IV stages described by fall of production of petroleum and significant growth watering, can correspond(meet) to the period of "aging".

Thus, it is possible to assume, that kinetically the equation 1.39 and statistical distribution, appropriate to it,(him,) Veybulla 1.40 can be taken for a basis of the description of dynamics(changes) of selections of petroleum while in service lie too long and, thus, specifications of borders of stages of development.

Practically given approach can be realized on the basis of transformation and subsequent analysis of the initial data of dynamics(changes) of development. The equation 1.39 will be transformed by double logarifming of his(its) both parts as follows:

$$1 - h = \exp(-l0tq),\ \ln(1 - h) = -l0tq,\ -\ln(1 - h) = l0t,$$

$$\ln[-\ln(1 - h)] = \ln(l0) + q \ln t, \text{ whence}$$

$$\ln[-\ln(1 - h)] = a + b \ln t \quad 1.42$$

As it is visible, the expression 1.42 represents the equation of a straight line in coordinates

$\ln[-\ln(1 - h)]$ and $\ln t$ with factors $a = \ln(l0)$ and $b = q$. It is obvious, that changes of stages of development, by analogy to change of failure rate in distribution Veybulla, is accompanied by change of factors and b, that should result in breaks of dynamics(changes) of production in the given coordinates.

Let's consider application kinetically of the equation 1.42 for allocation of stages of development of horizon SP (IV the block) deposit "Neft Dashlari", dynamics(changes) of which basic parameters is submitted in the table 1.7 and on it(her) the diagram submitted in a fig. is constructed 1.3.

As it is visible from dynamics(changes) of the basic parameters of development, in the period till 1962 the growth of production of petroleum occurs, basically, owing to increase of fund of obtaining chinks. If in 1956г. the annual production has made 0,9 thousand .т., in 1962 up to the meaning(importance) 107.5 thousand's accordingly has increased. Further, in connection with intensive drilling of horizon the increase of growth of annual volume of extracted production up to

184 - 190 years/years is observed, and the increase of production of petroleum proceeds till 1972 and makes 190 thousand's - peak of production. Such character of increase of parameters of process of oil extracting, basically, is connected to efficiency spent watering and with intensive drilling of a layer, where the number of chinks has made 40 units for date -1973r. With increase of number of chinks the increase of production of water is observed also. If by 1962 was extracted only 10,2 thousand's of water per one year, 1965 the production of water has made already about till 22 years/years, i.e. in 2 times is higher.

The next years the level of the maximal production of petroleum caused by increase of number of obtaining chinks is rather kept. However, despite of the further increase of number of working fund of chinks up to 40 units, since 1972, the technological parameters of production of petroleum tend falls of annual volume. If in 1972 the production of petroleum has made 190 thousand's, in 1982 she(it) has made 59 thousand т. Here, despite of increase of growth of production of a liquid, the reduction of a share part of petroleum is obliged to percentage increase watering of production. So, for example, the production of water by 1982 has increased up to 115 thousand's. From dynamics(changes) of parameters of development follows, that the further increase of number of chinks up to 28 units has not resulted in a significant gain of production of petroleum.

As it is visible from dynamics(changes) of selections of petroleum come on one chink of operational fund (specific production), shown on a fig. 2.2, the unequivocal allocation of characteristic stages is inconvenient enough. So for the end I of a stage any year with 1961 for 1963 can be accepted.

Similarly for the end II of a stage any year can be accepted during development with 1972 for 1977. The considered(examined) period of time is characterized by essential increase of rate of fall of production of petroleum.

From the given analysis follows, that for acceptance of the decision about allocation of stages of development it is necessary to take into account both current condition of production, and dynamics(changes) of the basic parameters of development, and for specification of borders of transition from one stage in another the

application of the device of mathematical methods is necessary. With this purpose the opportunity of application kinetically of model described by the equation is considered 1.42. For the first time substantiation and opportunity of application kinetically of models for allocation of development cycles was carried out on faculty « Development and operation of petroleum deposits » under the direction of the academician

A.X. Mirzadjanzade.

For allocation of characteristic stages in a fig. 2.3 the dependence ln is submitted [-ln (1-h)] = f [ln (t)] (i.e. dynamics(changes) of change of factor oil-recovery), designed on the COMPUTER and brought in the table 1.8 according to the equation 1.42. According to the above-stated procedure of the analysis is received, that period of development till 1962, up to which the growth of annual selections of petroleum is observed, corresponds(meets) period "of «operating time", period with 1962 on 1975, during which the maximal selections on horizon were observed, corresponds(meets) to the period « of normal operation », and period after 1975 - period "of «aging" of a deposit. Hence, 1962 and the 1975 represent accordingly points of transition with first on second and with second on a third of a stage of development of horizon.

The received results will well be coordinated to dynamics(changes) of the basic parameters of development (fig. 2.1), and also dynamics(changes) of specific production (fig. 2.2). During operation till 1962 the moderate production is observed at small number of chinks and almost by absence of water in taken production. With increase of number of chinks in 1962 the maximum level of production of petroleum is reached(achieved) and further at the expense of commissioning new chinks the achieved level is kept till 1975, and date of development 1962 r. appear by transition with first on the second stages.

The similar picture is observed and for date of development of 1975, when occurs sharp watering of obtaining chinks. So if the production of water in 1962 was only 10,2 thousand т, in 1975 the production of water has reached(achieved)

77,5 thousand т. As a consequence, beginning of fall of production of petroleum, despite of increase of number of obtaining chinks.

Thus, with application kinetically of the approach to the analysis of dynamics(changes) of the basic parameters of development on operational object it is possible unequivocally enough to allocate characteristic stages of development.

Annual parameters of development of horizon SP (IV the block)

Deposits « Neft Dashlari»

The table 1.7

Year	Quantity(amount) of active chinks		Selection of petroleum		Selection of water		Volume pumping
	Production	Injection	current	total	current	total	
T, years	$N_{prod.}$	$N_{inj.}$	Q_i, thousand's t	Q_i, thousand's t	Q_b, thousand's t	Q_{bi}, thousand's t	V_{tot}, thousand's $м^3$
1956	2		0,9	0,9			
1957	2		11,1	12,0			
1958	2		15	27			
1959	3		17	44			
1960	5		19	63	0,8	0,8	
1961	14	1	93,8	156,8	4,0	4,8	9,5
1962	13	3	107,5	264,3	10,2	15	173,5
1963	15	5	85,2	349,5	19	34	388,9
1964	17	5	75,6	425,1	20	54	507,3

1965	17	5	53,4	478,5	21,9	75,9	340,7
1966	19	4	91,8	570,3	21,4	97,3	302,5
1967	20	5	87,6	657,9	16,3	113,6	294,9
1968	21	6	96,4	754,3	44,6	158,2	262
1969	18	8	72	826,3	65,4	223,6	295,8
1970	20	8	64	890,3	41,7	265,3	339,9
1971	32	6	88	978,3	38,3	303,6	536,1
1972	34	6	190	1168,3	77,9	381,5	562,1
1973	40	7	184	1352,2	93,2	474,7	718,3
1974	30	7	129	1481,3	105,7	580,4	440
1975	27	4	74	1555,3	77,5	657,9	321
1976	22	5	57	1612,3	57,6	715,5	310,9
1977	26	5	61	1673,3	69,5	785	307
1978	33	5	89	1762,3	91,5	876,5	246,6
1979	30	3	97	1859,3	116,2	992,7	382,8
1980	31	3	85	1944,3	129	1121,7	264,1
1981	29	3	83	2027,3	101,5	1223,2	168,7
1982	29	4	59	2086,3	115,4	1338,6	201,1
1983	22	5	56	2142,3	93	1431,6	252,6
1984	21	3	41,5	2183,8	68,4	1500	160,3
1985	23	4	49,8	2233,6	67,1	1567,1	132
1986	17	5	63,9	2297,5	72,5	1639,6	147,2
1987	16	1	43,6	2341,1	62	1701,6	7,7
1988	18	2	39,1	2380,2	50,2	1751,8	8,1
1989	18	1	40	2420,2	40	1791,8	6,2
1990	23		37,8	2458	47,5	1839,3	
1991	28		44,1	2502,1	27,7	1867	
1992	22		44,5	2546,6	33	1900	
1993	27		57,3	2603,9	40,9	1940,9	

1994	22		33,4	2637,3	43,4	1984,3	
1995	22		29	2666,3	52	2036,3	
1996	23		27,6	2693,9	47,9	2084,2	
1997	20		27,1	2721	44,9	2129,1	
1998	15		22,8	2743,8	33,3	2162,4	
1999	17		17,7	2761,5	35,9	2198,3	
2000	15		18	2778,5	24,2	2222,5	
2001	16		17,2	2795,7	21,1	2243,6	

Deposit « Neft Dashlari» horizon SP (IV the block).

Allocation of stages of development by a method Kolmogorov - Erofeyev.

The table 1.8

T	$Q_{n.tek}$, thousand t	$Q_{n.nak.}$, thousand t	ln[- ln(1-η)]	ln (T)
1956	0,9	0,9	-8,133016527	7,578656851
1957	11,1	12	-5,540935412	7,579167967
1958	15	27	-4,727545162	7,579678823
1959	17	44	-4,236392093	7,580189418
1960	19	63	-3,874301677	7,580699752
1961	93,8	156,8	-2,946690021	7,581209826
1962	107,5	264,3	-2,40596775	7,58171964
1963	85,2	349,5	-2,111374239	7,582229194
1964	75,6	425,1	-1,901753826	7,582738489
1965	53,4	478,5	-1,773475884	7,583247524
1966	91,8	570,3	-1,580466234	7,583756301
1967	87,6	657,9	-1,420368896	7,584264818
1968	96,4	754,3	-1,264087134	7,584773078
1969	72	826,3	-1,157877604	7,585281079
1970	64	890,3	-1,069567661	7,585788822

1971	88	978,3	-0,955905906	7,586296307
1972	190	1168,3	-0,734110778	7,586803535
1973	184	1352,3	-0,541325216	7,587310506
1974	129	1481,3	-0,415085706	7,58781722
1975	74	1555,3	-0,345118247	7,588323677
1976	57	1612,3	-0,292194002	7,588829878
1977	61	1673,3	-0,236328153	7,589335823
1978	89	1762,3	-0,155942326	7,589841512
1979	97	1859,3	-0,069363735	7,590346946
1980	85	1944,3	0,006075586	7,590852124
1981	83	2027,3	0,079772681	7,591357047
1982	59	2086,3	0,132411242	7,591861715
1983	56	2142,3	0,182737049	7,592366129
1984	41,5	2183,8	0,220354252	7,592870288
1985	49,8	2233,6	0,265966861	7,593374193
1986	63,9	2297,5	0,325457777	7,593877845
1987	43,6	2341,1	0,366827938	7,594381243
1988	39,1	2380,2	0,404582067	7,594884387
1989	40,0	2420,2	0,443956489	7,595387279
1990	37,8	2458,0	0,481977936	7,595889918
1991	44,1	2502,1	0,527506239	7,596392304
1992	44,5	2546,6	0,574957896	7,596894438
1993	57,3	2603,9	0,638790203	7,59739632
1994	33,4	2637,3	0.677719195	7,597897951
1995	29,0	2666,3	0,712750569	7,598399329
1996	27,6	2693,3	0,747318687	7,598900457
1997	27,1	2721,0	0,782604443	7,599401333
1998	22,8	2743,8	0,813477576	7,599901959
1999	17,7	2761,5	0,838295131	7,600402335

2000	18,0	2779,5	0,864391283	7,600902460
2001	16,3	2795,8	0,911842940	7,601402612

2. Analysis of development of objects of a deposit « Neft Dashlari»

In the first chapter following /7/ the application of a method of construction of self-organizing models (MPSM) to the decision of a problem of an establishment of interaction between blocks of a deposit « Neft Dashlari» was shown. The similar approach is applicable for an establishment of interrelation between layers in blocks, and also between by layers in oil-saturated collectors. Specified in /7/ technique, also is applicable(applied) and for an establishment of interrelation between chinks in each block. All these measures are necessary for allocation of base of chinks producing one object, with the purpose of increase of reliability of reception of the information and efficiency of the forecast, process of development and management of oil extracting.

The following stage of increase of reliability of the forecast, revealing potential resort of collectors and obtaining chinks is the definition of stages of development oil-bearing of layers and obtaining chinks. In this direction the large work under the direction of the academician A.H.Mirzajanzade is carried out by(with) collective of faculty " Development and operation of petroleum deposits " of the Azerbaijan state petroleum academy / 1,2,3,4,6 /.

The long experience of development of petroleum deposits has shown necessity of allocation for this process of a number(line) of stages essentially(much) differing as on character of dynamics(changes) of the basic parameters, and distribution, connected to it,(him,) of material forces and means for production. In particular, for step by step of study of the given development it is offered, from the point of view of dynamics(changes) of production of petroleum, to subdivide a history of operation of deposits into four stages. Features of the specified stages (durations, the levels of selections etc.) in many respects define(determine) the current and final technical and economic parameters of development, in this connection, vicissitude it should comprehensively be taken into account both at designing, and during realization of systems of development of objects.

First of all, the revealing of the basic laws inherent in various stages of development, assumes objective enough and exact differentiation of separate stages at the

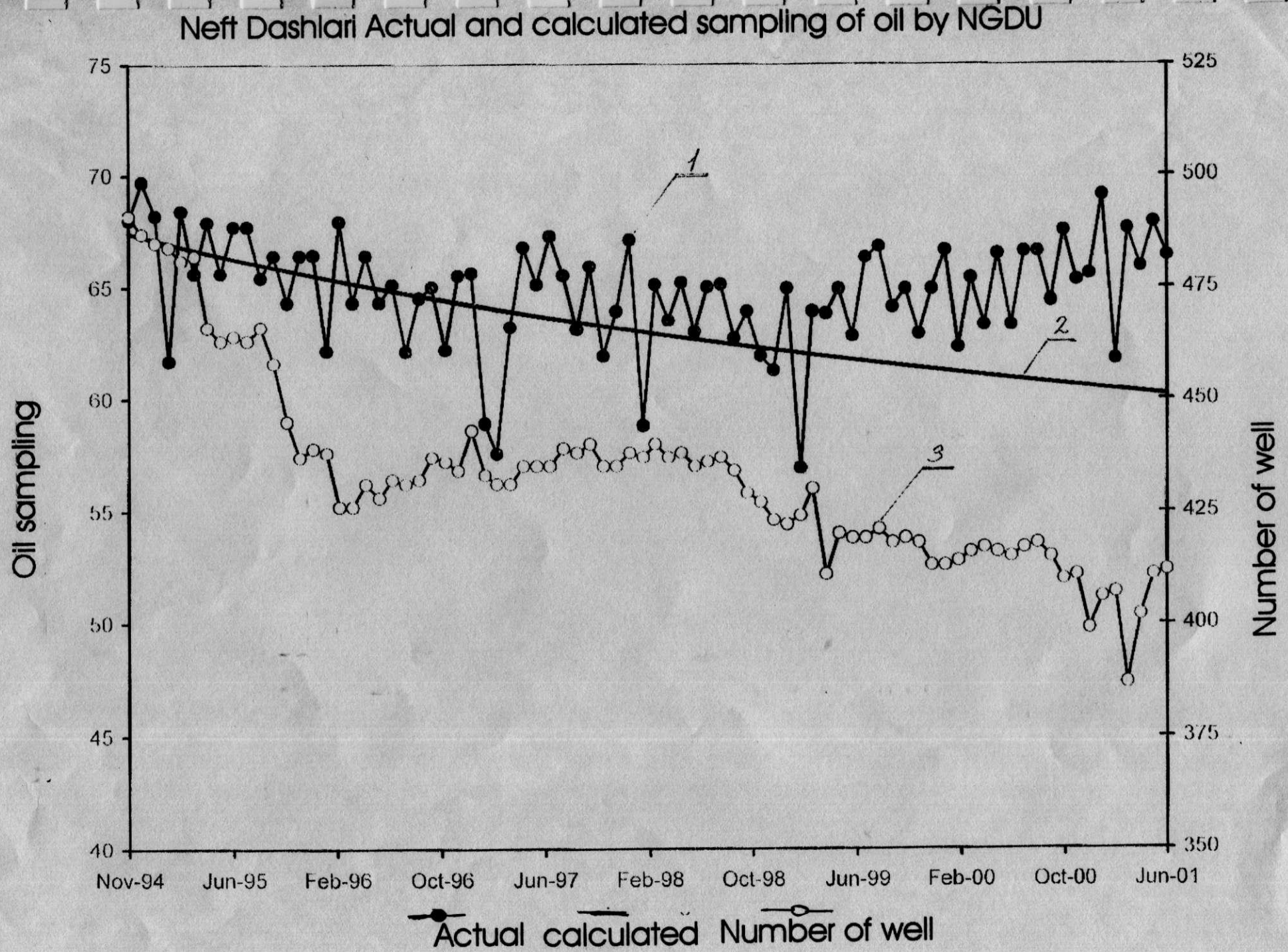

Neft Dashlari Actual and calculated sampling of oil by NGDU
Oil sampling
Number of well
75
70
65
60
55
50
45
40
525
500
475
450
425
400
375
350
Nov-94
Jun-95
Feb-96
Oct-96
Jun-97
Feb-98
Oct-98
Jun-99
Feb-00
Oct-00
Jun-01
1
2
3
Actual calculated Number of well

рис. 2.1

analysis of dynamics(changes) of development. The division of dynamics(changes) of development of deposits into four stages can be considered for today most standard. Let's result the characteristics of these stages.

The first stage (development of operational object) is characterized basically drilling of a fixed capital of chinks, development of system of maintenance of bed pressure and growth of production of petroleum at small (B=1-5 of %) watering of extracted production.

The second stage (maintenance of the achieved maximum level of production of petroleum) is characterized by a rather stable high level of production of petroleum, increase watering of production by the end of the period and, accordingly, at initial by fontan a way of operation, transition of a part of obtaining chinks to the mechanized way of operation.

The third stage (significant decrease(reduction) of production of petroleum) is characterized progressing watering of production, decrease(reduction) of a level of production of petroleum, translation of a significant part of fund of chinks on the mechanized way of operation, leaving of some part of chinks from working fund.

The fourth stage (finishing) is characterized low, slowly decreasing levels of production of petroleum, high watering of all chinks and production, extracted from object.

The first and second stage, during which the basic part of stocks is selected, and the rather high rates of selection of initial taken stocks are kept, form the basic period of development.

The third and fourth stage appropriate to fall of production of petroleum, make the late period of development.

In the given part of a statement we shall result a logic sequence of realization of the analysis of development of a deposit « Neft Dashlari», taking into account dynamics(changes) of change of the basic technological parameters.

In figure 2.1 dynamics(changes) of actual and settlement production of petroleum, and also number of obtaining chinks on NGDU as a whole is given during time since November, 1994 till June, 2001. The settlement meanings(importance)

of selections of petroleum are carried out(spent) with the help of application of a method of evolutionary modeling.

The practical experience of process of production is long developed oil-gas of deposits shows, that at the certain stage of development the most authentic forecasts of taken stocks can be received by application evolutionary model look for example 4, 6/. At such approach the petroleum deposit is considered(examined) as complex(difficult) system consisting of a number(line) of subsystems, the process of which growth carries evolutionary character, which course is defined(determined) by set of the characteristics of subsystems and complex of external influences as a whole on system. During oil extracting such factors can be change of bed pressure, change of fund of chinks, watering, phase transformations, various kinds of influence on a layer etc.

Under action of the above-stated factors, the curves of growth of parameters of development can have various character determined by a degree of influence of set of all factors on process of oil extracting, which can be described on the basis of evolutionary model of a kind:

$$Q_{н.нак.} = A + B\ ea T,$$

Where: And, In, and - factors of model at a considered(examined) stage (stage) of the characteristic of growth,

T - years of development;

$Q_{н.нак.}$ - size of the saved selection of petroleum, and at T ® Г;

$Q_{н.нак.}$ ® And - taken stocks of petroleum in a deposit.

The procedure of account of taken stocks by a method of evolutionary modeling consists of two stages.

On the first investigation phase the analysis of the initial information (interval of training will be carried out (spent)) and the forecast for the subsequent stage prognoses of the information (interval of examination) is made, and, the task of an interval of time and accuracy of the forecast is necessary, as they essentially influence reliability of result. With the help dispersion of the analysis actual and settlement given of selection the most authentic kind of model is defined (determined).

At the following stage, on the basis of evolutionary model with the certain factors And, In, and the forecast of the saved selection and definition of a taken stock of petroleum under condition of an invariance of parameters of system of development further is made.

The evolutionary modeling of growth of production of petroleum and application dispersion of the analysis determined parameters of models, with a sufficient degree of accuracy of system, describing behavior.

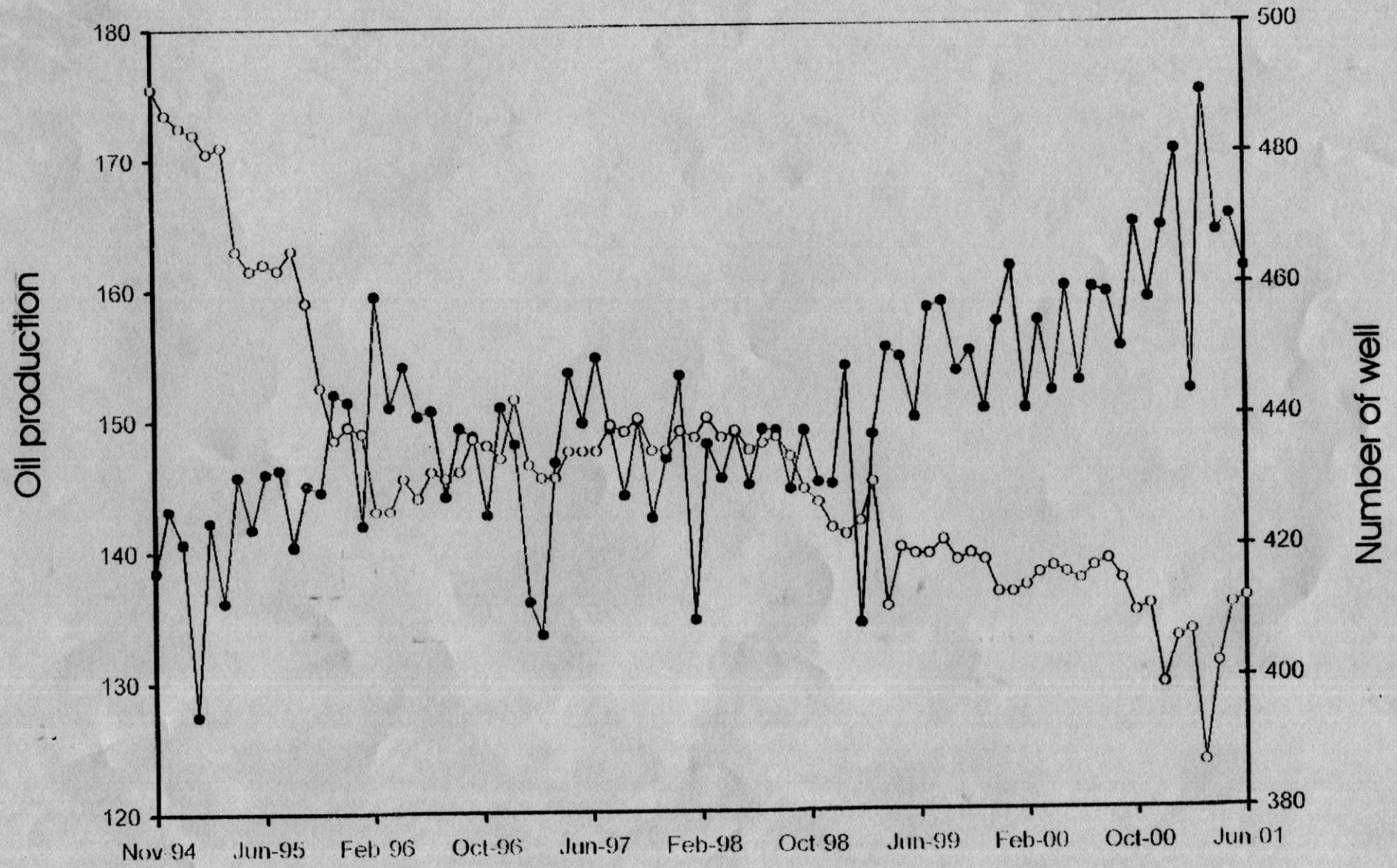
The comparison of actual and settlement meanings (importance) of selections of the petroleum which has been carried out(spent) on the basis of application of evolutionary modeling, has established presence of a gain of production of petroleum despite of reduction of number of obtaining chinks. The increase of production first of all is traditional the increases of quantity(amount) of obtaining chinks charge, in our case it is necessary to search for other source of increase of production of petroleum, with this purpose the procedure of the dynamic analysis will be carried out(spent). In figure 2,1 since June, 1999 the fall of number of working chinks (curve 3) is observed, and the size of actual selection of petroleum (curve 1) increase, though the forecast - settlement meanings(importance) of the extracted petroleum (curve 2) shows the tendency of fall of production. The establishment of the reason of increase of selections of petroleum will allow to prolong the period of increase debito and if necessary to adjust it(him).

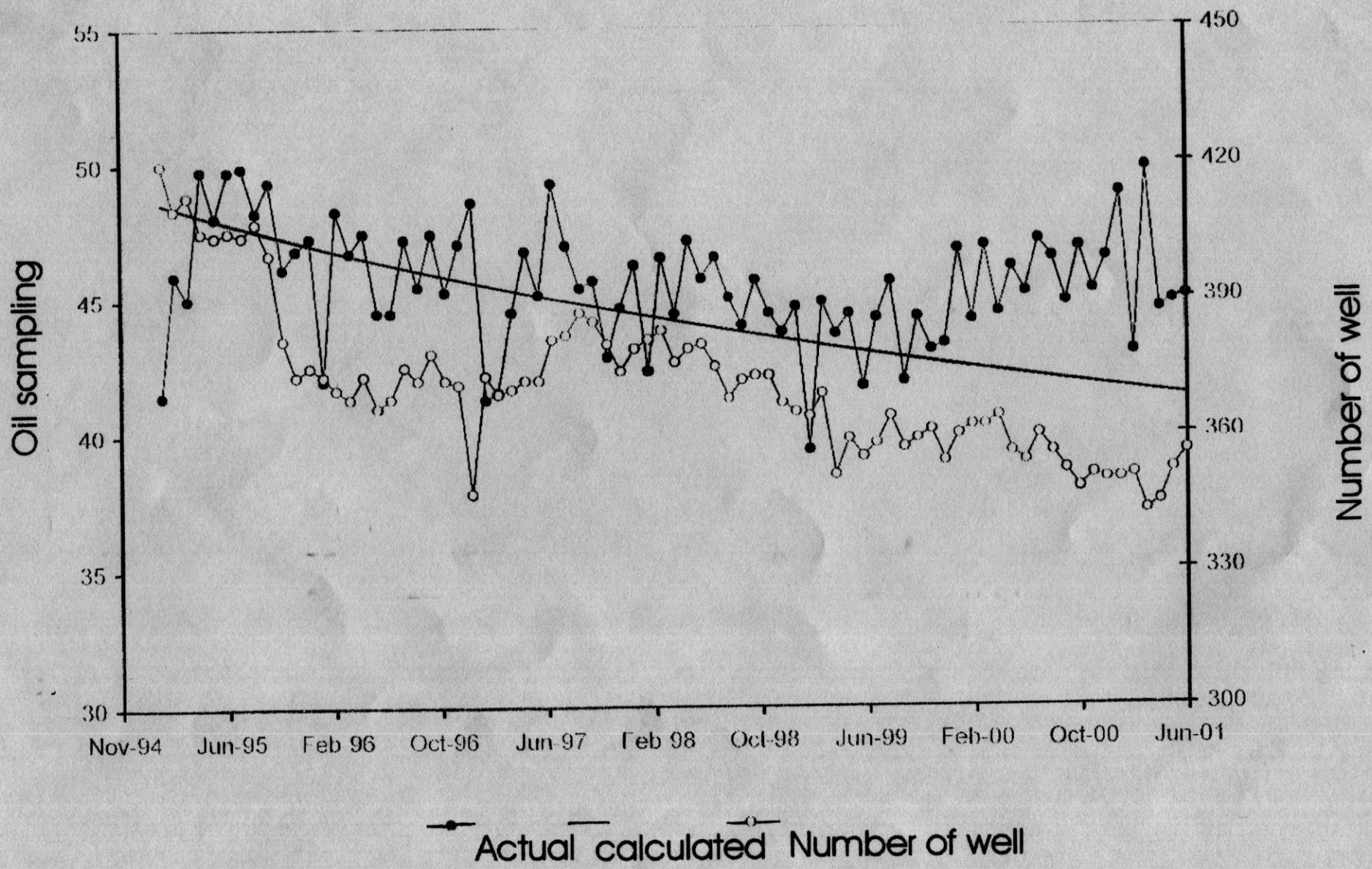
The process of increase of production of petroleum can be influenced by(with) set of the factors such as: number of working chinks, geo- technical measures, specific development(manufacture) of compressors, pressure on reception of compressors, size of selection of gas and others. Consistently analyzing the contribution of the various factors it is possible to allocate basic, productions, influencing increase.

As the increase of production of petroleum in our case poorly depends on quantity(amount) of obtaining chinks, there was a doubt, that exception of production with less debit of chinks and the input new high with debit of chinks can result in growth of production of petroleum. For entering clearness into this question it is

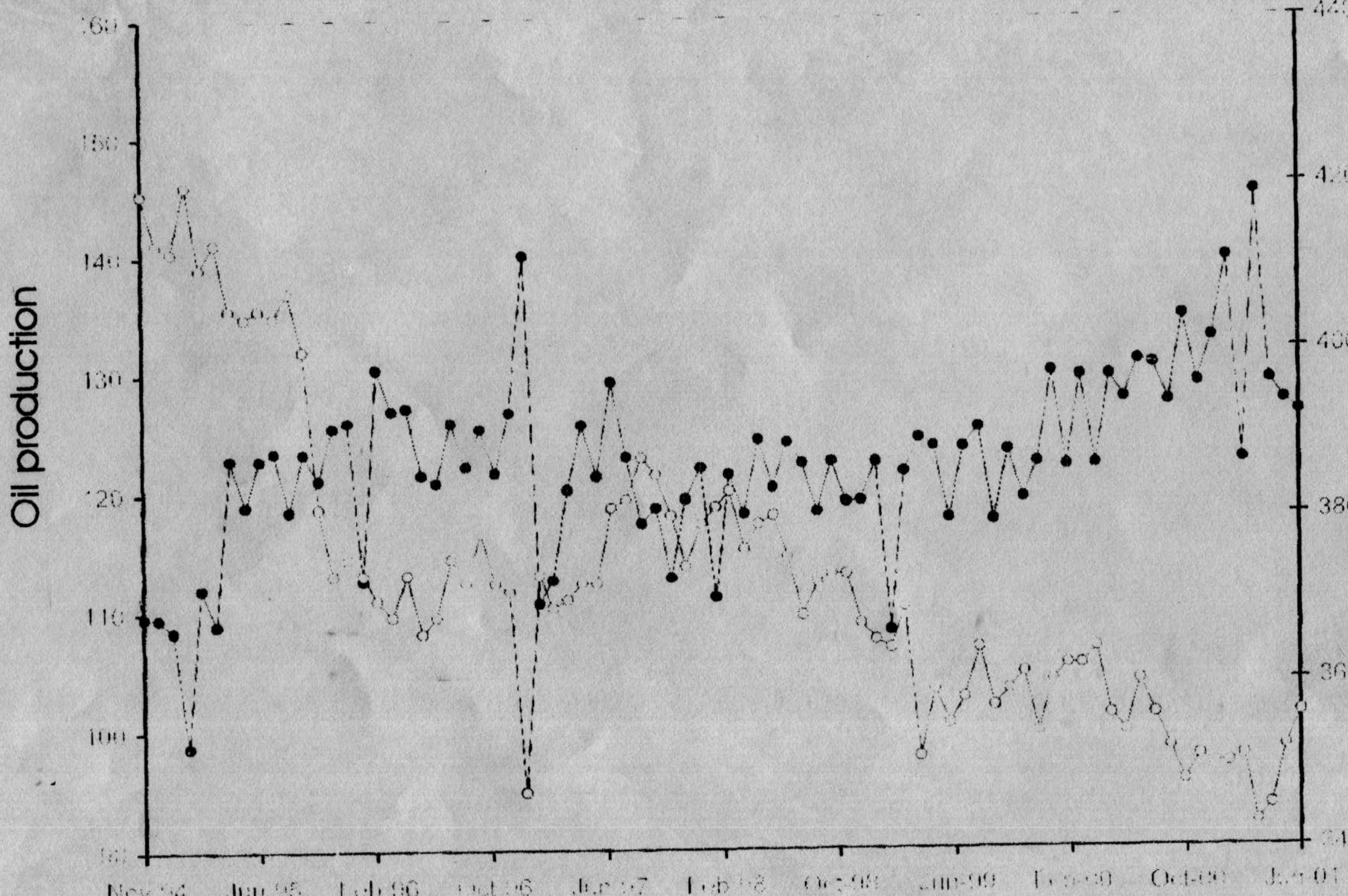
necessary to analyze result of specific production of petroleum. With this purpose in figure 2.2 dynamics(changes) of specific production and numbers of obtaining chinks on NGDU as a whole in the period with 11. 1994 for 06.2001 years (researched period) is given. From figure it is visible, that since November, 1994 till October, 1996 the increase of specific production with 140 т up to 150 т on the average on 10 т, and decrease(reduction) of quantity(amount) of chinks with 490 up to 440 chinks on the average on 50 chinks is observed. The further stabilization of number of chinks stabilizes specific production of petroleum till October, 1998. Since October, 1998 till June, 1999 the quantity(amount) of working chinks has decreased with 440 up to 420 on the average on 20 chinks, however, increase of specific production of petroleum has taken place with 150 т up to 170 т on the average on 20 т. The rate of change of specific production of petroleum in the beginning of the period of research has made 10: 50 = 0,2 т ./hard currency, in middle of the researched period practically did not vary, and at the end of the period of research has made 20: 20 = 1 т/ well. From here follows, that on increase of production of petroleum the reduction of working obtaining chinks is weak
Influence, it is necessary to search for other reason. As the change of quantity(amount) of working obtaining chinks practically does not influence production we shall check up quality of working chinks.

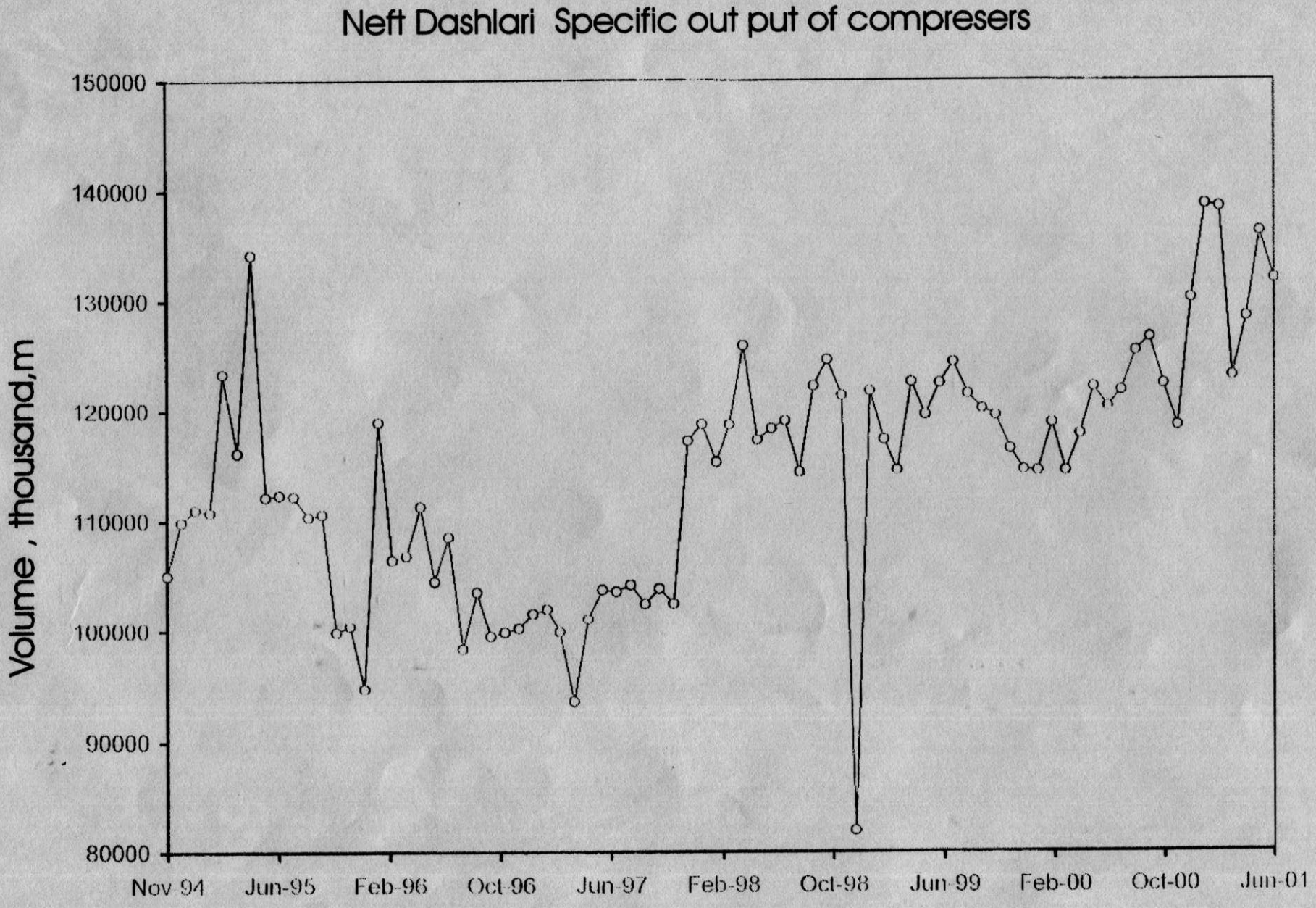
The business in that fund of obtaining chinks consists, basically, from gas lift, to a lesser degree fontan and absolutely insignificant quantity(amount) of the mechanized chinks. For allocation of the contribution in production dominant gas lift of chinks dynamics(changes) of actual and settlement selections of petroleum and number obtaining gas lift of chinks since November, 1994 till June, 2001 given in figure was constructed 2,3. From figure it is visible, that the comparison of actual and settlement meanings(importance) of selections of petroleum, has allowed to establish presence of a gain of production of petroleum, despite of reduction of number of obtaining chinks. It is necessary to note, that comparison of dynamics(changes) of production of petroleum as a whole on NGDU « Neft Dashlari » (figure 2,1) and dynamics(changes) of production of petroleum gas lift by chinks

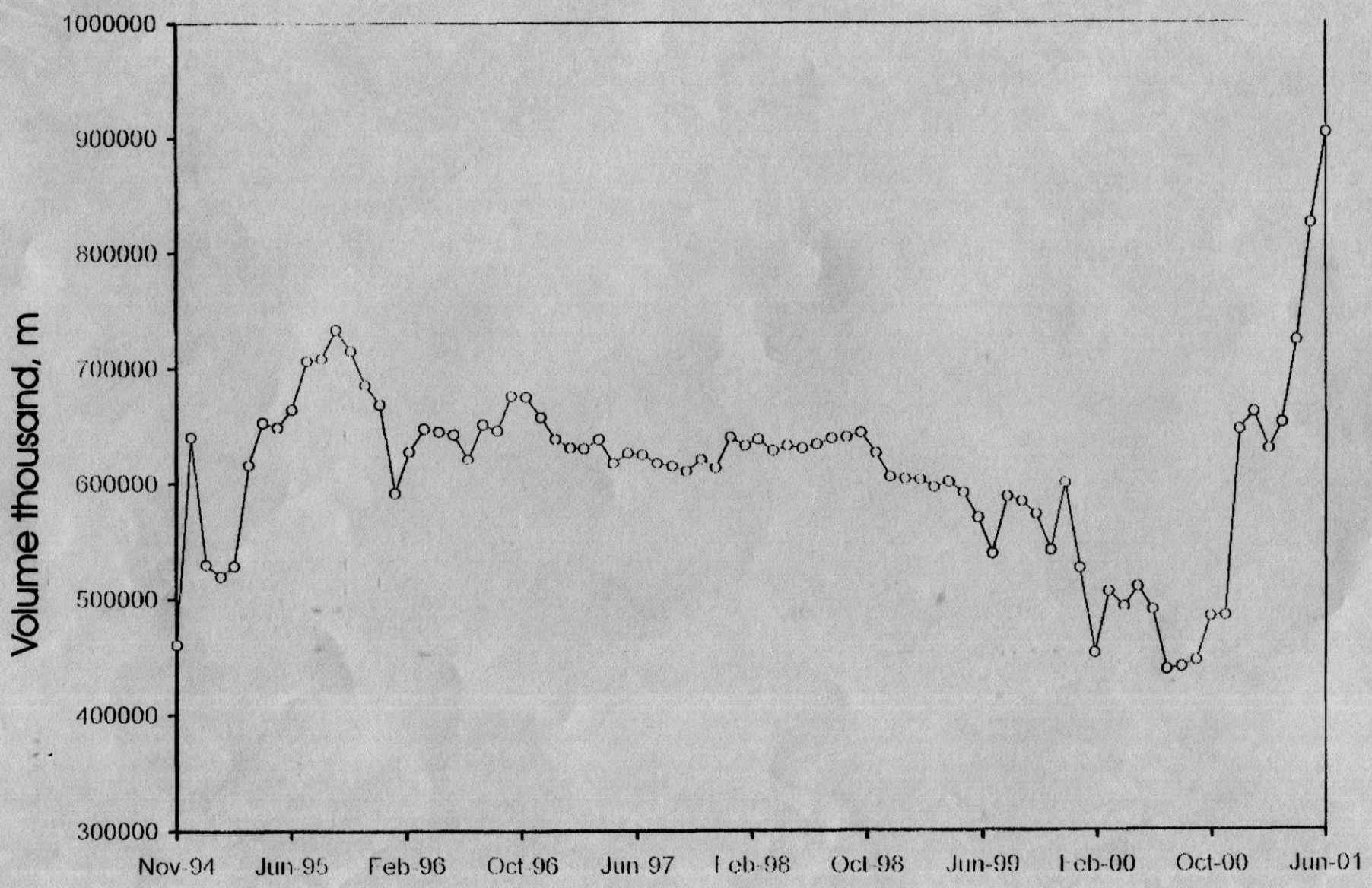

Neft Dashlari Specific Oil production by NGDU
Oil production
Number of well
180
170
160
150
140
130
120
500
480
460
440
420
400
380
Nov-94
Jun-95
Feb 96
Oct-96
Jun-97
Feb-98
Oct 98
Jun-99
Feb-00
Oct-00
Jun 01


Neft Dashlari Actual and calculated sampling of oil (gas lift wells)
Oil sampling
55
50
45
40
35
30
450
420
390
360
330
300
Number of well
Nov-94
Jun-95
Feb 96
Oct-96
Jun-97
Feb 98
Oct-98
Jun-99
Feb-00
Oct-00
Jun-01
Actual
calculated
Number of well

Neft Dashlari Specific oil production by gas lift well




Neft Dashlari Specific out put of compresers
Volume , thousand,m
150000
140000
130000
120000
110000
100000
90000
80000
Nov 94
Jun-95
Feb-96
Oct-96
Jun-97
Feb-98
Oct-98
Jun-99
Feb-00
Oct-00
Jun-01

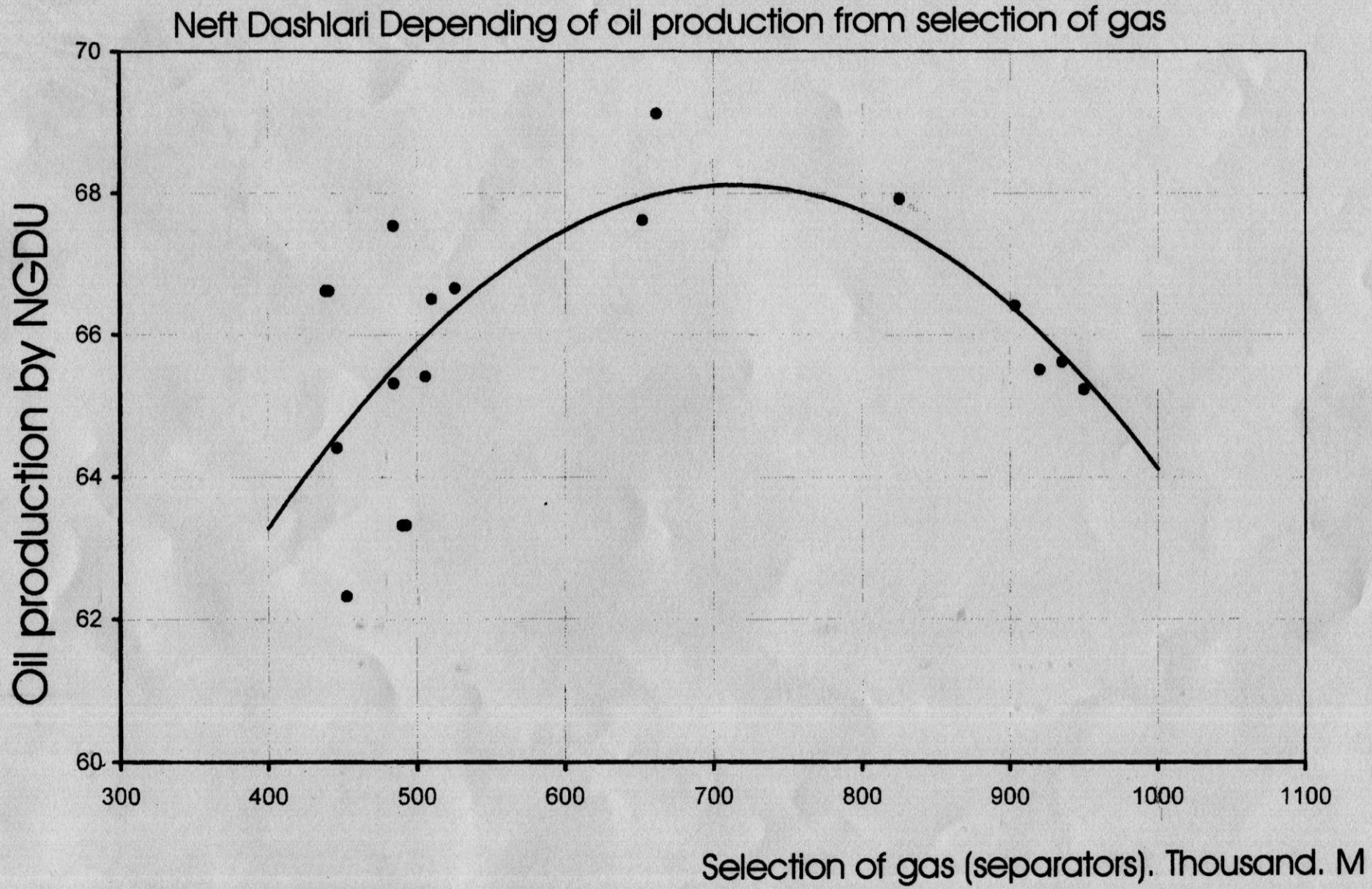

Neft Dashlari Selection of gas
Volume thousand, m
1000000
900000
800000
700000
600000
500000
400000
300000
Nov-94
Jun-95
Feb-96
Oct-96
Jun-97
Feb-98
Oct-98
Jun-99
Feb-00
Oct-00
Jun-01

(figure 2,3) shows the similar tendency. It testifies that all occurring processes of increase of production of petroleum at reduction of quantity(amount) of obtaining chinks are carried out for the account gas lift of chinks. For acknowledgement(confirmation) of this assumption dynamics(changes) of specific production of petroleum and number obtaining gas lift of chinks given in figure was constructed 2,4. Thus the comparison of figures 2,2 and 2,4 shows the similar tendency, that testifies to increase of production of petroleum, basically, at the expense of improvement of work of compressor chinks.

On production of petroleum at a compressor way of operation of a deposit the essential influence renders quantity(amount) of the submitted and selected gas. The quantity(amount) of gas, submitted in an obtaining chink, can be estimated on work of a compressor facilities(economy). In figure 2,5 dynamics(changes) of specific development(manufacture) of compressors is shown, essential increase of productivity of compressors since December, 1997, however, appreciable increase of production of petroleum whence follows is observed since June, 1999. Such essential time delay, about 1,5 years, between influence (increase of development(manufacture) of compressors) and response (increase of production of petroleum) at gas lift a way of production is improbable. Then we shall estimate the contribution of selection of gas on size of production of petroleum. In figure 2,6 dynamics(changes) of selection of gas on NGDU « Neft Dashlari » is given. From figure follows, that the average meaning(importance) of volumes of selection of gas corresponds(meets) 600 mln. м 3. Since November, 1994 till February, 1998 the selection, raised(increased) in relation to on the average meaning,(importance,) of gas is observed; just in this period the decrease(reduction) of production (see fig. 2.3) is observed. Since February, 1996 till October, 1998 some excess of selection in relation to average meaning(importance) (see fig. 2.6) is observed. In the same period of time the fall of production of petroleum, however not such sharp as in the first interval of time (see fig. 2.3) is observed; it and is clear, as the excess of selection of gas also was smaller (see fig. 2.6). Since May, 1999 and till November, 2000 the selection of gas (see fig. 2.6) was made smaller in relation to average

meaning(importance); it has resulted in increase of production of petroleum (see fig. 2.3). Since November, 2000 till June, 2001 the selection, raised(increased) in relation to on the average meaning,(importance,) of gas was made, and by the end of a considered(examined) interval of time the selection of gas has made 900 mln. м 3 (see fig. 2.6); In the same period of time the stabilization and some of decrease(reduction) of production of petroleum (see fig. 2.3) is observed.

On faculty « Development and operation of petroleum deposits » of the Azerbaijan state petroleum academy under the direction of the academician A.X. Mirzadjanzade the technique allowing optimize work gas lift of chinks on what - or separate site was developed by construction of dependence of production of petroleum from quantity(amount) of submitted gas on each moment of time for all chinks of a researched site. Thus the parabola similar to a parabola received at research by one gas lift of a chink is under construction with the purpose of definition of the optimum charge of gas and reception of the appropriate production. By analogy to it in / 17 / it is offered to build dependence of production of petroleum on selection of gas. Such approach can be carried out, as the losses as a result of selection of gas in comparison with pumping as a whole on NGDU will be grade the large volumes. Such dependence is given in figure 2.7, from which follows that the optimum selection in NGDU as a whole can change about 600 mln. м 3 gases; the excess of this quantity(amount) results in loss of production of petroleum and to the unjustified charge of gas. By construction of such dependences for separate blocks, layers it is possible to define(determine) the sites not of rational development which regulation more exact can considerably save means.


Neft Dashlari Depending of oil production from selection of gas
Oil production by NGDU
70
68
66
64
62
60
300
400
500
600
700
800
900
1000
1100
Selection of gas (separators). Thousand. M

THE CONCLUSION

1. The application of a method of construction of self-organizing models (MPSM), method, based on criteria, of the group account of argument (MGUA), shows an opportunity of allocation of borders tectonic of blocks by the analysis of the current geologist-trade information.

2. The borders of stages of development of horizon by application kinetically of the equation Kolmogorov-Erofeyeva are determined, Transformed by double logarifming the equation Kolmogorov-Erofeyeva in a kind 1P (-1P (1-G))) =G (1SH) represents three rectilinear sites, thus the points of transition from one site on another correspond (meet) 1962 and 1975. Hence, for horizon SP the period 1956 - 1962 year there corresponds (meets) to the first stage of development, period 1963 - 1975 year second, and since 1976 till the present time - final third stage. The received data will well be coordinated to dynamics (changes) of the basic parameters of development of the given horizon.

3. Analyzing influence of various technological parameters on production of petroleum in NGDU « Neft Dashlari » is received:

- The strategy of oil extracting NGDU is defined (determined) by (with) fund gas lifting of chinks ;
- The increase of specific production of petroleum does not depend on under pressure of a grid of chinks;

Realization of geological technical measures, the input of chinks from drilling raises efficiency of oil extracting, however, essentially does not influence the tendency of production;

- The rational work of a compressor facilities(economy) results to intensifications and stabilization of a level of production;
- There is an optimum size of the tax of gas at working system of development, which excess results in essential losses in production of petroleum and gas.

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