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1 **Analysis of fractured reservoir using well-log data (a case study from Naft-Safid field)**/ by Hamid Seifi.-supervisor M.K.Ghassem Alaskari;co-advisor Larry Lines.-M.S. University:Petroleum University of Technology; Calgary;Faculty: Graguate studies;Department: Geology and Geophysics, 2005.

Fracturing / Reservoirs / Analysis / Well logging / Data collecting / Fields / Case studies
050001

Abstract:
One of the most important issues for the characterization of a reservoir and the assessment of the fluid flow behavior is the role of faults, fractures, and micro-fractures. At different scales these reservoir features have a tremendous impact on the reservoir drainage and in the overall productivity of the field. The key to successful exploration in fractured reservoirs is to predict where natural fracturing is abundant. Therefore, the use of borehole imaging tecnology to locate fractures and determine the geometry of the existing fractures, lateral and vertical distribution of productive fractures, fracture quality and hydrocarbon potential, prior setting casing is an essential element in evaluating the economics of any given well. Naturally fractured reservoirs have always been difficult to describe and evaluate. The complex interaction of fractures, fault zones, matrix, and fluids is sufficiently variable to render each naturally fractures reservoir unique. There are many complex questions that have to be answered for a satisfactory evaluation. Where are the fractured zones? What is the density of the fractures in the system, their distribution and orientation, and what is the anisotropy of the fracture system? Does the system contain open or closed fractures? And above all, is the fracture system capable of flowing hydrocarbons or not? Electrical resistivity techniques have been developed which have a higher resolution than conventional logging methods. Therefore in this thesis, I explain about the conventional logs in one chapter and then in the other chapters borehole imaging is considered. This thesis aims to present results of fracture system characterization demonstrating how the information abtained from the borehole imaging devices provides better understanding of the complex fractured reservoirs. Examples include data acquired in a range of geological environments and borehole conditions. Field data presented here include borehole imagining examples from well drilled with conductive mud. As a result, directions of minimum horizontal stress derived from borehole breakouts are presented in a borehole in the Naft-Safid. We have found a clear tendency for a dominant N50W direction of breakouts on approximately perpendicular to the regional stress.

2 **An empirical study of the existing training and development system in National Iranian Oil Company including its affiliated companies to determine ways for improving and maximizing its performance and effectiveness**/ researcher Abbas Khanifar.- supervisor Behrooz Kafi; advisor Moharram Aghazadeh.- Ph. D. University: American University of Hawaii; Faculty: College of management, 2005.

Iran / N.I.O.C. / Performance / Surveys / Training / Development / Companies
050002

Abstract:
The main purpose of this study is to elaborate on deficiencies of training and development system of National Iranian Oil Company and to develop and introduce a systematic approach to improve its practices in the company. Accordingly, the selected scope for this study is National Iranian Oil Company (as Mother Company) and its ten major companies out of its 40 affiliated companies, institutes and major managements. In

this scope 120 employees had chosen to complete a researcher made questionnaire. The findings of the research imply that there is not a salient and reliable system for training and development in the training centers of NIOC. In this regard, researcher designed and proposed a system for T&D in NIOC. The proposed system/model has 11 components such as follow: 1.Determining Needs, 2.Setting Objectives, 3.Determining Subject Content, 4.Selecting Participants, 5.Determining the Best Schedule, 6.Selecting Appropriate Facilities, 7.Selecting Appropriate Instructor(s), 8.Selecting and Preparing Audiovisual Aids, 9.Coordinating the Program, 10.Implementing the Program, 11.Evaluating the Program

3 **Experimental invetigation of microbial enhanced oil recovery/** by Alireza Soudmandasli.- Advisors Sh. Ayatollahi, H. Mohabatkar.- M. S. University: Shiraz University; Department: Chemical engineering, 2005.

Enhanced oil recovery / Surveys / Bacteria / Temperature
050003

Abstract:
The present work is aimed to investigete the effect of temperature and salinity on enhancing the oil recovery by employing four types of bacteria: Bacillus subtilis, Bacillus licheniformis, Clostridium perfringens and Leuconostoc mesenteroides. Sand packed columns were used for this experimental investigation. The temperature and salinity ranged from 40 C to 70 C and 0% to 20% (w/v) NaCl respectively. Results showed that for B. subtilis and L. mesenteroides, the microbial oil recovery efficiencies decreased as the salinity increased; while the maximum recoveries by B. licheniformis were achieved at 5% NaCl. Temperature showed inhibitory effect on microbial oil recovery efficiency for these types of bacteria. No oil was recovered by employing C. perfringens at different temperatures and salinities. Beside, the etchedglass micromodels were utilized to investigate the efficiency of MEOR process in fractured porous media. The results indicate that, B. subtilis is more efficient in fractured media compared to the non fractured one. However when the L. mesenteroides was used in the fractured models oil recovery was diminished. further studies suggested that the plugging by exopolymer is the main reason for the low oil recovery by using the L. mesentroides. Oil viscosity reduction as well as reduction of IFT was also found to be the reason for better microbial recovery efficiencies of B. subtilis in fractured models. The recommendations derived from this work can also be used in the contaminated sites to remediate the spilled oil to the sands and underground water.

4 **Experimentally investigation and numerical simulation of free fall gravity drainage in conventional and naturally fractured reservoirs**/ by Alireza Mollaei.- supervisors M. Haghighi, M. pooladi-Darvish; co-advisors M. Sahimi, B. Maini.- M. S. University: Petroluem University of Technolgy; Faculty: Graduate studies, 2005.

Fracturing / Reservoirs / Surveys / Gravity / Drainage / Simulation
050004

Abstract:
Free fall gravity drainage as an important recovery mechanism was investigated and analyzed experimentally and by numerical (network model) simulation for both conventional (single matrix or single porosity system) and naturally fractured (fractured blocks or dual-porosity, dual-permeability model) reservoirs. The results of free fall gravity drainage of these two models were compared to each other to know that whether the network of fractures intensify the free fall gravity dranage recovery in matrix blocks or decrease the recovery of matrix blocks. For these purposes, a set of glass micromodels with real pattern of porous media were constructed in two main forms of single matrix model (as a 2D simulator of conventional reservoirs) and fractured blockes model (as a 2D simulator of fractured reservoirs) in laboratory. Also, two numerical network model simulators were programmed (using Visual Basic 6.0 as computer programming language) based on pore scale displacement mechanisms (drainage, imbibition and flow through film) to study, analyze and compare the behavior of free fall gravity drainage process in single matrix and fractured blocks models. The simulator takes into account the predominantly displacement mechanisms observed in free fall gravity drainage glass micromodel experiments of both single matrix and fractured blocks models. Free fall gravity drainage experimental results of glass micromodel were used to validate the network model simulator. The numerical simulator presented here used to study and interpret the effects of different parameters on free fall gravity drainage results in both single matrix and fractured blocks models. For this purpose, numerous sensitivity analysis scenarios were tested (run) by numerical simulator to evaluate the effect of different parameters on results of free fall gravity drainage process in both single matrix and fractured blocks model. In this way we can make more sure (be more satisfied) about the validity of numerical network model simulator and also it is possible to compare the free fall gravity drainage efficiency (recovery) of both models to find out whether the network of fractures intensify the recovery of matrix blocks or not.

5 **Feasibility study of petrophysical and 3D seismic information for reservoir characterization (a case study)**/ by Hassan Khanian.- supervisor Ghasem Alaskari; co-advisor Lines, L.- M. S. University: Petroleum University of Technology, 2005.

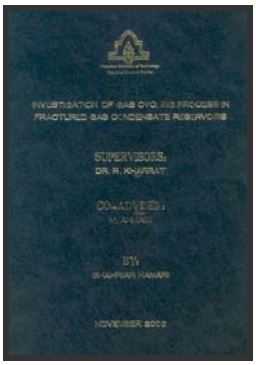
Petrophysics / Case studies / Seismic data / Information / Reservoirs
050005

Abstract:
We combined well log data and 3D seismic volume information to find the distribution of some reservoir properties of the upper glauconitic channel in the study area situated in the Blackfoot reservoir in east of Calgary. The well data were tied with 3-D seismic volume using synthetic seismogams. using synthetic seismogams we identified the lateral and vertical lithology changes shown in reflectors along the seismic profile. The basic petrophysical interpretations techniques such as picket plots show that the water saturation in the reservoir varies in the range of 25-75% in the upper Glaucomitic channel. By use of statistical interpolation techniques such as kriging, cokriging, seismic multiatribute transforms and probabilistic Neural Networks we built different model for distribution of porosity, shale content and Vp/Vs ratio in the reservoir. We used crossplots and validation errorwhich commpare the model with the real data sets. The second part of the thesis is modeling of complex geological structure of Gachsaran oil field located in south west of Iran. Comlex fracture and fault structure of Gachsaran from geological point of view are explained. The modeling of Gachsaran structure was done using designed software which uses theory of normal ray tracing. Using modeling based on theory of normal ray tracing we investigated different fracture network systems which is not detected using seismic section recorded by Oil Service Company (OSCo) in 1973.

6 **Investigation and simulation of the effect of wettability on water alternating gas injection in performance for fractured reservoir**/ by Vahid Saedi Gavdareh.- supervisor B. Roozbehani.- M. S. University: Petroleum University of Technology; Department: Chemical and petroleum engineering, 2005.

Fracturing / Reservoirs / Water / Gas / Injection / Performance / Simulation / Surveys
050006

Abstract:
A large amount of oil is remained in after primary and secondary recovery, and this oil can be our energy source for future. Also increasing rate of oil price and need for energy from the entire world lead to some methods to increasing the recovery of oil. The above methods have some limitations and problems such as low sweep efficiency, viscous fingering, early breakthrough of gas, controlling the front mobility. This problem led to development of a new method as Water Alternating Gas injection, which is the combination of the two primary methods. The recovery of WAG is grater than individual gas or water flooding, and almost all of the WAG process reported has been successful. Firstly I divide this process into two different methods and then consider individual mechanisms in each process. After that I investigate their effect simultaneously in the fractured reservoirs. I consider the different WAG method based on injection pattern (miscible and immiscible), different injectant (hydrocarbon gas, CO2). Also I investigate some problem associated with WAG process that reported before based on field data. In the simulation part, the small ideal cube shape reservoir is considered. The gas injection, water flooding, effect of matrix height, vertical to horizontal permeability, effect of injection rate, effect of non-homogeneous layer's, and 2-stage WAG process are compared for water wet and oil wet rocks. Finally I report some parameters to managing the real WAG process in a real reservoir.



7 **Investigation of gas cycling process in fractured gas condensate reservoirs**/ by Shahriar Kamari.- supervisor Ryaz Kharrat; co-adviser Mohabbat Ahmadi.- M. S. University: Petroleum University of Technology; Department: Petroleum engineering, 2005.

Fracturing / Gas / Processing / Condensate / Reservoirs / Surveys
050007

Abstract:
The study of depletion performance of naturally fractured reservoirs has gained wide interest in the petroleumindustry during the last few decades and poses a challenge for the reservoir modeler. The presence of a retrograde gas condensate fluid incorporates an additional layer of complexity to the performance of this class of reservoirs. Upon depletion, reservoir pressure may fall below the dewpoint of the hydrocarbon mixture which results in liquid condensation at reservoir conditions. This condensation reduces the gas and oil recovery considerably. Gas cycling is introduced as an alternative method to remediate the problem of recovery reduction due to condensate dropout in the reservoir. In this study a hypothetical multilayer reservoir model is constructed to be simulated for both conventional and fractured reservoirs by use of a commercial compositional simulator. Different sensitivity analysis under natural depletion and effect of various parameters to improv condensate recovery during cycling scenario are investigated in these simulation models. Due to significant differences between results of dual porosity and dual permeability models, recognizing the type of fractures and interplay between matrices seem to be necessary. This means that the reservoir model must be constructed according to the properties of the reservoir fracture network.

Although these investigations show an optimum value in the case of each sensitive parameter operationally, economical considerations and availablity of cycling gas must be taken in to account.

8 **Investigation of production problems and feasibility study of gas injection in an iranian offshore oil reservoir**/ by Mohammad Massah.- supervisor Riaz Kharrat.- M. S. University: Petroleum University of Technology, 2005.

Iran / Offshore / Oil reservoirs / Gas / Injection / Surveys / Production
050008

Abstract:
The scope of this project is to investigate production problems of an Iranian offshore oil reservoir which will be called in this project as a pseudonym "Field X" and as a remedy study feasibility of gas injection and find the best gas composition for Enhanced Oil Recovery (EOR). For this purpose an engineering investigation is nesessary to select the miscible displacement process properly and to ensure that it will be successful. Some information is generally necessary or desirable as a basis for selecting the scenario that will be most economically feasible, such as geology, past reservoir behavior, general applicability of miscible-displacement techniques, phase behavior of reservior fluids, recovery by miscible displacement and a primary economic evaluation. However our available information for this project is just past production history of producing wells, and PVT experiment data of one sample of the field fluid. The most important point about the past performance of Field X is that, the intial production rate of around 20,000 BOPD declined rapidly to around 9,000 BOPD within four years. Presently, the production of this reservoir is about 5000 STB/d, which is much lower than the predicted flow rate. The sharp decline is much below the anticipated decline predicted by a typical decline curve analysis. So, initiaily, this project performs some preliminary fundamental reservoir study to detect the possible cause for sharp production decline in Field X. For this purpose production gas/oil ratio, pressure decline, and diagnostic choking effect in Field X are analyzed. Also, effect of formation damage on production is investigated. Because there are no bottom hole pressure measurments, in Field X, they are generated from well head pressures using Beggs and Brill method. Production history of the reservoir as decline curve analysis is studied. The purpose of these analyses is to discover some specifications of the pool which have caused this problem, as well as future performance of the reservoir. F.A.S.T RTA software belonging to the Canadian Fekete company is used to perform rate transient analysis for 11 producting wells of Field X. Then some remedies are investigated and offered to stop or possibly to reverse the trend of decline rate. Phase behavior of reservoir fluids is required for decision on process selection, too. A fluid analysis study on a bottom hole fluid sample of Field X is available. Because of limitations of this study, modeling of fluid of the pool is done based on the only sample of the pool. Phase behavoir model of Field X is created using WinProp Software from CMG package. Minimum Miscible Pressure (MMP) is an important parameter in miscible displacement processes. Precise determination of MMP is very important in selection of injecting gas compositional and designing injection installations. A slim tube model is created in compositional model simulator of GEM from CMG package and the phase behavoir model of the reservoir is imported in it as the original saturated fluid of the tube. Then different gas compositions for miscible displacement process which may be effective to enhance oil recovery of Field X are examined, and MMP as well as their recovery factor are determined. Finally, evaluation and feasibility study of various miscible displacement processes is discussed and the proper gas composition to inject in Field X is selected.

9 **Optimization of production from oil rim of South Pars**/ by Mehdi Ghane.- supervisor V. A. Sajjadian.- M.S. University: Petroleum University of Technology, 2005.

Iran / South Pars gas field / Petroleum / Production / Optimization
050009

Abstract:
South Pars Field is located in Persian Gulf about 100 kilometers south of Assaluyeh and straddles the Iran/Qatar border. Hydrocarbons have been discovered in multiple layers with gas and condensate in the deep Permo-Trias reservoir and oil in the shallower Cretaceous. Due to the super giant gas/condensate reserves of the Permo-Trias reservoir, the main focus, so far, has been the development of the deep gas/condensate reservoirs. However, the South Pars field also contains four shallower oil-bearing formations some of which may be suitable for development. The main reservoir is the Dariyan limestone; in addition there is oil potential in both the Mauddud and the Gadvan Formation. Only the Upper Dariyan is regarded as producible based on available data. These oil-bearing formations extend into Qatar where they are known as the Al-Shaheen field. NIOC has recently decided to develop the oil reservoir. The objective of this work optimization of production from the South Pars Oil Zone. ECLIPSE100 has been used for this purpose and a sector of Upper Dariyan has been selected to construct the geological model. Fluid model also was generated and different scenarios such as natural depletion, miscible and immiscible gas injection, waterflooding and pressure maintenance by water injection were implemented into the simulatore. Obtained results confirm that maintain the pressure by water injection is the best strategy to develop the reservoir. The work presented herein, are the best that could be done, based on the available information on the field and within the available time frame.

10 **Study of steam injection in one of iranian fractured heavy oil fields**/ by Ashkan Haghshenas.- supervisor V. A. Sajjadian.- M. S. University: Petroleum University of Technology, 2005.

Iran / Steam / Injection / Surveys / Fracturing / Heavy oils / Oil fields
050010

Abstract:
Thermal recovery methods are the best candidate to improve recovery factor in heavy oil reservoirs. Reduction of the heavy oil viscosity is necessary to improve mobility and achieving an economical recovery from heavy oil reservoirs. The most efficient method to lower the viscosity is the application of heat to the reservoir containing heavy oil. Kuh-e-Mond is one of Iranian Fractured heavy oil fields. This field is not developed yet and there is not enough data about it. The API of oil in this field is very low (7.24 API) and the viscosity is very high (1758 cp) so thermal recovery methods are concerned for this case to reduce the viscosity because this field can not be produced by primary methods. Steam injection can be applied as a recovery method to produce heavy oil sources economically. Steam injection in naturally fractured heavy oil reservoirs provides an extremely challenging problem as well as a potentially effective and efficient improved oil recovery method. Coupling of the two distinct and contrasting matrix and fracture systems results in a highly non-linear problem, and it gets even more complicated as a result of steep changes in fluid properties due to the thermal effects of steam injection. Modeling and designing an optimum steam injection operation in such systems requires an accurate characterization and representation of a naturally fractured heavy oil reservoir and steam injection operation parameters and

dynamics. By using STARS, the thermal module of CMG, as a thermal simulator in this study we tried to optimize operations, and to improve reservoir managment. The model constrained, as much as possible, by the available measured data. In this research effort, a thermal dual-porosity model is developed for the problem. A comprehensive and comparative study is conducted in order to understand the relative effects of naturally fractured heavy oil system and injection operation properties on the oil recovery performance. The initial pressure in this field is low (927 psi), so pressure maintenance has been considered as one of dominate factors in this study.This work shows that steam injection could improve oil recovery from zero up to 17% so this scenario can be a good applicant for this field. For low permeability reservoirs, such as this case injection rates had a small effect on segregation. The effect of quality was secondary compared to the effect of permeability and with a 9-point scheme, the grid orientation effects disappear. Parameters with unique importance to modeling steam injection in Kuh-e-Mond field are permeability, fracture spacing and quality of steam injected. Additionally, another parameters important for conventional steam injection processes, such as relative permeability and injected steam volume, temperature of injected steam and rate, are important for Kuh-e-Mond field also. The present study should help us better understand design optimum recovery operation, pressure maintenance and determine range of confident for an oil recovery operation in Kuh-e-Mond field steam injection.

11 **Study of the polymer flooding in Siri reservoir Persian Gulf**/ by Reza Khayat Moghadam.- supervisor V. A. Sajjadian; advisor Emadi.- M. S. University: Petroleum University of Technology, 2005.

Persian Gulf / Sirri island / Reservoirs / Polymers / Flooding / Surveys
050011

Abstract:
Most of Iranian reservoirs in Persian Gulf are faced with declined production which IOR/EOR projects are required. polymer flooding will improve the water injection by increasing water viscosity and decreasing mobility ratio. In this study, after a theoretical review we compare three main cases including Natural Depletion, Water Injection, and Polymer flooding. We run the simulation in a sector model of Siri reservoir in Persian Gulf. In the results we can see an increase in the total production and in the production period. This results indicates that polymer flooding is an applicable and apprppriate method in the Siri reservoir.

12 **Study of water coning in carbonate fractured reservoirs**/ by Mehran Namani.- supeervisors M. Haghighi, M. Afshar.- M. S. University: Petroleum University of Technology, [2005].

Water / Surveys / Carbonate mineral / Fracturing / Reservoirs
050012

Abstract:
The water coning which is created by imbalance between gravity and viscous forces is the most important reason of water production in many oilfield. There are different controllable and uncontrollable parameters affecting this phenomenon; in this study some simulation models were constructed to analyze the effect of different parameters

in a radial single-well model. Furthermore, some studies were done using multi-well models in order to investigate the effect of them. A systematic parameter study has been carried out. It was determined that oil layer thickness, perforation thickness, fracture permeability and its anisotropy, especially horizontal fracture permeability, production rate, mobility ratio, storativity and conductivity have the major role in water coning phenomenon; also it was determined that fracture spacing, skin factor and aquifer power has negligible effect on water coning in fractured reservoirs. The change of breakthrough time of water cone respect to each effective parameter has been studied and each trend was shown, so it seems necessary to optimize the conditions before adjusting the location of wells and determining production program. Multi-well studies showed that the trend of dependency of water coning on each parameter is similar to the single-well model, however coning simulation in field scale is a unique problem for each field. In the other word it is necessary to have all data correspond to reservoir, well location, and production history completely for a successful simulation, because a small pressure drawdown exerted by a far well will affect the cone shape and its breakthrough time. The significance of this work is the study of coning phenomenon in carbonated reservoirs. Carbonated reservoirs having fractures in different scales are very different than conventional sandstone reservoirs. In this work in addition the all critical parameters, the role of single-well versus multi-well in coning phenomenon have been investigated and the results are discussed.

13 **Theoretical investigation and simulation of the vapor extraction (vapex) process for conventional and fractured reservoirs**/ prepared by Mehdi Dabiri.- Supervisor R. Kharrat.- [M. S.]. University: Petroleum University of Technology, 2005.

Fracturing / Reservoirs / Vapors / Extraction (minerals) / Simulation / Theoretical study
050013

Abstract:
Vapor extraction (vapex) process is an emerging technology for viscous oil and bitumen recovery that has gained much attention in the oil industry, as it appears to be superior to the currently used thermal based recovery methods. The process has potential to succeed even in some problematic scenarios, such as reservoirs with an overling gas cap, bottom water table, high water saturation, low thermal conductivity, thin pay zone, unacceptable heat losses to overburden and underburden formations, etc. This process employs hydrocarbon vapours as solvents to dilute and mobilize the heavy oil or bitumen in the information. The injected solvent must first diffuse into the heavy oil and bitumen for some time to reduce the viscosity of the oil/gas mixture sufficiently. Then the diluted oil drains downwards by gravity to a horizontal producter located at the bottom of the reservoir. In recent year, extensive theoretical and experimental investigations of the vapex process have been carried out in different branches. This project represents the theoretical investigation and the computer simulation of the Vapex process for conventional and fractured reservoirs. In the presented project, a sensitivity analysis is also carried out to investigate the effect of different parameters on the Vapex process. In order to analyze the effect of parameters on the Vapex process, two separate chapters for conventional and fractured models is considered and in each chapter the relevant parameters is studied. The result show that much higher oil rates in field processes are possible compared to those predicted by previous investigators.

14 **Time-lapse seismic reservoir monitoring**/ Abdolrasoul Khoshood.- supervisor L. R. Lines, Ghassem Alaskari.- M. S. University: Petroleum University of Technology, 2005.

Seismology / Reservoirs / Monitoring
050014

Abstract:
Repeatedly acquired seismic at the site, during calendar time is referred to a time-lapse seismic. It is a fairly new technology allowing dynamic characterization of a reservoir in a true volumetric sense. The basic idea is that a production-induced change in the reservoir causes a change in the seismic signal over time. Often 3D time-Lapse seismic is referred to as 4D seismic, and the fourth dimension is time. Time-lapse seismology is a valuable tool in the reservoir characterization. When we are producing from the reservoir the fluid saturation, pressure, and temperature of a reservoir change, so these changes have some effects on the acoustic properties of the reservoir. Time-lapse seismic analysis can clarify dynamic changes of reservoir properties; therefore it is a good tool for reservoir management and reservoir monitoring. Time-lapse seismic analysis has been used to monitor fluid saturation during production and injection. AVO attributes can also be useful tools to distinguish causes of some of these changes in the reservoir properties. Depending on the rock and the reservoir condition, pressure, saturation, and temperature have different effects on the time-lapes signal. Rock physics plays an important role in describing and explanning how the seismic analysis (time-lapse) hpysically related to the rock properties and reservoir state. These type of analysis have been done by modeling technique to verify the feasibility of time-lapse for the reservoir monitoring.

15 **Vertical seismic data analysis in complex geological area**/ by Mohammad Roostaeian.- supervisor M. K. Ghassem Al-Askari; advisor L. R. Lines.- M. S. University: Petroleum university of technology, 2005.

Geology / Seismic data / Analysis / Regions
050015

Abstract:
The vertical seismic profiling (VSP) is a technique in which seismic signals generated at the surface of the earth are recorded by geophones at various depths in a borehole. The VSP has found a number of applications in the oil industry. Primarily, VSP data have been used to assist surface seismic interpretation through time-to-depth values and a zero phase, largely multiple-free reflectivity trace. It has given insight into the nature of seismic wave propagation in the earth and provided estimates of rock properties such as interval velocities and attenuation near the borehole. Detailed descriptions about the history and applications of the VSP can be found in Hardage (1983) and in Toksoz and Stewart (1984). Hardage (1992) also describes the reverse VSP (RVSP) technique in which seismic signals generated by a source in a borehole are recorded by receivers at the surface of the earth. Vertical seismic profiles (VSPs) can supply information about both velocity and subsurface interface locations. Properly designed VSPs can be used to map steeply dipping interfaces such as salt dome flanks. Mapping subsurface interfaces with VSP data requires careful survey design, appropppriate data processing, interval velocity estimation, and reflector mapping. The first of these four ingredients is satisfied, in most cases, by pre-acquisition modeling. The second is accomplished by careful data processing. Initial velocity estimates are provided by seismic tomography. Velocity-model refinement is accomplished by a combination of iterative modeling and iterative least- squares inversion. Finally, the resultant interval velocities are

used indepth migration of the processed VSP. This project has focused on making synthetic VSP modeling for different subsurface structures by ray tracing method. These subsurface structures include flat layers, Dipping layer, fault, angular unconformity and flank of a salt dome. Also, the characteristics and features of each one of them with some key VSP interpretational rules have been discussed.