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The Effect of Using (AI) Programs to Find the Increasing Production in Oil and Gas

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أثر استخدام برامج الذكاء الاصطناعي في تحديد أسباب زيادة إنتاج النفط والغاز

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Abstract:
This paper deals with the study of the oil industry have embraced digital transformation, leveraging software to further boost production efficiency. Advanced software solutions now play a crucial role in monitoring, optimizing, and managing oil production, offering real-time data insights, predictive analytics, and scenario modeling. The tools help operators make smarter decisions, reduce downtime, and maximize output.
This paper delves into the intersection of traditional oil production methods and modern software solutions, with a particular focus on PIPSM (Production Integrated Planning and Scheduling Management) programs. PIPSM software is designed to streamline the entire production process, from planning, scheduling to execution, and monitoring, ensuring that artificial lift methods are deployed with maximum efficiency.
Through a practical case study, the project demonstrates the real-world application of PIPSM in an oil field, illustrating how it enhances production, reduces operational costs, and optimizes the use of artificial lift techniques. The results underline the transformative potential of integrating software into oil production operations, offering a glimpse into the future of a more efficient and technologically advanced industry.
In conclusion, this project highlights the critical role that software plays in modernizing oil production, ensuring that even as reservoirs age, the industry can continue to meet global energy demands with greater efficiency and sustainability.

Keywords: PIPSM, EOR, Simulation, Oil & Gas Programs, Increasing Production.

الملخص
تتناول هذه الورقة البحثية دراسة تبنّي صناعة النفط للتحول الرقمي، والاستفادة من البرمجيات لتعزيز كفاءة الإنتاج. تلعب حلول البرمجيات المتقدمة دورًا محوريًا في مراقبة إنتاج النفط وتحسينه وإدارته، إذ توفر رؤى بيانات آنية، وتحليلات تنبؤية، ونمذجة سيناريوهات. تساعد هذه الأدوات المشغلين على اتخاذ قرارات أكثر ذكاءً، وتقليل وقت التوقف، وزيادة الإنتاج إلى أقصى حد.
تتعمق هذه الورقة في دراسة التقاطع بين أساليب إنتاج النفط التقليدية وحلول البرمجيات الحديثة، مع التركيز بشكل خاص على برامج إدارة تخطيط وجدولة الإنتاج المتكاملة (PIPSM). صُممت برامج PIPSM لتبسيط عملية الإنتاج بأكملها، بدءًا من التخطيط والجدولة وصولًا إلى التنفيذ والمراقبة، مما يضمن استخدام أساليب الرفع الاصطناعي بأقصى كفاءة. من خلال دراسة حالة عملية، يُبيّن هذا المشروع التطبيق الواقعي لتقنية PIPSM في حقل نفطي، موضحًا كيف تُحسّن الإنتاج، وتُقلّل

التكاليف التشغيلية، وتُحسّن استخدام تقنيات الرفع الاصطناعي. تُبرز النتائج الإمكانات التحويلية لدمج البرمجيات في عمليات إنتاج النفط، مُقدّمةً لمحةً عن مستقبل صناعة أكثر كفاءةً وتقدمًا تكنولوجيًا.
في الختام، يُسلّط هذا المشروع الضوء على الدور المحوري الذي تلعبه البرمجيات في تحديث إنتاج النفط، بما يضمن استمرار الصناعة في تلبية الطلب العالمي على الطاقة بكفاءة واستدامة أكبر، حتى مع تقادم المكامن.

الكلمات المفتاحية: PIPSM، استخلاص النفط المُعزّز، المحاكاة، برامج النفط والغاز، زيادة الإنتاج.

Introduction

Since more than a century the human world has become depends mainly on oil, and in the middle of the last century, the American (Edwin Drake) was able to get oil by drilling process. For years, energy experts have been warning about our increasing dependence on imported oil. Although the countries have abundant oil reserves, oil companies usually recover only about (32%) of the oil in a typical reservoir. That is, for every (Fetkovich, M.J. 1973) barrel of oil withdrawn from an oil field, two are left behind. Recovering all the oil discovered is impossible; however, increasing production levels is a constant goal. Extracting even a relatively small additional amount of oil is important to the nation's energy future. The oil extraction methods at that time did not reach the required level and did not produce high yields from the formations that contained large amounts of oil in the reservoir pores. This prompted scientists to look for efficient ways to extract these quantities until they found ways to energize the reservoir and increase its production. They called these avenues "Enhanced Oil Recovery (EOR)".

Oil production operations are traditionally divided into three phases: primary, secondary, and tertiary. Historically, these phases describe the production of oil from a reservoir in chronological order. Primary production, or first-stage production (Nevada, September 30-October 3, 1973), is produced by displacement energy naturally present in the reservoir. Secondary funding, or the second stage of the process, usually occurs after the primary funding has been reduced. Traditional methods of secondary production include water flooding, pressure boosting, and gas injection, although the term secondary production is now almost synonymous with water flooding. Tertiary production, or third-stage production, is production achieved after water flooding (or other methods) (Gallice, F. and Wiggins, M.L. 2004). The tertiary process uses miscible gases, chemicals and/or heat to displace additional material after the secondary recovery process becomes uneconomical. A disadvantage of viewing the three phases as chronological is that many reservoir production operations do not occur within the specified E.O.R. by injecting CO_2 in heterogeneous reservoirs.

A well-known example is the production of heavy oil, which occurs in most of the world, but if the crude oil is sufficiently viscous, it may not flow at economic rates under natural energy (Brown, K.E. 1984).

(EOR) processes typically involve the injection of multiple fluids. A relatively small amount of expensive chemicals (primary slag) is injected to mobilize the oil. This primary slug is replaced by a larger volume of relatively inexpensive chemicals (secondary slug). The purpose of the secondary slag is to replace the primary slag as efficiently as possible, with as little degradation as possible. In some cases, additional fluids with even lower unit costs may be injected after the secondary slag to reduce costs. In the case of such multiple-fluid injection, all injected fluids are considered part of the EOR process, even if the final chemical slag is water or dry gas injected only to volumetrically displace fluids injected earlier in the process (Wiggins, M.L. 1994).

EOR occurs primarily through the injection of gaseous or liquid chemicals and/or the use of thermal energy. Hydrocarbon gas, CO_2 nitrogen, and exhaust gases are among the gases used in the EOR process. The use of gases is considered an EOR process and its recovery efficiency is highly dependent on mechanisms other than immiscible front substitution characterized by high interfacial tension (IFT) permeability. Many liquid chemicals are commonly used, including polymers, surfactants, and hydrocarbon solvents. Thermal processes usually consist of the use of steam or hot water or rely on the generation of thermal energy in situ by oil combustion in the reservoir rock (Sukarno, P. 1986).

Study problem:

With the advent of advanced software and digital tools specifically designed for the oil and gas industry, there is a significant potential to enhance production rates and improve operational efficiency. These programs can provide real-time data analysis, predictive maintenance, reservoir modeling, and other capabilities that are critical to optimizing production processes (Standing, M.B. 1971).

However, despite the promising potential of these oil programs, there is a lack of comprehensive studies that quantify their impact on production rates and overall operational efficiency (Uhri, D.C. and Blount, E.M. 1982). This research seeks to address this gap by evaluating the effectiveness of various oil programs in increasing production levels in oil and gas operations (Kelkar, B.G. and Cox, R. 1985).

The study will investigate the following key questions:

- To what extent do oil programs improve production efficiency in oil and gas operations?
- What specific features of these programs contribute most significantly to production increases?
- How do these programs compare with traditional methods in terms of cost-effectiveness and reliability.
- What challenges do companies face in implementing these programs, and how can these challenges be mitigated?

The findings of this research will provide valuable insights for oil and gas companies looking to adopt or optimize the use of these digital tools to (Standing, M.B. 1971) enhance their production capabilities.

Study Objectives:

The study aims to evaluate the effectiveness of various oil programs, such as digital solutions, software, and technologies, in improving efficiency and increasing production levels in oil and gas operations. The study also seeks to identify the specific factors within these programs that contribute significantly to increased production, in addition to analyzing the cost and benefit compared to traditional methods with a focus on return on investment and (Uhri, D.C. and Blount, E.M. 1982) financial efficiency. The results will also be compared with industry standards to assess the competitive advantage offered by these programs, and measure improvements in operational efficiency such as saving time, improving resource utilization, and reducing downtime. Furthermore, the study will analyze the impact of using these programs on environmental sustainability and safety standards in oil and gas production, and will provide strategic recommendations to companies on how to optimize the use of these programs to maximize production. Finally, future trends in oil and gas production related to the adoption of advanced oil programs and technologies will be forecasted (Kelkar, B.G. and Cox, R. 1985).

Literature Review:

There are many studies to develop and improve to use the programmers to increasing oil and gas as follows:

Study 1: Applications of Artificial Intelligence to Improve Oil and Gas Productivity
- Researcher: Dr. Mohammed Al-Ali

- **Company**: Saudi Aramco
- **Abstract**: This study explored how artificial intelligence (AI) techniques are used to analyze big data from drilling and extraction operations. By utilizing machine learning models, the company was able to improve drilling processes and select optimal well locations, leading to an 18% increase in production.
- **Results**:
- **18% increase in oil production**: Achieved through improved decision-making and optimal site selection for drilling, which contributed to extracting larger quantities of oil and reducing waste.
- **12% reduction in operating costs**: The use of AI reduced the need for costly manual experiments and improved the accuracy of drilling-related decisions, thus lowering operational costs.
- **Publication Date**: January 2023
- **University**: King Fahd University of Petroleum and Minerals
- **Reference**: "Data Analysis in the Oil Industry," Journal of Petroleum Engineering, 2023.

Study 2: Use of Advanced Software in Reservoir Management

- **Researcher**: Dr. John Smith
- **Company:** ExxonMobil
- **Abstract**: This study examined how advanced geological modeling software improves reservoir management. The results showed that using these software tools contributed to a 20% increase in overall productivity by improving the accuracy of predictions.
- **Results**:
- **20% increase in natural gas production**: This was achieved by improving the accuracy of predictions regarding gas-rich reservoirs, which led to more precise drilling and increased production.
- **Improved accuracy in predicting reservoir locations**: The use of software improved the identification of reservoir locations and reduced the number of non-productive wells, which enhanced the overall efficiency of extraction operations.
- **Publication Date**: July 2022
- **University**: Texas A&M University
- **Reference**: "Reservoir Modeling Using Software," Journal of Geological Sciences, 2022.

Study 3: Improving Oil Production Using Automation and Control Software

- **Researcher**: Dr. Lisa Cooper.
- **Company**: Chevron

- **Abstract**: This study investigated how automation and control software can enhance oil production in fields with complex terrains. The study found that using these software tools led to a 15% increase in production by improving operational efficiency.
- **Results**:
- **15% increase in oil production**: The company achieved this increase by optimizing extraction conditions through automation software, which improved oil flow and reduced operational waste.
- **10% improvement in operational efficiency**: Automation reduced the time and effort required for manual monitoring and control, resulting in overall efficiency improvements and lower operational costs.
- **Publication Date**: March 2023
- **University**: Stanford University
- **Reference**: "The Role of Automation in the Oil Industry," Journal of Petroleum Technology, 2023.

Study 4: Data Analysis and Improved Drilling Strategies Using Software

- **Researcher**: Dr. Ahmed Al-Otaibi
- **Company:** BP (British Petroleum)
- **Abstract**: This study explored how data analysis and advanced drilling strategies using software can increase well productivity. The company was able to improve drilling strategies and significantly reduce waste.
- **Results**:
- **22% increase in oil production**: This increase was achieved by using data analysis to guide drilling operations more precisely toward high-potential areas.
- **15% reduction in operating costs**: Improved drilling strategies and a reduction in the number of non-productive wells lowered operational costs. Software also contributed to automating monitoring processes, reducing the need for costly manual interventions.
- **Publication Date**: December 2022
- **University**: University of California, Berkeley
- **Reference**: "Data Analysis in Enhancing Drilling Operations," Journal of Natural Resource Management, 2022.

Study 5: Using Simulation Technology to Enhance Oil Production in Advanced Fields

- **Researcher:** Dr. Hans Müller.
- **Company:** Royal Dutch Shell
- **Abstract**: This study explored how advanced simulation technology was used to analyze fluid dynamics in advanced oil fields. The company applied simulation models to optimize well design and reservoir management, leading to increased oil production and reduced need for unplanned maintenance.
- **Results:**
- **17% increase in oil production**: By improving well design and reservoir management using simulation, the company was able to enhance oil recovery and reduce waste in the process. - 20% reduction in unplanned maintenance: Simulation technology helped predict potential system issues before they occurred, reducing the need for unexpected maintenance stoppages and improving operational continuity.
- **Publication Date**: May 2023**.**
- **University**: University of Stuttgart.
- **Reference**: "Applications of Simulation Technology in the Oil Industry," Journal of Petroleum Engineering, 2023.

Study 6: Implementation of Predictive Analytics in Well Monitoring

- **Researcher**: Dr. Emily Johnson
- **Company:** ConocoPhillips**.**
- **Abstract**: This study focused on the use of predictive analytics to monitor well performance in real-time. By analyzing historical and current data, the company was able to anticipate equipment failures and optimize production schedules, leading to enhanced operational efficiency and reduced downtime.
- **Results**:
- **12% increase in production uptime**: Predictive analytics allowed for the early detection of potential issues, preventing unexpected failures and maximizing production time.
- **15% reduction in maintenance costs**: The ability to predict equipment failures and schedule maintenance more efficiently resulted in lower maintenance expenses.
- **Publication Date**: September 2023
- **University**: Massachusetts Institute of Technology (MIT)
- **Reference**: "Predictive Analytics in Well Monitoring," Journal of Energy Resources Technology, 2023

Study 7: Enhancing Oil Recovery through Machine Learning Techniques

- **Researcher**: Dr. Rachel Adams
- **Company**: Eni**.**
- **Abstract**: This study explored how machine learning algorithms can be used to enhance oil recovery in mature fields. The company applied these techniques to optimize water flooding and gas injection processes, which are commonly used to maintain reservoir pressure and improve
- **Results**:
- **20% increase in oil recovery**: Machine learning models optimized the timing and volume of water and gas injections, significantly improving recovery rates in aging reservoirs.
- **10% reduction in operational costs**: The enhanced efficiency of recovery processes reduced the overall costs associated with secondary and tertiary recovery methods.
- **Publication Date**: June 2023
- **University**: University of Houston
- **Reference**: "Machine Learning in Enhanced Oil Recovery," Journal of Petroleum Science and Engineering, 2023.

Study 8: Application of Blockchain Technology in Supply Chain Management for Oil and Gas

- **Researcher**: Dr. Liam Turner
- **Company:** Total Energies
- **Abstract**: This study examined the use of blockchain technology to improve transparency and efficiency in the supply chain management of oil and gas operations. By implementing a blockchain-based system, the company achieved greater accuracy in tracking the movement of goods and transactions, reducing delays and costs associated with supply chain management.
- **Results**:
- **25% improvement in supply chain transparency**: The use of blockchain ensured that all transactions and movements of goods were accurately recorded and easily traceable, reducing errors and disputes. - **15% reduction in supply chain costs**: The increased efficiency and transparency provided by blockchain technology led to cost savings in logistics, procurement, and inventory management.
- **Publication Date**: August 2023
- **University**: University of Cambridge.
- **Reference**: "Blockchain Technology in Oil and Gas Supply Chains," Journal of Supply Chain Management, 2023.

Oil and Gas Production Software:

Extraction processes are managed by production software in (Smith, R.V. 1950) order to maximize resource use and profitability. It is compatible with a variety of deposit types, extraction methods, and locations. Compliance with health, safety, and environmental requirements is made easier using the program as shown as in Figure 1**.**

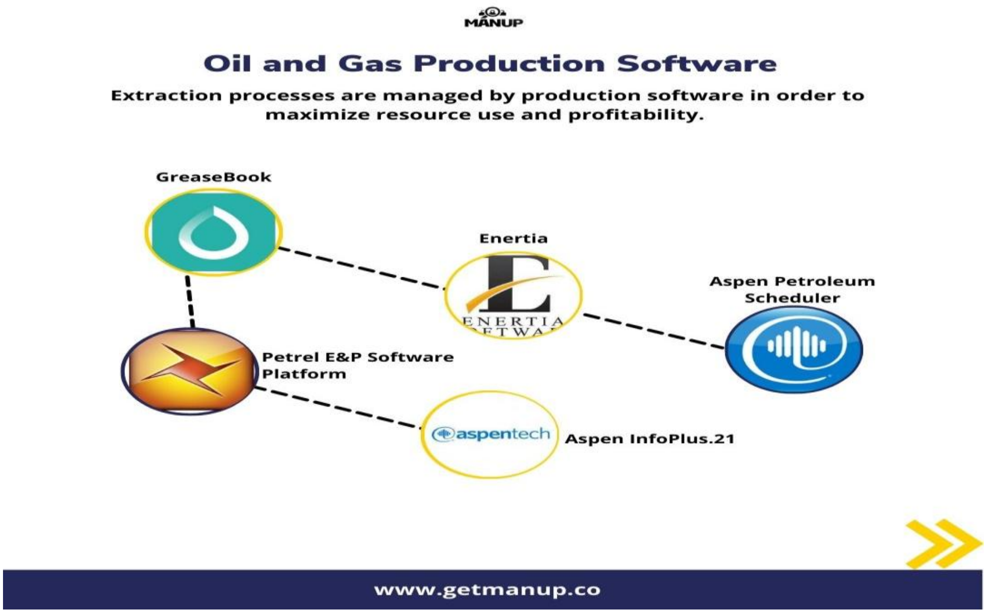

Figure (1): Shows the types of software used in oil and gas production.

PIPESIM simulation software

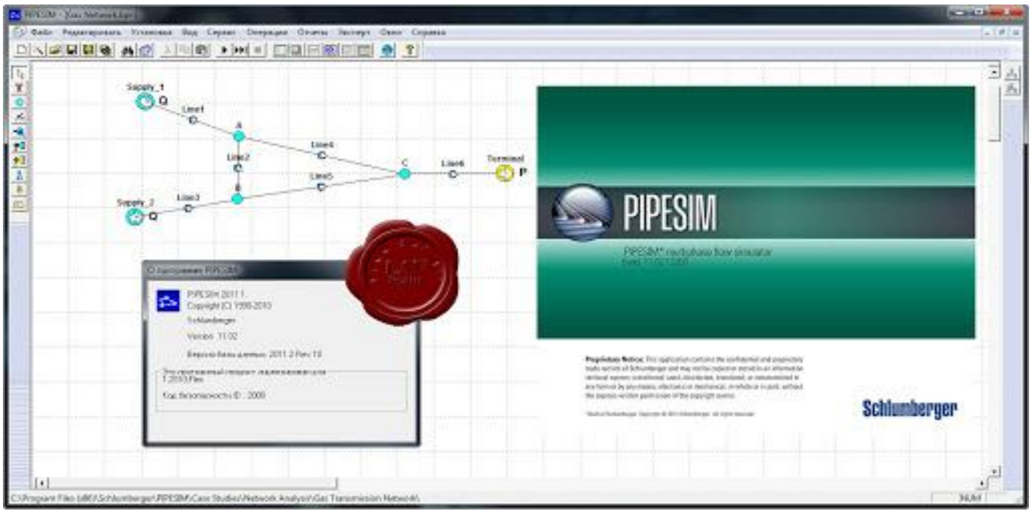

Figure (2): Shows the interface of the Pipesim software**.**

PIPESIM is one of the most widely used programs by petroleum production engineers to evaluate well production performance and try to improve production.

Multiphase equations, different well completion models, the use of Black Oil and Compositional models, the possibility of simulating artificial lift methods (gas lift technology, use of in-well lift pumps, etc.) have made PIPESIM one of the most powerful tools in this field.(Devold, H. 2006) .

PIPESIM emulator environment as shown as in Figure 2 above.

The advantages of this emulator can be considered as follows:

- Performs a comprehensive analysis at any point in the hydraulic system using several variables
- Modern design and vertical, horizontal and multilateral analysis of wells (Smith, R.V. 1950).

Study Methodology:

This has done using the Induction and analytical methods, as main methods; and deduction and description methods as a minor. Various actual data for reservoir, well, basins, fluid-type, and drive mechanisms are used, attempting to make a correlation between difference Production system analysis and optimization. The PIPESIM 2020.1 Schlumberger software have been used for designing Static Model, analyzing Well data, and design multi-completion.

Results: After enter the data in the PIPESIM program by the searcher we showing the results below:

- **Current production:** i.e., build a model of the well, calibrate the data to fit the theoretical data with the actual data, and perform a nodal analysis task. In this task, we need to know the outlet pressure of 500 pisa. Figure 3 shows the optimal operating system for this well with 866 STB/d of fluid and 1094 Pisa of flowing bottomhole pressure, and the intersection of the inflow performance relationship (IPR) and the outflow performance relationship (OPR) (Kelkar, B.G. and Cox, R., 1985).

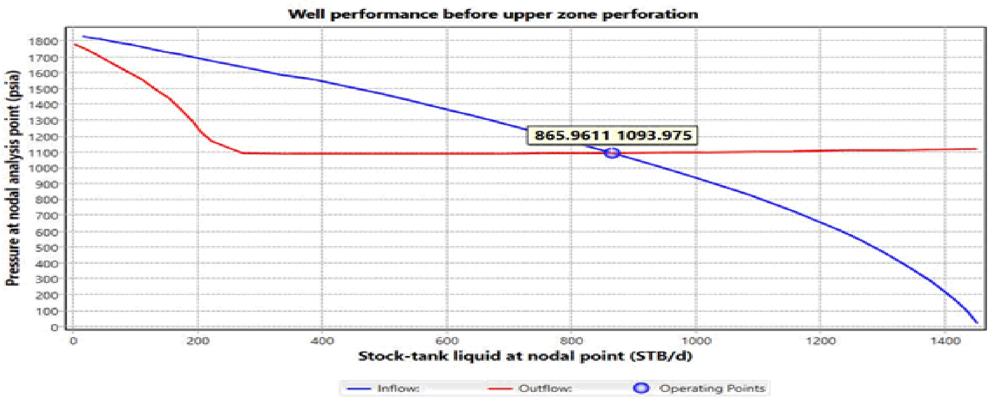

Figure (3): The current optimum operating system for this well.

- **Required Gas Rate:** In order for perforation an upper gas zone, we first need to know how much gas rate required for being as an optimum injection gas rate, which we can find it by studying the relationship between the liquid production rate and Gas injection rate by doing analysis in pipesim program (Sukarno, P. 1986).

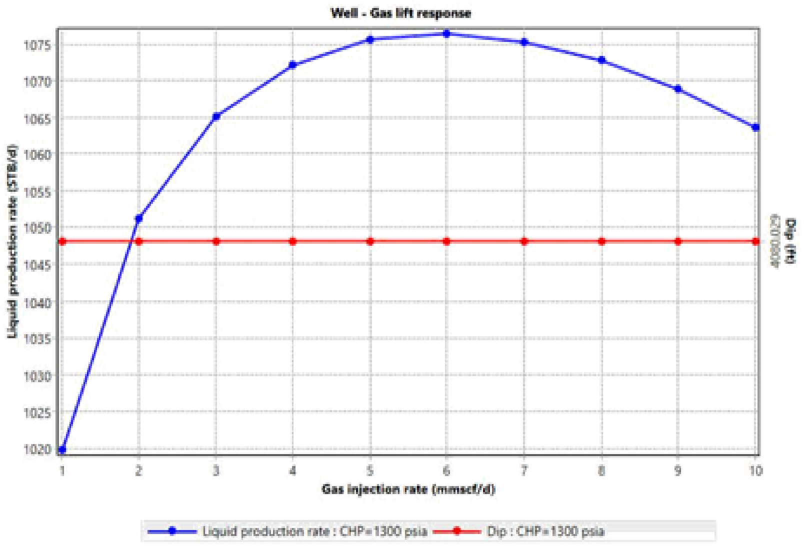

Figure (4): Relationship between gas injection rate and liquid production rate

Figure (4) illustrates that, as the gas injection increase the liquid production keep increasing to reach the maximum flow rate of 1076.395 STB/d achieved when the gas injection rate is 6 mmscf/d, Table (1) shows the response of liquid rate according to the change of gas injection rate.

Wherefore, we need to select an optimum quantity of gas injection in order to give us optimal liquid rate by design the appropriate perforation which will be in the gas zone (prefer to be in the deepest injection zone) that why we can control the shape and size of resulting bores which modified the gas rate.

Table (1): Shows Liquid flow rate response

Required GR (mmscf/d)	Liquid Rate (STB/d)	DID (ft)
6	1076.395	4080.029
5	1075.571	4080.029
7	1075.321	4080.029
8	1072.722	4080.029
4	1072.209	4080.029
9	1068.81	4080.029
3	1065.116	4080.029
10	1063.723	4080.029
2	1051.203	4080.029
1	1019.844	4080.029

Furthermore, we can use subsurface valve that controls the amounts of gas rate into wellbore.

- **Gas zone perforation design:** before we begin the design, let's look at the reservoir shown in Figure (5). As mentioned earlier, the current productivity is 866 STB/d with a bottom pressure of 1094 Pisa. To increase the productivity of this formation, the upper gas zone would be perforated, but to do so, many things must be considered (Fetkovich, M.J., 1973).

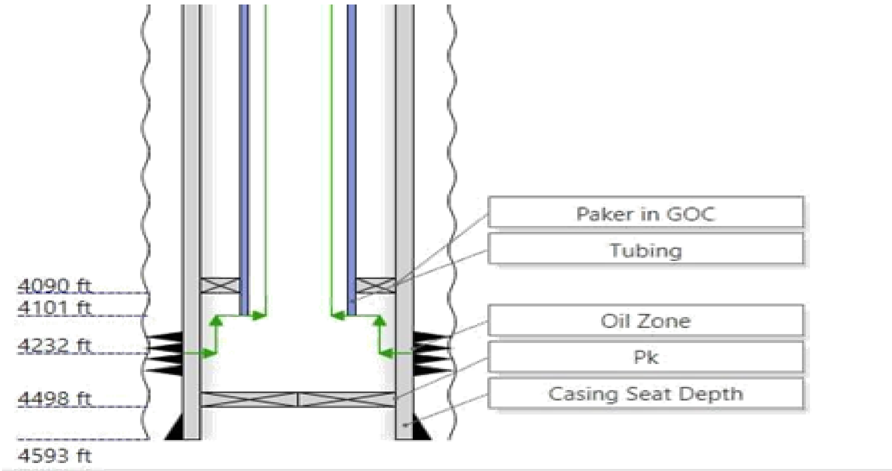

Figure (5): The current production formation

- **Procedures**: We must first determine the Gas Oil Contact to avoid gas conning, so that we can isolate it from the oil zone, Figure (6) the installed packer between the upper and lower perforations (Nevada, 30 September-3 October 1973).

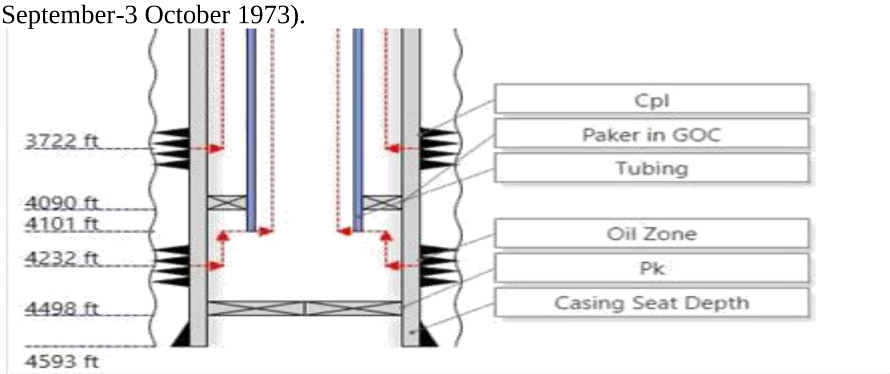

Figure (6): Shows the installed packer between the upper and lower perforations.

The next procedure is to avoid the produced fluid from the upper zone to flow in the annular, so this requires installation of a packer above the gas zone, as it shown in the Figure (7).

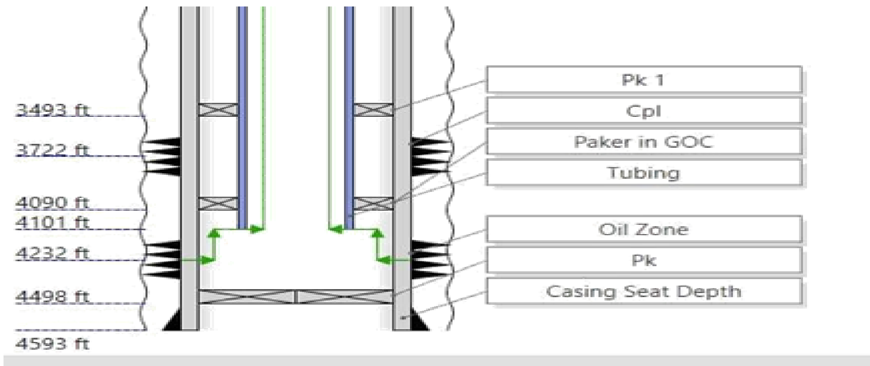

Figure (7): Shows the restriction of upper zone fluid to not be produced through the annular

Now let's insert the upper zone completion data, the completion depth is 4080 as calculated in the section (4) which is the deepest injection point that the gas lift valve must be installed, so this depth is in the gas zone and that's why we select this depth to be perforated as a gas zone. It's important to change IPR mode for this zone to Darcy as shown in Figure (8), the reservoir pressure and temperature are 2023 Pisa, 135.698 F respectively, the permeability is 43 md in addition (Gallice, F. and Wiggins, M.L. 2004).

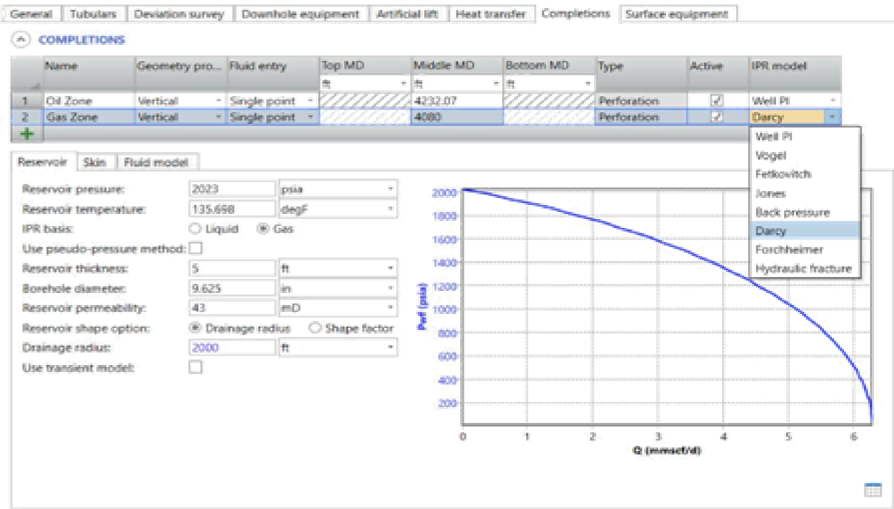

Figure (8): Shows the IPR data for the upper gas zone

The next procedure is to force the fluid to be flown through the tubing, this procedure requires to install Sliding Sleeve in the same depth of the upper zone completion, so this allow the upper zone fluid to be mixed with the lower zone produced fluid as shown in Figure (9).

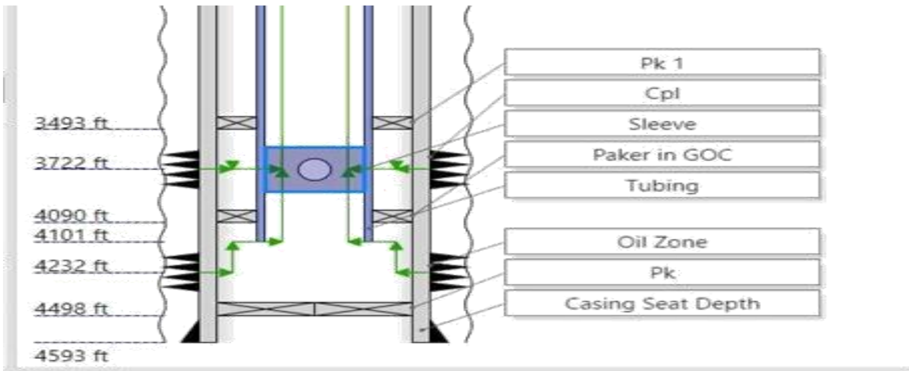

Figure (9): Shows Sliding Sleeve installation

Eventually we need to calculate the perforation thickness that will produce gas rate of 6 mmscf/d only as calculated in section 3.2, (Neely, A.B. 1967) so we insert the reservoir as 2023 Pisa and the outlet pressure is 500 Pisa in addition to restrict the gas flowrate as 6 mmscf/d, Figure (10) illustrates the inserted data for this procedure.

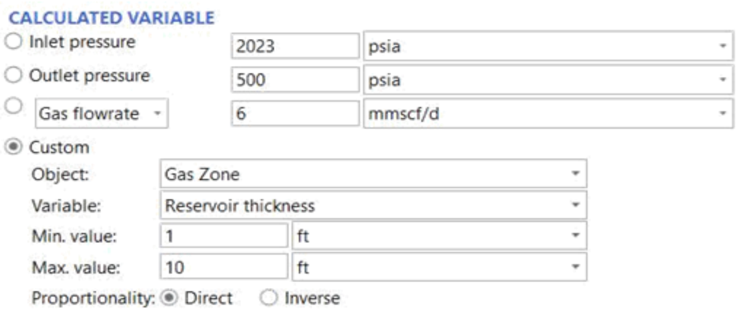

Figure (10): Shows the procedure of perforation thickness calculation.

The calculated thickness is shown in Figure (11) so we will change the designed thickness to the new calculated one, which is 5 ft.

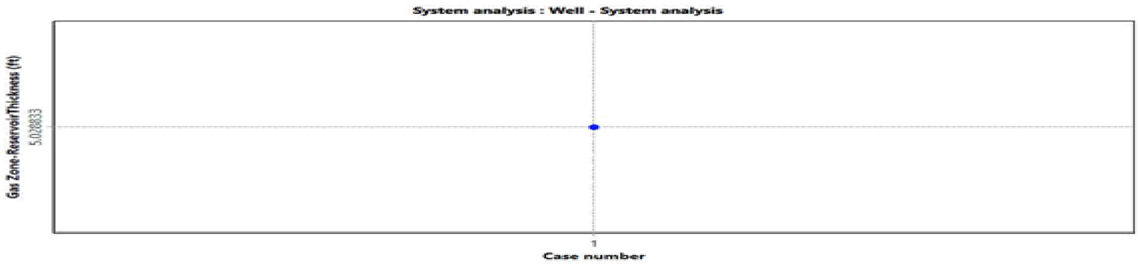

Figure (11): Shows the calculated value of perforation thickness

- **Optimum Choke Bean Value:** In some cases, we cannot control the gas flow rate produced from the upper gas zone by restriction of perforation thickness, this leads us to install subsurface choke to control the produced gas rate from the upper zone with a specific diameter. Choosing the diameter of choke mainly effects on the optimum productivity, which consider the tool that controls wells work to reach perfect production which based on the critical upstream and downstream pressure ratio. If wells work without valves or wrong operating of wells during acting inappropriate pressure on the well head that cause wells kill or heavy drop in pressure and rate in short times.

The down hole chock permits for a controlled and self-regulated drawdown, creating both improved reservoir performance and well operations. Mitigating surface hydrate formation and fracture sand flow back has resulted on significant cost saving (Brown, K.E. 1984).

By using nodal analysis in pipesim program to evaluate the diameter of valves with the productivity of gas.

Table (2): shows the relationship between chock size and gas flow rate

Choke Size (inches)	Gas flow rate (mmscf/d)
0.5	5.966439
1	5.984648
1.5	5.985884
2	5.986095
2.5	5.986153
3	5.98617

The table illustrates that the relation between chock size and the gas flow rate is directly relationship the bigger chock size the larger gas flow rate, but we need the chock who give us the optimal productivity by making nodal analysis between the quantity of gas we get it from the chock and the oil productivity (Wiggins, M.L. 1994).

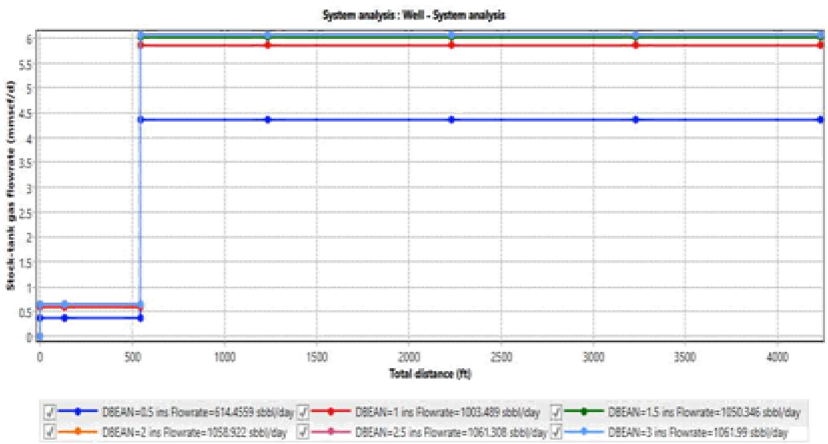

Figure (12): The relation between the gas injection and oil produced

From figure (12) we concluded that the chock (1.5 in) is the best chock who give us the high quantity of gas (6 mmscf/d) which give us the optimal productivity (1050.346 stb/day).

- **New Production:** After multi-completion procedures and designing the perforation of the upper gas zone the IPR relationship improved by natural gas lift, which decrease the hydrostatic pressure by delivering

the liquid up to the surface that leads to increase the pressure in the opposite reservoir in order to refresh the formation pressure resulting more and more liquid production, the previous production was 866 bbl/day with some obstacles like specific weight of liquid and the reverse pressure of elevation of liquid in wellbore acting on formation pressure after we cross over those obstacles by redissolved gas in oil the productivity increase to 1050.346 stb/day as shown in figure (13) due to simulation in pipesim program(Sukarno, P. 1986) .
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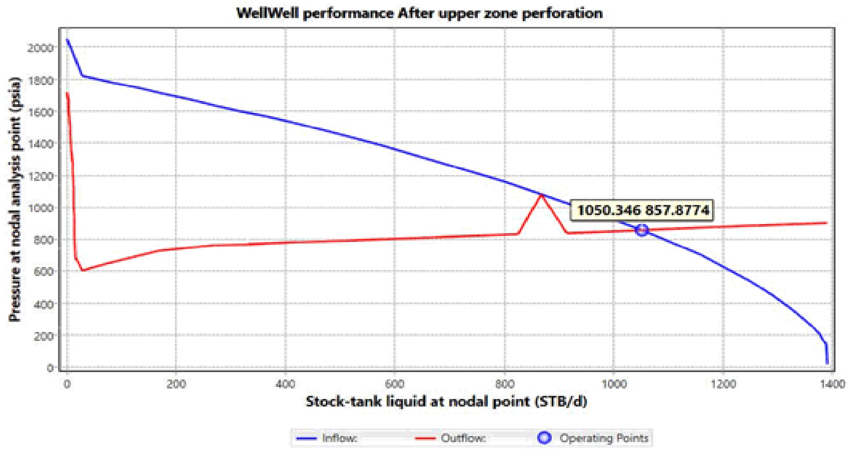

Figure (13): Shows the new optimum flow rate for the well after upper zone perforation

- **Economic Analysis:** Installation of gas lift system requires complicated station in the surface to store the injection gas and process the produced gas to be prepared for injection, the station includes tanks, compressors pipelines, suitable tubing with injection valves, (Standing, M.B. 1971) in addition to the work over costs for that equipment.

Perforation an upper gas zone is better choice if the reservoir drive is gas cap drive, so doesn't require storage equipment costs in addition to the work over costs so it's cost-effective.

Discussion of Results:

After we select the layer of the upper gas cap (4080 ft) that we want to perforate depending on the deepest injection zone (4080 ft) which point to the best height for perforation before this operation we insert up and down packers in an annular space in the two sides to ensure that neither liberated gas moved up nor escaped down, subsurface valve (one-way) works when the fluid level is being opposite the valve and making pressure equals the pressure of opening valve (Gate valve), Gas sliding sleeve cover the space between casing and tubing strings and force gas to flow in one way which is in tubing space where is the liquid located to dissolve in liquid and decrease its specific weight then the hydrostatic (Kelkar, B.G. and Cox, R. 1985) pressure of wellbore will decrease and the liquid will rise up to the surface ,As the level of the liquid decrease under the elevation of the valve that means the pressure on the valve created by the liquid height decrease the valve will close automatically, Above the casing seat depth under the oil zone there is plug to stop water encroachment (Uhri, D.C. and Blount, E.M. 1982) and prevent oil to fall down. The final design is shown in figure (14).

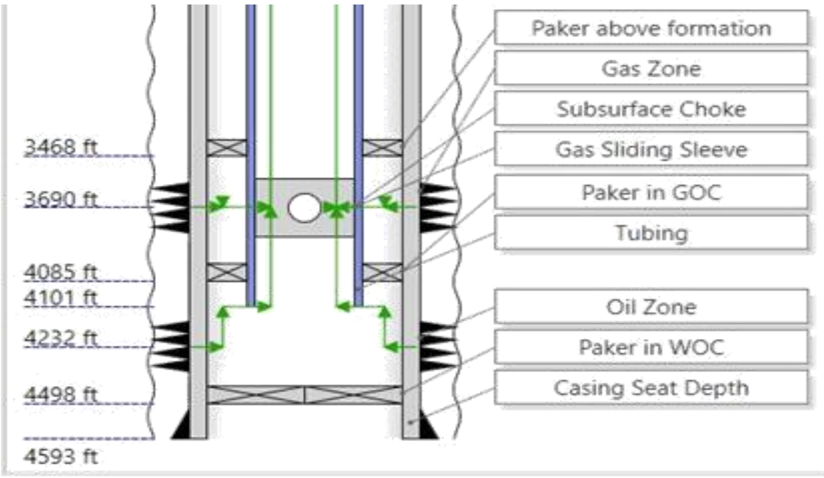

Figure (14): Shows the final design of upper gas zone

Conclusion:

The searcher concluded that the perforation of upper gas zone has the following benefits:

- The produced gas from the upper zone dissolves in the produced oil from the lower zone in the wellbore section, this leads to reduce the specific gravity of the liquid, resulting in reducing the total hydrostatic pressure, which is the clue of increasing the production rate.
- The upper gas zone perforation doesn't require surface equipment or work over costs to inject the gas to the wellbore but it's cost-effective.
- This project delves into the intersection of traditional oil production methods and modern software solutions, with a particular focus on **PIPSM** (Production Integrated Planning and Scheduling Management) programs. **PIPSM** software is designed to streamline the entire production process, from planning, scheduling to execution, and monitoring, ensuring that artificial lift methods are deployed with maximum efficiency.
- In conclusion, this study highlights the critical role that software plays in modernizing oil production, ensuring that even as reservoirs age, the industry can continue to meet global energy demands with greater efficiency and sustainability.

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