SPT MIRROR

NOVEMBER-2014

- PETROLEUM DOWNSTREAM CONCLAVE-2014
- ENERASIA-2014
- TESSERECT (TECHNICAL FEST OF PDPU)
- INTERVIEW : SAPAN RAY (RIL)
- ARTICLES

TESSERACT
Enlivening Perception

PANDIT DEENDAYAL PETROLEUM UNIVERSITY
A RESERVOIR OF KNOWLEDGE

SPT MIRROR TEAM

Patron
Prof. Anirbid Sircar

Editor-in-Chief
Mr. Sanjiv Kumar

Editorial Team
Shivam Pandey
Pulak Jawaria
Yatharth Shukla
Abhishek Singh
Mitesh Soni
Pranshu Praleya
Ashish Agarwal

Associate Team
Prahasith Garimella
Riddhiman Sherlekar
Hitisha Dadlani
Mudit Vajpayee
Palash Dhurvey
Ishaan Shah

Designing Team
Palash Dhurvey
Vikas Gushar

CONTENTS

SPT MIRROR

MESSAGE FROM THE EDITORIAL BOARD

A WARM WELCOME TO OUR READERS AND REVIEWERS

It happens to be a matter of immense elation and glory for all of us to greet you with this issue of SPT Mirror. SPT Mirror, right from its inception, has been a flagship achievement of the School of Petroleum Technology. We indeed feel the pride and joy of sharing our laurels with all our readers and reviewers . SPT Mirror today, stands as an important medium of connect between all the affairs of the SPT and our beholders. It is actually gratifying to receive appreciation and accolades from different quarters of industry and academe. SPT Mirror has been providing platforms to the burgeoning cocoon of thoughts, ideas and opinions from our readers and will continue to carry this benign mantle in the coming years of future.

This issue of SPT Mirror covers the momentous event of Enerasia-2014; The Global Energy Summit of Gujarat. It provides valuable insight into the Downstream Conclave organized by the School of Petroleum Technology while, it also sheds light into the grandeurs of Urjauday-2014; the maiden Energy Fest of PDPU. The periodical also includes some of the valuable pieces on the dynamic trends of petroleum industry and things beyond. We sincerely hope that you would appreciate our endeavours and find this issue worthwhile. We humbly beseech your feedbacks.

MESSAGE FROM THE EDITOR-IN-CHIEF

I would begin by extending a wholehearted welcome to all our readers and reviewers. I would also like to congratulate and thanks the editorial board for putting up their unflagging efforts in materializing this issue of SPT Mirror. It imbues me with content and warm fuzzes to witness the heights of readership that the periodical has managed to attain in its past issues. I sincerely hope that it would burgeon and bag unprecedented laurels from its growing readership.

This issue of SPT Mirror attempts to illustriously cover all the major events that the University was privileged to host in its premises. Furthermore, it also encourages and invites participation from all the readers of the periodical. SPT Mirror has been providing a flagship podium to all the budding thinking caps and the future of this humongous oil and gas sector. It has indeed been a very promising gesture to serve as a receptacle of worthy articles from all of you. I hope that the this trend would flourish and there would be more contribution from your side.

Conclusively, I would take this moment to thank all our readers and reviewers. I hope that you would appreciate this issue of SPT Mirror. I along with the entire editorial board of SPT Mirror humbly welcome your suggestion and feedbacks.

With Regards
Sanjiv Kumar

SAPAN RAY, Senior Executive Vice President, RIL

Q-How is PDPU at your first glance?

A-To be frank, I did expect a good campus and good students, but you all exceeded my expectations. It is not just a campus or the building but its students like you which makes a huge difference. I do see difference between our campuses and yours and I got much more than my expectations.

Q-How has been your journey in petroleum industry?

A-It had been quite satisfying and exciting at time , there has been numerous challenges. Fortunately for me what happened with me was that when the industry was at a lessened stage , I had the opportunity to join the industry and I had joined it with some confusions. I wanted to join IT. Initially at Baroda I had a huge exposure. During that time I made so many mistakes still they appreciate my work. When I made mistakes they use to teach me.

Q What are the new invention that are being done in polymer industry?

A- In this age we don't see new molecules are being invented but new and exciting use of existing molecules ,increasing their performance by some modification for example polypropene is a commodity product, but long fiber reinforced polypropene is very strong material that is the product which autoindustry needs and we are trying to meet their requirements by improving some parameters and modification.

Q- What knowledge does the chemical industry expect from the new young comers?

A- Have confidence in you. We strongly believe that some of you will do wonders in this field. There is a Paucity of talent so that there is huge demand of technically advanced people in this industry and good scientists not just in India but in the whole world that's why still people like me having white hair still have to be in this industry.

Q- From your point of view what is the importance of the trade and banking in the industry?

A-Trade is an important factor in terms of reaching to the consumers. There are some barriers like countries putting their domestic markets at priority, second is high tariff, some are also non tariff like a person who wants to import Polypropene from Saudi Arabia needs the license from the government and that license will come only after the local producer give the green signal to the government. We should not give so much importance to the export as the Indian demand of petroleum is very high and that potential we need to realize and sometimes readjust to this potential just like the idea of MADE IN INDIA. India has very large area as compared to European countries still they have very good economic condition and living standards.

Q- Are you looking forward to built good relation with this institute?

A-I already have so many relations in academics section. I also spent so much time with IICT (Indian Institute of Chemical Technology), Mumbai. UDCT was also part of ICT which is now independent deem university, I am also associated with it. I also spent a lot of time in IIT Bombay and IIT Delhi.

Q- To be industrial and more effective in industry what would you suggest us as a student?

A-Have an open mind and become more interactive. Sometimes it may be frustrating with some issues which we have to deal but perseverance would say that you are better. At the end I must say you people have much more better future than us.

Q-How was your conclave experience?

A-I Enjoyed a lot.

ENERASIA-2014

ENERASIA 2014, in Gandhinagar, Gujarat, was an international Summit where world energy leaders participated in Mega Exhibition and various Seminars. . The objectives of the Summit were to explore New Energy Resources, Energy Audit & Conservation Methods, Environment Protection Proposals and Investment Opportunities in Gujarat's Energy Sector.

ENERASIA 2014 had a series of events lined up. It started with inaugural session in the presence OF SHRI SAURABHBHAI PATEL Hon'ble Minister of State for Civil Aviation, Government of Gujarat. The first event was CEO ROUND TABLE on 26th September, 2014. The group of 200 CEOs who lead the oil and gas sector recognized the challenges and opportunities to plan on Energy Security for India. SHRI GURDEEP SINGH (Managing director Gujarat State Electricity Cooperation Ltd.) being the moderator discussed the growth of energy sector in India. SHRI ASHOK VERMA (DIRECTOR (ONSHORE) ONGC) discussed the type of energy we should produce and the method of generation of the same.

SHRI YASH MALIK (Executive Director- Asset Manager ONGC Ahmedabad) talked about huge potential mature fields and many other factors which directly or indirectly effect oil and gas sector. SHRI RAKESH JAIN (CEO Jubilant Energy) was asked to discuss on expansion of cooperate world. On the other hand investment policies were discussed by MR VIJAY IYER (Senior Adviser, Infrastructure South East Asia Region, World Bank). . SHRI RANDEEP AGRAWAL (President, Queensland Chapter Australia India Business Council) told few points to make LNG more affordable. Thus speakers discussed on many recent trends and challenges.

CEOs round table was followed by Energy Financing - Challenges & Solutions. The reason behind this was the several new projects launched in the state. Looking into the huge funding opportunity, Banks and Financial institutions are exploring their business potential in this area. Leading Indian and international financial institutions like World Bank, GETCO, NEXGEN Financial Solutions Pvt. Ltd, India Infrastructure Finance Company Ltd. (IIFCL), Indian overseas Bank, Sun Edison and many more participated in the Seminar and discussed the challenges associated with energy financing, and offer solutions giving fillip to the unprecedented growth in the energy sector.

The end of the day-1 ENERASIA 2014 was by Queensland Gujarat Energy Round table. The motto behind this was Gujarat has business and trade connections in the Energy Sector with many regions across the world. many industrial houses from Gujarat have forayed into energy investment opportunities in Queensland. A large delegation of industrialists, Government officials and decision makers from Queensland participated in the event.

Day 2 started with HR Round Table on "The emergence of Learning & Development as the key Business Application in the Petroleum Sector – Challenges and Issues". SHRI SANJIB BARUAH (Oil and Gas Professional) being moderator of this event started with an introduction to the topic of this round table. On being questioned on the policy of BG to expedite the skill development process by the moderator, Mr. BALA (Head HR BG Exploration and Production India Ltd.) started with the term "Unlimited Potential".

SHRI D V SHASTRY (General Manager HRD GAIL (INDIA) LTD.) explained how GAIL was coping with the skills vacuum created by the emergence of gas as an increasing important energy resource. The VUCA theory, i.e. Volatility, Uncertainty, Complexity, and Ambiguity applied to the business operations of GAIL in their sector was also described by him. SHRI DEEPAK GARNAIK (VP-HR & CC Mahanagar gas) described the two way process (the top and the bottom (students) should put equal effort in learning and development process). Concerted and reciprocated approach. SHRI HEMANG DESAI (AVP HR RIL) his words "learning can't happen without unlearning" and "reverse mentoring".

It was followed by New Energy Resources: The Indian Perspective. The energy industry today is growing at a fast pace. Dedicated to providing the energy industry with insights on emerging topics, ENERASIA 2014 brought together energy executives, researchers, entrepreneurs, investors and regulators from around the globe. Lastly there was a seminar on Solar & Smart Grid Technology at ENERASIA 2014. It provided perfect platform to discuss exciting new ideas and technologies that are changing the electricity industry. The theme of the seminar was on optimizing transmission and distribution systems, including new energy resources like distributed generation, energy storage, deferrable demand and intermittent renewable power.

PETROLEUM DOWNSTREAM CONCLAVE 2014

The downstream conclave was held on 11th September, 2014 in Pandit Deendayal Petroleum University. We had dignitaries from all diverse backgrounds. They gathered there to share their immense knowledge with us regarding some specific areas of Downstream Sector of Petroleum Industry.

The welcome address was given by Anirbid Sircar (Director, SPT). He talked about the hardships they faced with the bifurcation of spt into upstream and downstream. The current status of industry shows that we adopted the right way in giving our nation a better outcome. On the other hand Mr. Raghvendra talked about reiterating the importance that events such as these play in a student's overall development.

The keynote speaker, SHRI SAPAN RAY (Senior Executive Vice Chairman, RIL) was invited to discuss on "RECENT TRENDS OF DOWNSTREAM SECTOR". He focused on major trends under four sub-topics i.e. feedstock, processes, product and market along with challenges of same. Then SHRI VIJAY MENON (Senior Vice President, RIL) was invited to speak on the same topic. He covered a variety of points like RIL value chain, industry maturity, easy accessibility, price control, job-market and e-commerce development. Both the speakers tend to increase our interest and gave us a new direction to think.

SESSION 1

It began with the Session chair Satish M. Pillai (Larsen & Toubro) on "Downstream Industry Outlook & Value Improvement practices in Engineering". He started with the various challenges faced by downstream sector like Sourcing feedstock & feedstock processing flexibility, Improve Energy Efficiency, Improved fuel quality, meeting environmental norms and many more. In the second half of his address, he spoke about Value Improvement Practices (VIPs). After his effective speech Shri Krishna Vadrevu (Business Development Manager, Linde Engineering) spoke about "Integration of Gasification in Refinery complex.".

He briefly described the key drivers of coal gasification and about Rectisol®. implications. He added the impact of integration of refining and petrochemical segments. At the closure of session 1, Mr. Pillai summed up the entire session with his insightful thoughts.

SESSION 2

G.C. Shah (General Manager) GNFC, Bharuch starting the address, Mr. Shah spoke about the present challenges concerning the design of plants. He highlighted the role of Process Design engineers and Chemical engineers. He briefed students about the present demand of 'Process Operations' and its parameters. He briefly summarized the latest developments in energy optimization. At the end, he urged students to think "Out of the box" for innovations which can benefit mankind.

Ram Krishna Kona (Principal Design Engineer) & Prajwal Adiga (Conceptual Design Engineer) (Linde Engineering India Pvt. Ltd.) started their talk on sulfur. Mr. Ram Krishna used a Block Flow Diagram to explain the separation of H2S from H2S rich gas and explained the crude trend. Mr. Prajwal Adiga talked about Linde's SRU. Then Himanshu Sagar (Principal Engineer-Process, Mott MacDonald) was invited to share his ideas on "Industrial Approach: Process Equipment Selection". He started the address by stating various industrial aspects used for process equipment selection including codes & standards, Process equipment.

U.V. Yajnik (Senior Manager, GSFC) talked about "Energy Efficiency improvement in Pumping system". He began with the introduction of GSFC. He further highlighted the main reasons for higher specific consumptions in Indian Industries. Mr. Pandeya sharing 37 years of experience in fertilizer & petrochemical plants said that for energy conservation and technological development above all positive attitude is required.

Thus conclave ended with the thanksgiving ceremony.

TESSERACT '14

The maiden technical fest "TESSERACT" of Pandit Deendayal petroleum university was organised on 8th and 9th November,2014. The highlights of the fest were:

- Guest lecture by Shri. Raghunath Medge (President of Mumbai dabbawala association) Shri. Medge enlightened the students of PDPU by delivering a motivating lecture explaining the functioning of the nutan Mumbai tiffin box supplier association. The students and faculties of PDPU were completely mesmerised by Shri. Medges's witty conversation .

- A splendid show was put up by the famous car designer Mr. Dilip Chhabaria who along with Vardenchi had some exquisite vehicles to exhibit in the Tech –Fest.

- A miniature planetarium was also set up by the students of Brahmand club of PDPU. Dr. J.J Raval (former president Indian planetary society) was also among the dignitaries who were invited for the tech-fest.

- SHAMIANA –the short film club conducted regular screenings of award winning short films .

- Student's were mesmerized on the 9th evening by a mind-boggling performance by DJ Anish Sood in the EDM night which was accompanied by a 3D projection show .

- Continuing the legacy of PDPU, a Cyclothon (Bicycle race) was organised by the economic rides club of PDPU, the winner of the race was Mr. Raj Rangani .

URJAUDAY -2014

Urjauday is school of petroleum technology's own tech fest. A no. of events were organised in Urjauday with a comprehensive approach along with keeping the pre –requisites of petroleum industry in mind. The solitary aim of the tech-fest was to encourage the budding petroleum engineers to unravel their minds and to improve their presentation skills.

- Abhivyakti: The Technical Paper and poster Presentation Contest invited new ideas and detailed investigations perseveringly pursued by the contestants. This is a very good platform for the budding new minds that belong to petroleum industry.

  1st- Aman Sharma and Kirtesh Mantri (PDPU)
  2nd- Aditya Harsh and Vidhur Chandra (UPES) + Abhishek Singh and Sudarshan Sai
  3rd- Prakshal Shah and Vihar Vaghasiya

  (Downstream)
  1st- Aditya Balraj Menon, Lakshit Daggar and Vivek Verma (UPES)
  2nd- Hiren Dhameliya and Shivam Pandey (PDPU)
  3rd- Ashish Agarwal and Kiran Chadhayamudhi (PDPU)

- **Anveshan:** The Case Study Competition involved a situation pertaining to the upstream or the downstream sector of the petroleum industry that tested the skills and ability of the participants to develop a holistic solution to the problem presented before them. The cases dealt with some kind of problems that were being faced by professionals during their stint in the industries.

1st- Khamosh Patel and Roshan Patella (PDPU)
2nd- Shubham Pathak (UPES)
3rd- Vaibhaw Pandey and Anubhav Sisodia (DIT)

- **Pratikrosh**: A virtual block bidding competition was organised in the urjauday-2014 on 8th November with an aim to perplex the minds of the budding petroleum engineers. Virtual bidding is a strategy implemented in various E&P markets of trading Day-Ahead prices against Real-Time prices. The participants had to virtually bid for various oil block with acuity combined their negotiation skills. The dignitaries invited under the banner of SPE international for the event were Mr. Ajay Kumar (Chief Reservoir Engineer, ONGC) and Shri. Sanjay Parulkar.

- **Satyanrita - The Petroleum Quiz**
  Satyanrita-the petroleum quiz witnessed a totally different level of competition. The quiz was hosted by Mr.Prakhar Sarkar, six participants from PDPU and Participants from all over the country tried their knowledge.

- **Paricharya**
  "Paricharya" the debate competition of Urjauday was organised on the topic "Price of crude hovering around 80$:a boon or a bane?? Participants expressed their strong views on the effects and

WELL LOG INTERPRETATION WORKSHOP

It is said that logging is the eye of Oil and Gas industry. The student chapters of SPG, EAGE, SEG and AAPG in PDPU organized Well Log Interpretation Workshop on 6th September in collaboration with Institute of Reservoir Studies (IRS) ONGC. The workshop received an overwhelming response with an attendance of more than 150 students of PDPU. The event was graced by eminent Geophysicists and Geologists from ONGC IRS and faculties from PDPU. We were truly honored and privileged to have Mr. Rakesh Kumar Sharma, Executive Director and Head IRS ONGC. He was accompanied by

1. Mr. Indrajit Dasgupta (Chief geologist)
2. Mr. A.P.P. Singh (Dy. Supt. Geophysicist)
3. Mr. Rajesh Kumar (Dy.General Manager)
4. Mr. P.P. Deo (Dy. General Manager (W)

The session began with a talk on Geo-cellular modeling by Mr. Indrajit Dasgupta. He talked about various parameters of static and dynamic modeling along with the assumptions involved in various models. The next talk was by Mr. A.P.P. Singh, Dy. SG (wells) and he presented on an

Overview of Well Log Data Acquisition. This encompassed history of logging and its evolution, role of logging in Oil and Gas industry. He detailed various logging techniques and tools used for open hole, cased hole and production logging. He explained working principles, elicited the parameters measured and mentioned the applications of electrical logs, porosity logs, formation structure logs, pressure logs, side wall coring, depth correlation logs, production logs and high tech logs (DSI, Formation Imager, NMR and CHFR tools).

The entire session was highly interactive and the curiosity and inquisitiveness of students was appreciable. The experts from IRS were pleased to reply to queries from students and clarified their doubts. Mr. Singh continued on tirelessly and explained the importance of cement evaluation, perforation, plug setting, cutter, back off services, shaped charges. He ended with a brief on importance of production logging and production logging tool string (telemetry cartridge, Gamma, CCl, Pressure, Hydro, Density, Temperature, centralizer and spinner). The seminar continued and the post-lunch session started with a very interesting talk on Formation Evaluations by Mr. Rajesh Kumar CG (Wells). He spoke about fundamentals of well log interpretation and parameters calculated by using well logs. The properties that can be measured by logs are porosity, shaliness, density, water saturations etc. He reiterated the importance of calibration of tools which ensures good quality log data. He talked about effects of drilling mud, depth alignment, hole size, hole rugosity, barite effect, salinity and temperature on log data. He then talked about flow profile and casing/tubing caliper, etc. A test was conducted to check the abilities of students on well log interpretation and students were asked to calculate various parameters. The logs were tough to interpret but when they were discussed by experts the

PROSPECTIVE NEW TECHNOLOGIES FOR OFFSHORE MARGINAL FIELD DEVELOPMENT

-Prof. S. S. P. Singh
Adjunct Professor-SPT, PDPU

There is an increasing need to reduce cost for economical monetization of offshore marginal fields in India. In recent years there has been a remarkable development in the technology for marginal offshore fields. S*trategies of production from the marginal field remain the same i.e. Standalone approach, tie back and integrated approach, unless some break-through technology is invented, but many new and innovate researches are being done in order to bring down the cost ,both on technology as well as on management front.* Some of the prospective new technologies/innovations which are at various stages of implementation are discussed below:

1. Minimum platform Technology

The use of subsea completion technology for small fields is a well established. However there are a number of technical and economic reasons to prefer platform completion over sub- sea completion. For marginal field development in shallow water, fixed production platforms with a small deck are now being preferred.

Various studies have been done to identify and select, among existing production platform concepts, the ones that would optimize the development of fields in 150 ft (46 m) and 200 ft (61 m) of water.

Many innovative concepts developed in response to the challenge of the marginal fields in these areas, the major break-through has been in the design of low cost, efficient jacket designs, providing support structures at minimum as-installed cost. Also many new platform concepts such as the tripod based platform structures have been developed and used by oil companies, platform designers and offshore contractors in recent years. Any platform design concept will benefit from a reduction in the weight which they must support. However over zealous attempts at weight reduction without examining the implications such as operational availability and well re-entry, over the entire field life cycle may not result in cost benefits in the longer term. The main areas for weight reduction when it comes to designing platforms for marginal and satellite field developments may include:

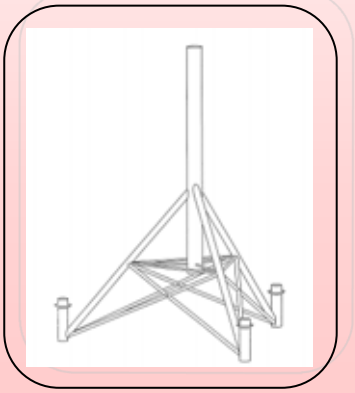
Minimal Processing facilities.

Drilling capability

Production storage.

Manning levels.

However the key factor in ensuring continuous production from an unmanned facility is the ability to deploy maintenance engineers rapidly to carry out emergency repairs. A balance must be achieved between the potential capitals and operating cost savings for unmanned and sub sea developments with the potential additional maintenance cost.



Minimum Platform Technology

2. Reusable Platform concept

For the fields with short production time there is particular need to find ways to reduce cost. The idea of reusable platforms is very attractive. From technical point of view it seems obvious to consider reuse of production system in order to arrive at optimum field development schemes for small and marginal fields. Reuse is already implemented in the drilling phase of the project. This concept can be applied in relatively shallow water of about 70 – 140 meters of water. There are many type of reusable structures that are proposed but as per researches concrete platforms can provide a particular cost effective and efficient production system.

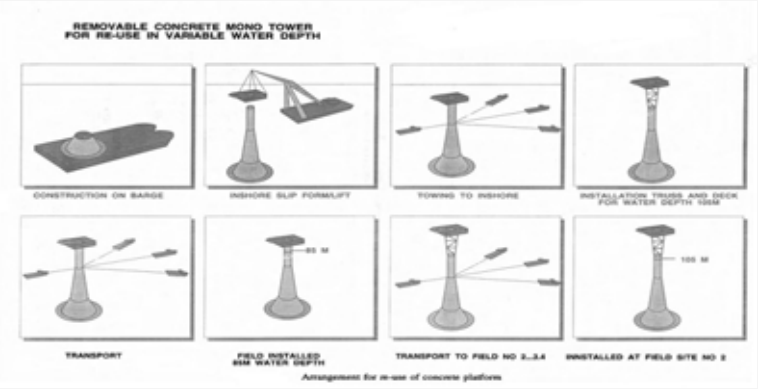
A concrete re-usable platform is designed to operate in water depths which vary up to 40 meters and is expected to be competitive in water depth ranges from approximately 70 to 150 meters. This platform can be re-used in variable water depths with varying topside functions and weights. Storage of oil is possible within the body of the platform.

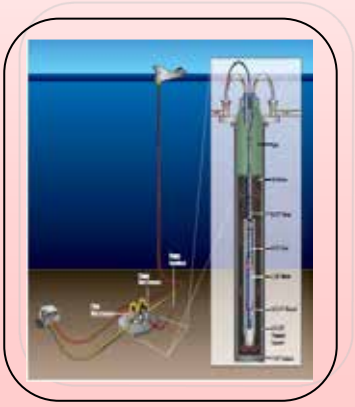
The basic design of the concrete re-usable platform comprises a sub -sea form which may be designed from numerous alternative geometrical shapes such as: central tower with conical walls to allow for oil storage typical gravity base structure with cells for oil storage with one or more shafts penetrating its water line box shaped base with one or more shafts penetrating the water line concrete trusses etc.

The enclosed sketch shows a typical design for the CRP comprising a central shaft and conical walls to allow for oil storage. A concrete base is incorporated in the central shaft approximately

5-10 meters above the sea bed to allow for installation over pre-drilled wells. The platform comprises a central concrete shaft which at all times penetrates the waterline at the water depth which is relevant for each application.

When the platform is moved to other location where is there is difference in water height then a truss structure is mounted between the base of the structure and the topside. This would help to increase the height of the platform.





3.Seabed Boosters

New innovative production systems to economically boost fluids from deepwater subsea fields and increase the distance of tie back are being developed and one of the solutions employ electrical submersible pumping (ESP) systems on the seabed.

The concept would work in the same way as normal onshore ESP pumps but when employed for such offshore booting applications there would a little change is its configuration. These pumps would not be installed inside the well otherwise the well intervention and repair costs will be too high. The seabed booster concept is a compromise that provides some boost without the enormous capital.

The concept would work in the same way as normal onshore ESP pumps but when employed for such offshore booting applications there would a little change is its configuration. These pumps would not be installed inside the well otherwise the well intervention and repair costs will be too high. The seabed booster concept is a compromise that provides some boost without the enormous capital.

A vertical booster's proposed configuration is as shown as above. The vertical booster stations would require installation of a large pipe, such as 36-in. conductor pipe, by drilling or suction pile if the seafloor is muddy. The ESP system will be encased in a pressure vessel with a connection system on top. The system will is lowered into the 'dummy well' by a light construction vessel. The booster station can be located at any point between the well and host facility. If more than one field is connected to the host production platform, the booster station may be closer to the platform and boost production from several fields.

The vertical configuration of these installations would make gas separation much easier, but the initial cost of the 'dummy well' can be a drawback. However, pump encapsulation in the pressure vessel onshore dramatically decreases installation costs.

Another proposed configuration is as ESP Jumper System. This system places the ESP equipment in the existing subsea flowline jumper infrastructure either between the wellhead and the manifold or the manifold and the pipeline end termination. The lower costs associated with ESP Jumpers could make the technology ideal for such marginal applications.

4. Multi Phase Pumping

Multiphase production systems require the transportation of a mixture of oil, water and gas, often for many miles from the producing well to a distant processing facility. This represents a significant departure from conventional production operations in which fluids are separated before being pumped and compressed through separate pipelines. By eliminating this equipment, the cost of a multiphase pumping facility is about 70% that of a conventional facility and significantly more savings can be realized if the need for an offshore structure is eliminated altogether. However, multiphase pumps do operate less efficiently (30-50%, depending on Gas volume fraction and other factors) than conventional pumps (60-70%) and compressors(70-90%).

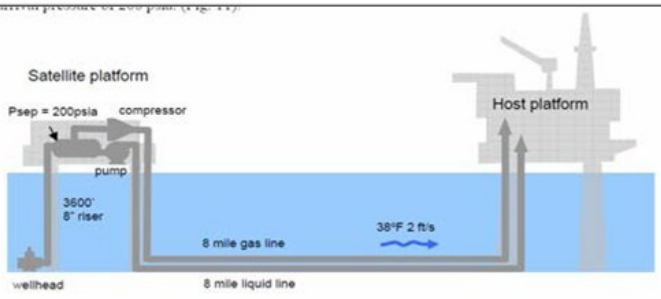


Figure 10: Schematic of Production System using satellite platform

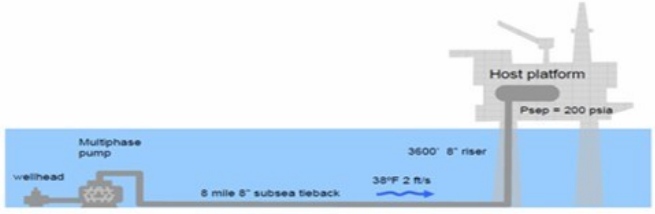


Figure 11: Schematic of Production System using subsea multiphase pump

Still, a number of advantages in using multiphase pumps can be realized, including:

1)Increased production through lowering backpressure on wells;

2)Elimination of vapor recovery systems;

3)Reduced permitting needs;

4)Reduction in capital equipment costs; and,

5)Reduction in "footprint" of operations .

Conventional And Multiphase Pumping

•Multiphase pumping is a relatively new technology and acceptance has been hampered by a lack of engineering design tools.

Recently, pipeline simulation codes have incorporated the ability to model multiphase pump performance as part of the overall multiphase production system.

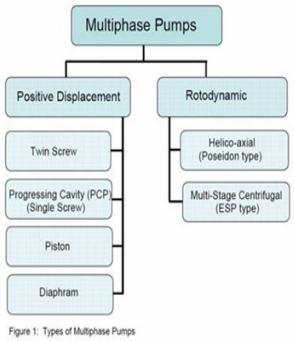


Figure 1: Types of Multiphase Pumps

5. Subsea Processing

•Normally used in deepwater

•Separation of heavy oil and water

•Reinjection of water to boost production in a mature field development.

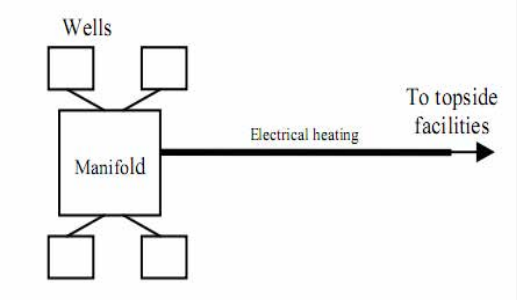
The separation system may also includes cyclone modules that perform water treatment before reinjection the water back in reservoir.

6. Subsea pipe line heating

The most natural option for the development of marginal reservoirs is tie-back to an existing facility. Concerning the flowline architecture several concepts can be considered for oil production. The conventional loop architecture, which has the greatest operating flexibility, production is taken in two lines of same diameter and connected to same manifolds. During a shutdown, dead oil is circulated in both lines to displace the live oil. The drawbacks of this option are:

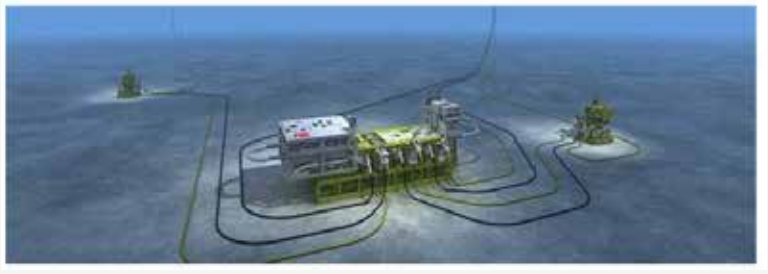
1.Thermal requirements for preservation and consequently the time allocated for dead oil circulation, limiting the maximum tie back distance to 20-25 km.

2.The cost of two insulated lines over a long distance is higher than the cost using a single line concept.



There to solve the above issues a new concept of single heated flow line is created

Thermal management is a key issue for long tie backs and use of heating can be considered as an alternative to fluid circulation or chemical injection for preservation purpose. The cost advantage is that it saves one flow line and one riser, plus a dead oil circulation pump.



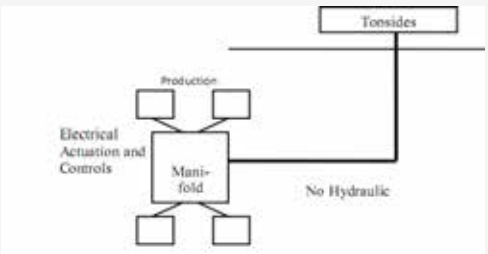
Several technologies are currently under development are: Direct electrical heating, Heat tracing with Pipe in Pipe, Hot water circulation.

The main limitations centers on power requirements, voltage levels, reliability, and energy efficiency or installation constraint. The direct electrical heating technology produces heat using induction effect with electrical current in the flow line wall pipe itself. In the wet pipeline architecture, the flowline is insulated with foam, and the alternative current passes first through the pipe wall and is return in an important part in a piggy back electrical cable installed above the flowline. In a pipe in pipe DEH architecture, the flowline is manufactured with a second pipe around the insulation and the return current uses the outer pipe.

Presently it is said that as compared to DEH, PiP option is significantly more efficient, close to 90%. This technology presents the advantage of consuming less power than other heating systems and therefore minimizes the impact on the host.

7. All Electric Subsea System

Marginal field the cost has to be kept low. For this all electric subsea system is proposed. The gain on the umbilicals will be achieved by removing the hydraulic lines, which will reduce the cross section. The gain on the reliability is attained with the use of fully redundant electric actuators that maximizes production availability.



All electric and fiber optical solution will enable expandability, plug and play control, high bandwidth an transparent connectivity.

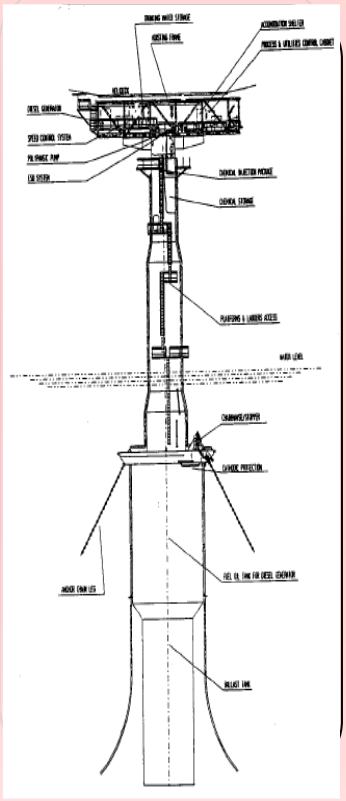
Obsolescence can be a problem. Introducing all electric control commands and fiber optics will improve the interface between the systems. It will also be possible to upgrade software or change equipment operating parameters safely. Thus the challenge of remoteness and reliability can be mastered.

Advantages:

- Longer Tie Backs
- Fewer Chemicals
- Lower CAPEX
- Interoperability
- Improved Reliability

8. Extended Reach Drilling (ERD)

Horizontal wells are now days being drilled to long offset distances. For the development of marginal fields ERD will be possible future technology. It would help to reduce the cost of development by directly drilling the wells from the platform to the nearby marginal field. They could act as a substitute for tie-back approach. The CAPEX on the production support is greatly reduced and only significant cost is the well cost. Without fabrication and installation of new facilities, the oil production could be achieved in much easier way than tie back approaches.



The above discussion was mainly concerning systems which are used in the tie back strategy, though they may be used in other too. A lot of developments are taking in standalone production systems too to reduce the cost. Many advanced version of the production support systems are being developed. The units are being designed to maximize ease of fabrication and minimize construction time while meeting all necessary safety regulations. New types of semi-subs, FPSO, jack-ups are being proposed which have increased their operationability and significantly reduced the cost. The major concepts as per the type of production supports can be listed as:

Semi Sub: Highlander 6000, IMFP 300

FPSO : Offshore Oil Production and Test Ship (PTS), The 'SWOPS' Oil Production System, The Floating Oil Patch, The TAPS System, Gorilla FPSO

Jackup : Seaplex,

Articulated Towers: Subsea Riser Tower, MACC(Manifold and Control Columns), CONAT.

A new class of production support systems is being proposed and one of them is Nomad.

9. Nomad System

The Nomad System consists of a small floating unit equipped with minimum facilities to produce subsea wells and to pump the produced effluent in a single multiphase pipeline, towards an existing platform, for separation, processing and export. It is designed to operate in an unmanned mode.

The floating unit is anchored on the seabed by a catenary mooring system. Its deck supports the pumping and power generation systems. It also contains the control and safety systems as well as a survival shelter.

The field is produced by subsea completed wells. Individual or man folded wellhead streams are flowed to the floating unit by flexible flow lines and risers. A retrievable flexible pipe is also used to provide the tie-in between the floating unit and the processing platform. Such a system is characterized by its mobility. Few of the components are actually specific of a field. It can be easily retrieved and moved in another field.

Not only on the technological ground also at the same time on the managerial front efforts needs to be done for counter balancing the marginality of the fields. Some of the concepts in this regard are represented.

10. Concept of Standardization

In marginal developments it is well recognized that economics are strongly influenced by time to first production. The key factor that is expected to allow for significant savings in lead times is standardization. It also contributes to reducing cost.

The uniformity and the number of similar items for each field also bring in the concept of 'learning curve' in production processes, procurement, testing and construction activities; the final advantage is reduced time schedules, when compared to traditional situations.

Nowadays many companies are trying to use this approach.

There are trying to standardize the equipments and procedures that they would use in the development of their marginal fields but to achieve this, firstly companies are trying to have similar type of marginal fields in their bags.

Then, standardization can be applied whenever possible things like sub sea equipments, type jackets, risers & processing equipments, etc.

Standardization of main items also calls for a general 'streamlining' of the number of traditionally time consuming phases. Particularly effectiveness is expected for the orders follow-up because of reduction in the number of tenders to be awarded.

Flexibility will have to be as high as interchange-ability, in order to allow the direct reallocation of a large number of items during procurement and construction, depending on time and contractual constraints.

Standardization would also help to rationalize the maintenance and hence reduce cost.

11. Overall Integrated approach to project Management

The profitability of the offshore marginal development could be further optimized and increased by complex combination and integration of human resources, advanced techniques for design, construction & installation, with the most effective management of the project during its life time.

The management should carry out the detailed analyses related to integrated planning, environmental issues, market investigations, facility planning and simplification & organization of operations during the production life of the fields. If all these investigations are integrated with each other in the project at all stages in the project outcomes could be fast reaching but for such integration on the overall project level a good project team needs to be created.

ACID JET DRILLING -COULD BE THE GAME CHANGER

-SUDARSAN SAI G
3RD Year, SPT (Up Stream)

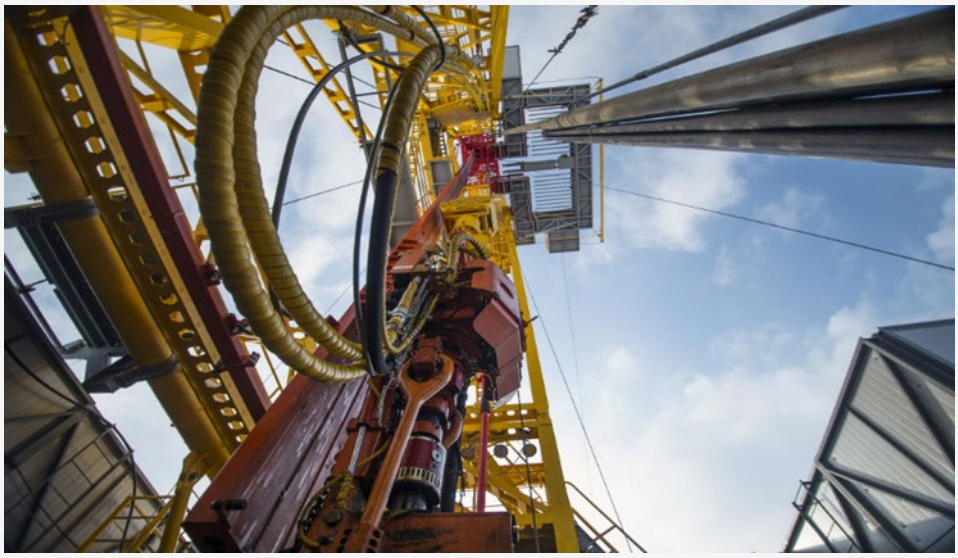
Acid jet drilling technology is suitable for carbonate reservoir formations, which are very common in the Middle East.

The new technique, which consists of tools and chemicals, aims to increase the recovery factor to be as good as acid fracturing a few times. Currently, depending on situation in your field, you can select different methods of stimulation, like cleaning, acidizing, and hydraulic fracturing, conveyed through Coiled Tubing, or acid jety drilling conveyed through Coiled Tubing. Meanwhile, acid jet drilling can enlarge reservoir contact area as good as acid fracs and, therefore, have the same drainage improvement results. The only difference is that there is less environmental impact and less equipment.

The new approach consists of making holes in the rock by dissolving it with acid, so there are no returns to the surface. Normally, acid drilling is done on a 2-joint bending tool. The tool is smaller in diameter and has 6-joint bending, so it can bite better into rock walls and make a hole in it. This new hole can drain new fractures that have not been connected to the wellbore.

Acid jet drilling is an innovative technology used on a large scale. The method involves creating several side horizontal boreholes using coiled tubing and special assemblies in the uncased part of the productive formation. The use of coiled tubing enables us to perform operations without involving a well workover team and without pulling the equipment out of the hole. This ensures well control at all stages of the job and reduces time and money needed to put the well into operation.

The new technology is mainly suitable for companies that operate big carbonate reservoir formations. Almost all fields in the Middle East are carbonate formations, where acid drilling can be done in carbonate formation and limited to openhole completions.



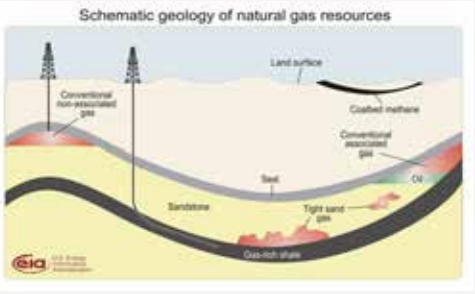
Research and development for an acid jet drilling package of new generation is being conducted ,will allow to receive information about the arrangement of channels and to orient the tool.

THE TRUE POTENTIAL OF TIGHT GAS.

-RIDDHIMAN SHERLEKAR
2nd Year, SPT

Tight gas refers to natural gas reservoirs locked in extraordinarily impermeable, hard rock, making the underground formation extremely 'tight' and generally have permeability less than 0.1 millidarcies. Tight gas reservoirs characterized with low porosity and permeability, small drainage radius and low productivity. The development of tight reservoirs includes factors such as mineralogy, grain size, its sorting, sedimentary depositional environment and the lithification. The other factors include digenesis (compaction, cementation, dissolution) followed by tectonics and development of fractures. Tight gas reservoirs are generally multi –layered, having complex strata which require significant well logging. The exploration part is quite complex and uneconomical.

Tight gas exploration along with other non-conventional resources such as CBM, took pace when the fear of depletion of conventional resources came into the picture.



The exploration part is a bit twisted in the case of tight gas because conventional suits of well -logging such as borehole imaging, spectral gamma ray imaging may lead to false evaluation of tight gas reservoirs due to the presence of clay minerals and shaly sand around the reservoirs .NMR spectroscopy and bore hole imaging are the two techniques which are mostly used in case of these reservoirs as NMR porosities are not affected by shale minerology.Mainly exploration is done using the hydro-fracture technique which came into existence from the year 1947.

The hydro frac technique involves pumping pressurized water along with sand and other chemicals into the well in order to fracture the reservoir and make way for the trapped natural gas. The sand particles are regularly circulated into the well in order to hold the fractures. This method is a bit disadvantageous as it contaminates the

Steam injection and acidization are other common methods of extracting heavy crude oil. Well acidizing is achieved by pumping acid into the well to dissolve limestone, dolomite and calcite cement to restore the natural permeability.

TIGHT GAS: THE INDIAN SCENARIO

Tight reservoirs occur in almost all the producing basins of India and in frontier basins viz. Bengal basin. Exploration of tight reservoir has already started in KG-PG, Cauvery and Cambay basins.

In the KG Basin gas was struck in East Godavari sub basin near Mandapeta in the year 1988. Recently Penugonda, South Mahadevpattanam and Malleshwaram fields have been discovered with very good potential for exploration of tight reservoirs. The estimated in place volume of tight reservoirs is approximately 50 BCM.

Cambay Basin contains thick, over pressured low permeability tight reservoirs in the Eocene section. Tight- gas reservoirs in Cambay Basin hold approximately 413 BCF of economically recoverable tight gas (Oilex). Total reserves at Cambay basin amount to 0.55 TCF, according to the study, carried out by NuTech Energy Alliance, a US oilfield services company. Oilex says its gas and condensate reserves will rise by 248 BCFand 11m barrels as a result of exploration activity at Cambay.In Mizoram ONGC has discovered non -commercial gas in a tough and geologically challenging field, well drilled about 130 km north of its capital Aizawal.

In Bengal Basin one well Ichapur-1 drilled by ONGC flowed non-commercial quantity of oil and gas from basal sand pack of Oligocene formation. The reservoir was found to be poor in porosity and permeability. Vindhyan Basin, a Proterozoic basin of India is under exploration for the last few years. Discoveries have been made in Son valley, few wells flowed gas during production testing from Rohtas limestone at a depth of around 1500m-1600m. The discoveries have opened a new window for exploration in Proterozoic sediments.

SHALE GAS IN INDIA:

TODAY'S CHALLENGES AND FUTURE'S OPPORTUNITIES

-MODIT VAJPAYEE
2nd Year Petroleum Engineering

"Availability of technology and skills, as exploration and exploitation of shale gas is widely different in comparison to the conventional plays and require special technical and project management skills and therefore accessing and ramping up the technical and project management skills are the most critical to the business," – Sudhir Vasudeva, Former MD ONGC

Shale Gas is the most talked about thing in the energy industry in this period of time. On one hand recent extractions are being carried out in some countries whereas on the other widespread protests regarding ban on fracking are also being held all over the globe. Now the question arises what is India doing towards shale gas, What are the developments going on and what are the steps are own country has taken regarding shale gas.

Challenges To Be Encountered:

Firstly requirement of technical resources and physical inputs such as rigs, different services including frac services, specialized logging etc and surface infrastructure is huge compared to conventional drilling. Large number of service providers is to be attracted through special initiatives to increase the availability of cost competitive services.

It is evident that potential shale gas bearing areas, such as Cambay, Gondwana, Krishna-Godavari, and the Indo-Gangetic plains are also areas that will experience severe water stress by 2030.

Not only the consumption of water is an issue, 70% of frac water which is dewatered from the well is contaminated with hazardous chemicals; therefore needs to be properly treated before it could be reused, which is further going to add to the cost. The possibility of contamination of aquifer (both surface and subsurface) from hydrofracturing and fracturing fluid disposal and the need for safeguarding the aquifer is the need of the hour.

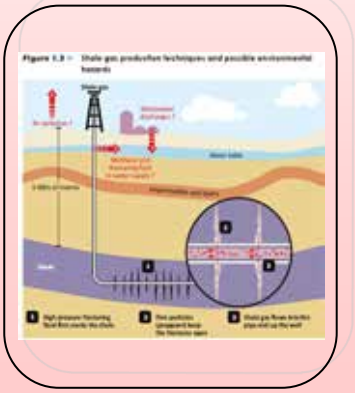
Potential Solutions:

First, the government needs to come out with a shale gas policy. It should facilitate seismic surveys that can quickly delineate potential shale gas deposits, and then invite bids for exploration.

All future exploration contracts for oil should permit exploitation of shale gas as well as conventional gas. That will make it worthwhile for companies to investigate shale gas they may find while drilling for conventional hydrocarbons. This will simply relax the boundaries of exploration.

Effective incentives for landowners need to be developed so that they provide their land for exploitation.

Proper management and recycling of fracturing water needs to be done to manage water resources and treatment of contaminated flowed back fracturing fluid.



Benefits to Be Reaped:

US federal authority on energy statistics and analysis, has estimated India's shale gas recoverables to 96 TCF. This (96 TCF) is enough to take care of India's gas demand for 26 years.

By 2015-16, India's demand for gas is set to rise to 446 mscmd (124 mtpa) against a partial increase in the domestic supply to 118 mscmd (33 mtpa) and higher imports of 170 mscmd (47.2 mtpa). This will leave a gap of 158 mscmd (44 mtpa), according to estimates of the petroleum and natural gas ministry. And Shale gas can be a key factor to solve this gap.

In summary, shale gas has potential but it is not the silver bullet which will resolve India's energy crisis tomorrow. And although we need a policy around shale gas, it needs to be holistic and incorporate lessons learned from the experiences of other countries (USA and UK) that are further ahead. It will allow us to create a more robust policy for India which will sustain over the long term.

BE UPDATED

Chevron Confirms First Oil Production From Tubular Wells In Gulf Of Mexico.

Chevron Corporation announced today that the Hess Corporation-operated Tubular Bells deepwater project, located in the U.S. Gulf of Mexico, has started crude oil and natural gas production. The field is located 135 miles (217 km) southeast of New Orleans, in approximately 4,300 feet (1,310 m) of water in the Mississippi Canyon area. The discovery well was drilled in 2003, and project construction began in October 2011.

Tubular Bells is expected to deliver total production of approximately 50,000 barrels of oil-equivalent per day producing from three wells.

Oil prices slide on New York, London markets

US light, sweet crude oil price settled below $76/bbl Nov. 17 on the New York Market and Brent oil prices settled below $80/bbl on the London market upon expectations that the Organization of Petroleum Exporting Countries will not act to reduce ample oil supplies worldwide.

OPEC is scheduled to meet in Vienna Nov. 27. Traders expect the cartel, especially Saudi Arabia, will refuse to reduce its production quotas despite falling prices. Saudi and OPEC officials told The Wall Street Journal that Ali al-Naimi, the Saudi oil minister, is expected to say at the OPEC meeting that Saudi Arabia won't cut production on its own. "Essentially they have lost their biggest customer (US) and are falling over each other to try to get to the next biggest consumer in line (China)," Larry said of cartel members.

Big Oil Discovery In CAMBAY BASIN

A significant oil discovery has been made near Ahmedabad in the Cambay basin that by some estimates may be the biggest onland find this year.
Jay Polychem (India) Ltd, a unit of city-based Jay Madhok Group, made the oil discovery in the very first well it drilled on the block CB-ONN-2009/8 in Gujarat's Cambay basin. The discovery in the well Kharenti-A has been notified to the upstream regulator DGH and the government.

Testing done this month resulted in oil being found in three zones. A gross column of 52 meters was interpreted from log analysis and testing data to be oil bearing, they said. Initial analysis of the oil samples suggests the presence of oil of API 14. The firm will further deploy world best technologies used to produce heavy oil in USA, Canada and South America to determine and commence production on commercial basis from the Khrentie field. The discovery enhances their understanding of the Olpad Play which extends over the entire block and establishes hydrocarbon potential of the various prospects in the block, the firm said. Jay had won the block in the 8th round of bidding under New Exploration Licensing Policy (NELP). The discoveries are first in NELP VIII blocks and very significant in the recent times in the Cambay basin.

The company, which has acquired 200 sq km of 3D seismic data, will drill 5 more wells by next quarter. Site for the new wells has already been acquired and the development is on. It also has city gas distribution licence to retail CNG to automobiles and piped cooking gas to households in Jallandhar, Ludhiana and Kutch (east).

BE UPDATED

Iran leases oil storage in China; ships crude to India from there: Sources

NEW DELHI/BEIJING: Iran leased oil storage at Dalian port in China earlier this year and has made at least two deliveries of crude from there to India and one to South Korea, according to sources with knowledge of the matter. Iran, besides having to cope with western sanctions that have cut its oil exports by more than half, has been battling along with other Middle East producers to hold onto market share in Asia as softening global prices have hit its economy.

The oil is held in bonded tanks, and can be sold into China or transhipped, the Beijing source said. The leases were primarily to serve North Asia, said the source, adding that at least one delivery had been made to South Korea. Ship tracking data available on the Thomson Reuters terminal shows the Singapore-flagged Varada Lalima, which the Indian government source said was carrying 90,000 tonnes of Iran's Norouz crude, left China in May and arrived in India in August.

OVL bids for oil and gas block in New Zealand

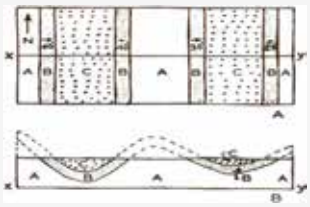
November 21, 2014: ONGC Videsh Ltd, the overseas investment arm of India's biggest energy explorer, has bid for an oil and gas block in New Zealand. New Zealand offered eight onshore and offshore blocks covering more than 190,000 square kilometres in its latest licensing round, bids for which closed in end-September. In an investor presentation, Oil and Natural Gas Corp (ONGC) said OVL "has submitted bid for New Zealand exploration block." It, however, did not identify the block it has bid for. The blocks on offer include five onshore areas and three offshore exploration areas.

ONGC said OVL was recently awarded two exploration blocks each in Bangladesh and Myanmar and is "actively pursuing 2-3 exploration blocks in Vietnam." OVL will take 40 per cent stake in Block 102/10 and 50 per cent in 106/10 in Vietnamese portion of the South China Sea. Last year it awarded 10 licenses, all of them to companies already exploring for oil and gas in the country.

QUIZ

Q1. Offshore holds huge gas reserves. But transporting it to on-shore through pipelines is very expensive. But what if we liquefy this gas offshore and then transport the LNG to wherever required. This will be possible now as Shell is constructing the world's first floating liquefied natural gas (FLNG) project. What is the name of this FLNG Project?

Q2. Where (in which part) in the below map and cross section of an arbitrary field, you expect a commercial hydrocarbon prospect?



Q3. A gaseous hydrocarbon-bearing zone can be best identified by a combined analysis of:

A. Density and SP logs.
B. Density and neutron logs
C. Sonic and neutron logs
D. Natural gamma ray (GR) and Neutron logs.

Q4. X is a French multinational oil company whose CEO recently died in a plane crash and Y is the company for which SPE 2015 president works. Both X and Y recently backed out of one of the world's biggest gas pipeline project due to soaring costs. What is the name of this pipeline project?

Q5. Which amongst the following logos, is not the correct logo of an oil & gas company?

Q6. Which of the following statements is not correct with respect to Single Well Chemical Tracer Test i.e. SWCTT test?

A. It requires a well to be brought off production.
B. It gives residual oil saturation of a well.
C. It gives an estimate of the effective mobility of the fluids involved.
D. Permeability layering in wells can cause excessive dispersion of tracers used.

Q7. The Mangala Development Pipeline (MDP) or simply the Mangala pipeline carrying the waxy crude of Barmer region is the worlds longest continuously heated and insulated pipeline, and is developed by Cairn India. *To a majority of people's misconception, Cairn does not use heaters at intervals to heat and insulate the pipeline.* What is the name of the technology used by Cairn India to ensure that the crude oil remains above the Wax Appearance Temperature (WAT) of 65 Deg C, through the pipeline?

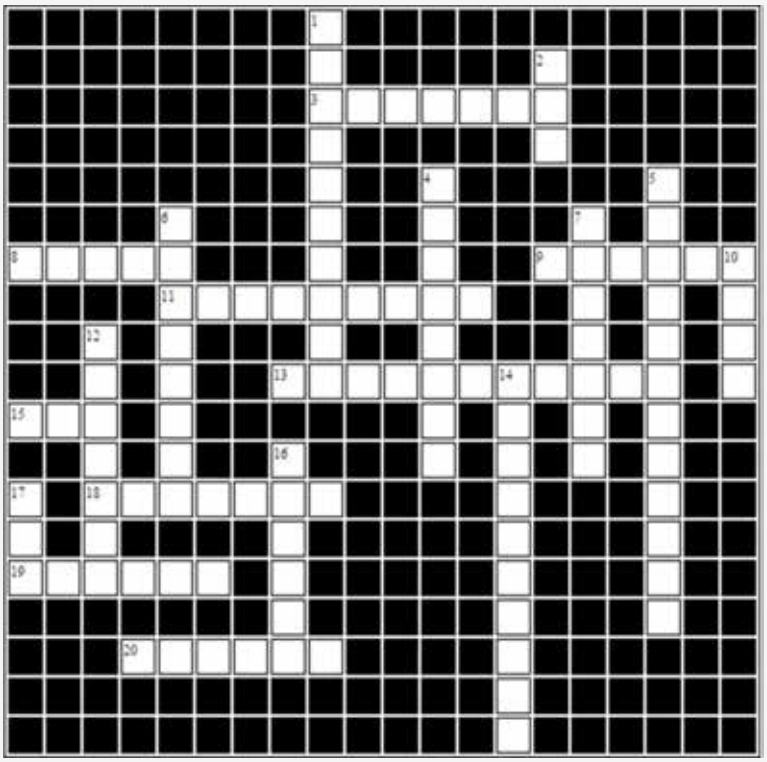
Q8. There are a number of problems that can occur while drilling a well. Whether a drill string breaks and falls to the bottom of the wellbore or a bit breaks, accidents happen. Even pipe or a tool can fall from the rig floor into the bottom of the well. What is the name of the technique/process (performed by a separate service company) to remove the stray equipment?

Q9. What is the name of the yellow coloured part of the drilling rig in the picture below?

Q10. This person shown in the photograph Conceived the idea of prospecting for Metal ore deposits by using the electrical conductivity of ore rocks to distinguish them from the less conductive surrounding country rocks.
This gave birth to the Well-Logging Industry. Identify this person?

1) Prelude
2) Nowhere as it has either synclines and anticlinal part is eroded so HC must have seeped to atmosphere.
3) B) Density and neutron logs
4) Trans-Anatolian Natural Gas Pipeline or Tanap
5) BP
6) C. It gives an estimate of the effective mobility of the fluids involved
7) Skin Effect
Heat Management System (SEHMS)
8) Fishing
9) Top Drive
10) Conrad Schlumberger

CROSSWORD



Across

3. Gas Lift _____
8. _____ Flooding
9. _____ Law (HINT: a generalized relationship for flow in porous media)
11. The pumping of acid into the wellbore to remove near-wellbore formation damage
13. A hole made in the casing, cement, and formation through which formation fluids enter a wellbore
15. Sucker _____ Pump
18. Space between the wellbore and casing
19. _____-Steady State (HINT: no flow boundary)
20. Designed to make a seal between the tubing and the casing during production

Down

1. _____ Production (HINT: total amount of oil and gas recovered as of a particular time in the life of a field)
2. IPR vs. ____ shows optimal bottomhole flowing pressures for the corresponding flow rate
4. The uncased portion of a well
5. _____ _____ Analysis (HINT: A means of predicting future oil well or gas well production based on past production history)
6. The difference between the average reservoir pressure and the bottomhole flowing pressure
7. An artificial lift method in which gas is injected into the production tubing to reduce the hydrostatic pressure
10. Near wellbore damage
12. Gas molecules trapped in a cage of water molecules
14. _____ Lift
16. _____ Point (HINT: the pressure and temperature conditions in which gas starts to come out of solution)
17. An electric downhole pump used in heavy oil production

School of Petroleum Technolgy
Pandit Deendayal Petroleum University
Gandhinagar-382 007

www.spt.pdpu.ac.in/spt_mirror.html
facebook.com/spt.mirror