

THE OFFICIAL MAGAZINE OF SCHOOL OF PETROLEUM TECHNOLOGY

SPT MIRROR

May 2020

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COVER PHOTOGRAPH BY : **ARCHCHI SARKAR**



IPTC 2020

*SPT Students participate
in International Petroleum
Technology Conference, 2020*

PETROCOAL 2020

*SPT participates in World
PetroCoal Congress 2020*

INTERNATIONAL PARTICIPATION OF SPT STUDENTS

HIGHLIGHTS

IPTC 2020

APGCE 2019

GEOSCIENCE 2019

PETROCOAL CONGRESS 2020

ARTICLE

OIL & GAS Industry Initiatives to mitigate
climate change

LEARNING AT THE TIME OF COVID 19

Pictures from online learning media Zoom
and YouTube

SCHOOL OF PETROLEUM TECHNOLOGY PRAYS FOR THE WELL BEING AND HEALTH AND HAPPINESS OF ONE AND ALL

FROM THE EDITORS' DESK



Dear All,
Indeed, the present time is very difficult as the entire world is grappling with COVID-19 pandemic. We are very grateful to our public workers who are fighting in this battle against pandemic COVID-19. We also appreciate for their valuable efforts and contributions to win this battle. As we navigate through these challenging times, we have been recalled of how fortunate we are to be part of this strong community that supports each other to accomplish great things. It is quite obvious that this the power of our community that will propel us through this to better times.

While we contribute our bit toward its prevention by maintaining social distancing and following guidelines directed by medical associations, there cannot be a better time to learn new things. The importance of technology has been proved by this pandemic. In order to overcome any such challenges in the future, we must be ready now by getting adequate knowledge. We encourage you to try and learn new things like artificial intelligence (AI) and Industry 4.0 among many others. As you have probably noticed, AI is currently a "hot topic": including among media coverage and public discussion. However, you may also have noticed that AI means different things to different people. For some people, AI is about

artificial life-forms that can surpass human intelligence, and for others, almost any data processing technology can be called AI. It has several applications like Self-driving cars, Content recommendation, Image and video processing among many others.

There are many free certification courses running online by reputed universities which can be availed. If you wish to try any of these courses, do not hesitate to let us know and get featured in next SPT Mirror issue.

Last but not least, From the bottom of our heart we would like to thank our entire SPT mirror team for their relentless efforts, without whom it would be impossible to bring out this issue.

We have thoroughly enjoyed to prepare this issue in this circumstance, and sincerely hope you enjoy reading it too. On the behalf of entire PDPU family, we wish for your good health and safety.

Take care and stay indoors.

Best Regards

Mrs. Namrata Bist Rawat
Dr. Rohit Srivastava

FROM THE DIRECTOR'S DESK



My dear Readers,

Greetings of the day

Hope you all are safe at home and taking care of yourself & family. I am really thankful to faculties and students for taking great pain and participating in Zoom classes and other academic and Research activities during the month of April 2020.

I am happy to announce that we could completely engage our SPT students and cover semester course curriculum significantly by organizing 291 zoom classes.

Hope we will continue with same zeal during the remaining period of Covid19 and switch over to ONLINE education system with the help of infrastructure and technology. Be at Home and stay safe enjoying the family bonding in this period of Crisis

Regards

Dr. R. K. Vij

Director

School of Petroleum Technology

THE EDITORIAL TEAM



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Archchi Sarkar
(Special mention for Cover Picture)

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GLOBAL OIL AND GAS HEADLINES

written and edited by: Hitakshi Kubawat
Eshaan Verma

COVID-19 and Low oil prices - Critical supply chain and procurement strategies

Now when oil prices are at historic lows and with COVID-19 supply chain disruptions, the time has come to evaluate supply chain and strategies, techniques and costs.

Major pandemics like COVID-19 can break the reliable supply of equipment/parts such as valves, turbines, compressors, etc. within the oil and gas value chain. The COVID-19 pandemic is a sputnik moment for executives to develop new business strategies in their supply chain designs. Procurement and supply chain strategies will be in the forefront of issues plaguing oil and gas companies, especially with the current downward spiral of oil prices and COVID-19.

More affected regions such as China, Italy, South Korea, and Spain are suppliers or subsuppliers (tier 2/tier 3 suppliers) of many worldwide oil and gas companies. This single sourcing or sourcing everything from one location has led to the current disruption. Oil and gas companies should go ahead on the way of developing supply chain resilience and have adequate risk intelligence.

Supplier risk intelligence is the process of acquiring and analyzing supplier risks to understand present and

future risks, support sourcing and market sector strategy execution anticipate changes in the external marketplace and react before others do.

Another way is "Supply chain mapping." If there is overdependence on one country or one location, supply chain mapping is effective to mitigate risks. Supply chain mapping involves understanding suppliers' global sites, local sites, and subcontractors, as well as knowing which components or parts originate or pass through them.

Companies who are forward in supply chain mapping can have benefit when these disruptions happen because they can predict impacts to their supply chain. When these companies know where the disruption will come from and which equipment or parts will be impacted, they can handle the situation. As many companies had already begun rethinking of supply chain strategy, this pandemic will lead more companies to decentralise the global supply chain.

Oil and gas companies can reduce costs by improved supply chain and focus on optimized oil and gas production and exploration engine of world

India pitches for stable oil market, says it will remain growth engine of the world

India, the world's third-largest oil consumer, is gearing up for a stable oil market on April 10, 2020 that will provide producers with reasonable prices and affordable rates for consumers. Speaking at an extraordinary meeting of energy ministers of the G-20 countries, Oil Minister, Dharmendra Pradhan emphasized that India would be the engine of growth in the world's energy demand.

"In terms of the ongoing energy market fluctuations, Minister stated that India has always advocated for a stable oil market, which is reasonable for producers and affordable for consumers," an official statement said. The G20 Energy Ministers focused on ways and means to ensure stable energy markets, which have been affected by declining demand as a result of the COVID-19 epidemic and ongoing surplus production.

Attending the meeting via video link, the Minister highlighted the decision to provide free LPG cylinders to 80.3 million poor families as part of a USD 23 billion relief package to cope with the consequences of COVID-19. He emphasized that India has been and will continue to be a global energy hub. The minister also emphasized the government's efforts to fill strategic reserves using the low oil price regime.

The meeting of G-20 Energy Ministers will adopt joint statements, proposing to set up a task force to advise G-20 Energy Ministers on subsequent phases, and agreeing to remain engaged in the coming days. The G20 group of major world economies convened an extraordinary energy ministers' meeting to discuss OPEC-led plans for a global crude oil production cut agreement aimed at reducing prices in the past month.

“Faster global dialogue and cooperation to ensure stable energy markets and enable a stronger global economy,” the G20 said in a statement.

This is the first time the G20 has convened specifically to address energy issues, reflecting the depth of concern about the oil crash.

Crude oil price plunges below zero for first time in unprecedented wipe out

Financial markets have seen unprecedented changes since the outbreak of the Covid-19 epidemic but none has been more shocking than collapse in a key segment of U.S. oil trading of April 20, 2020.

The price on the futures contract for West Texas crude that is due to expire April 21, 2020 fell into negative territory minus \$37.63 a barrel. The sellers were actually paying the buyers to take the goods out of their hands. The reason behind this is that the economy has stagnated due to the epidemic, there is so much unused oil that American energy companies have run out of space to store it. And if there is no place to put oil, no one wants a crude deal that is to come.

Just how intense the concern is over the lack of storage, underlining that after a month the price on the futures contract hit \$ 20.43 a barrel. The difference between the two contracts is by far the largest.

“The May crude oil contract is going out not with a whimper, but a primal scream,” said Daniel Yergin, a Pulitzer Prize-winning oil historian and vice chairman of IHS Markit Ltd.

“There is little to prevent the physical market from the further acute downside path over the near term,” said Michael Tran, managing director of global energy strategy at RBC Capital Markets. “Refiners are rejecting barrels at a historic pace and with U.S. storage levels sprinting to the brim, market forces will inflict further pain until either we hit rock bottom, or COVID clears, whichever comes first, but it looks like the former.”

Since the beginning of the year, oil prices have fallen after

the combined effects of the Covid-19 and the collapse of the original OPEC + agreement. Without any visual cessation, and manufacturers around the world continue to pump, causing fire-sales among merchants who do not have access to storage.

The extreme move showed just how the U.S. oil market has become oversupplied with industrial and economic activity get stuck as governments around the globe extend shutdowns due to the swift spread of the novel coronavirus. An unprecedented production deal by OPEC and affiliated members a week ago to curb supply is proving little in the face of a one-third drop in global demand.

There are signs of weakness everywhere. Before Monday’s plunge, buyers in Texas were offering as low as \$ 2 a barrel last week for some oil streams. In Asia, bankers are increasingly reluctant to let commodity traders survive as lenders become ever more fearful of the risk of catastrophic defaults.

In New York, West Texas Intermediate for May delivery dropped as low as negative \$40.32 a barrel. It’s far below the lowest level previously seen in continuation monthly data charts since 1946, just after World War II, according to data from the Federal Reserve Bank of St. Louis. Brent declined 8.9% to \$25.57 a barrel.

Crude stockpiles at Cushing -- America’s key storage hub and delivery point of the West Texas Intermediate contract -- have jumped 48% to almost 55 million barrels since the end of February. The hub had working storage capacity of 76 million as of Sept. 30, according to the Energy Information Administration.

Negative US Oil Prices Could Return in May

On 20 April the world watched US oil prices sink from the previous trading day’s high of \$18 to an unprecedented low of -\$37. This sudden crash came as oil traders came around due to the fact that storage for crude is running out in places such as Cushing, Oklahoma, where prices for West Texas Intermediate (WTI) are established.

Those who are holding future contracts for oil, but have

no physical space to store their orders, rush to find a dwindling number of buyers with storage - sending WTI to negative territory for the first time.

“Unfortunately, because storage is starting to run out in the US, I think we can expect to see a similar price crash around 19 May, if not enough production is shut in”, said Christopher Page, a senior analyst of oil market research at Rystad Energy.

SPT SHINES AT INTERNATIONAL PETROLEUM TECHNOLOGY CONFERENCE 2020 – DHAHRAN

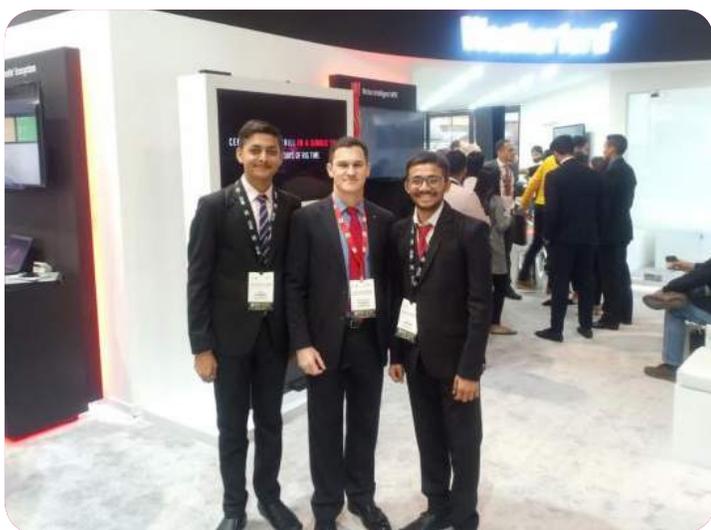
written by: *Bhoraniya Parag, Dayma Yashpalsinh*
edited by : *Eshaan Verma*

SPT, PDPU is overwhelmed with pride to announce the selection of Bhoraniya Parag H and Dayma Yashpalsinh S, to be a part of the International Petroleum Technology Conference (IPTC) 2020 exclusively hosted at Dhahran, Kingdom of Saudi Arabia (KSA) from the 11th to the 15th of January '2020. These two meritorious pupils of our institution had attended the IPTC Education Week' 2020, as delegates from India, being among the Top 100 students from 29 countries of the globe, and added feathers to the cap of PDPU with their knowledge and intellect. The IPTC Education Week consisted of panel discussions, plenary sessions, exhibition, lecture sessions, field trips, project work and the momentous IPTC – 2020.

Both Parag and Yashpalsinh participated in the events of IPTC Education Week' 2020 with full zest of obtaining new insights into the petroleum industry. IPTC Education Week' 2020 gave them a golden opportunity to have live conversations with industry veterans from global giants like Saudi Aramco, Schlumberger, Halliburton, Weatherford, Baker Hughes, TAQA, Sinopec, etc. The humungous exhibition held at Dhahran EXPO, KSA helped them understand and explore the upcoming technologies in the oil and gas industry.

As a part of IPTC Education Week Young Members Activities (YMA), they were exposed to mind-boggling virtual oil and gas problem-solving competition titled, "Unlock The Reserves: Schlumberger Case Study Solving Competition". Bhoraniya Parag H. and his team solved the case study with their mental agility by applying the practical knowledge of all the domains of the petroleum arena, emerged as winners and attained the 1st position in the competition which is indeed a marvelous achievement. They were felicitated by Mahmoud M. Abdulbaqi, Chairman, IPTC and Najwa Al Azaimi, Chairperson, Saudi Aramco at the grand IPTC – 2020 Closing Ceremony, Dhahran EXPO, KSA.

Bhoraniya Parag H and Dayma Yashpalsinh S extend their gratitude towards Dr. R.K. Vij, Director SPT and Dr. Bhawanisingh Desai, Faculty Mentor, SPT, PDPU for their immense support that helped them to escalate the greater heights of success. Representing India and PDPU on an international platform fills the heart of these young gentlemen with pride and joy unspeakable. They also acknowledge each resource that made this international exposure one of the most fruitful event of their professional life.



Delegates at Weatherford Stall, IPTC Exhibition (Dhahran EXPO, KSA)



Bhoraniya Parag H. and his team receiving the 1st prize award from Mahmoud M. Abdulbaqi, Chairman IPTC & Najwa Al Azaimi, Chairperson, Saudi Aramco (Dhahran EXPO, KSA)

NEW FRONTIERS MANIFESTED IN APGCE 2019 MALAYSIA

written by: Harsh Patel, Parth Viramgama,
Dhairya Varanava
edited by: Hitakshi Kubawat, Eshaan Verma

Pandit Deendayal Petroleum University participated in APGCE 2019, representing India's specific region at an international level. The conference attendees comprised of top management executives of the oil and gas megacorp, industry experts, engineers, stratigraphers, technologists and other members of the geoscience fraternity exchanged their ideas and discussed about opportunities comprehensively offered by the industry. SEG Student Chapter committee members were sponsored to attend the conference. Mr. Harsh Patel (President SEG SC), Mr. Parth Viramgama (Vice President, SEG SC) and Mr. Dhairya Varanava (President EAGE SC) got this golden opportunity from the University. The Student Program was organised, dedicated to preparing the university students for a better career in the geosciences. Mentioned underneath, are the main highlights for the program:

1) Career Outlook in the Oil & Gas – a Conversation (Faisal Bakar – Senior Manager, Sarawak Ventures Exploration, PETRONAS)

This session emphasized the massive opportunities and potential value creation, the industry has to offer to its future workforce through the sharing of experience and future outlook from an industry's insider. The participants gained valuable insights of career outlook via an interactive platform.

2) Climate Action through Geosciences Mini Challenge

It was a very proud moment for the university itself our student, Mr. Harsh Patel secured the second position amongst all the international students who participated in CCS (Carbon Capture and Sequestration) case study competition. The case study provided the contestants with economic, strategic, environmental and sustainable growth, and field development aspects and required them that to solve it within 40 minutes.

3) EAGE GEO-QUIZ

This was the most popular feature in the EAGE student program. Together with PETRONAS, the winning team would get a chance to attend EAGE Annual Conference 2020 in Amsterdam, the Netherland. The questions were related mainly to geoscience and were presented to the teams in a modern-quiz style, within 20-30 seconds

the participants had to select the correct answer. They were expected to have basic knowledge in topics such as geophysics, petroleum engineering, and geoscience and cross-discipline as well. It was an endeavoured round where Mr. Harsh Patel and his teammate Mr. Parth Viramgama stood at the 3rd place, thus deputing PDPU and SPT at Petronas Kuala Lumpur.

4) Best student award

The Student Excellence Award recognises outstanding undergraduate Geoscience students. The students are judged on academic performance and leadership and extracurricular activities. Nominated student Mr. Dhairya Varanava (President EAGE SC) received a certificate of achievement and a token. An official announcement was made to celebrate the success of the winning Geo-Quiz team.



GEOSCIENCE 2019 – A MADRIDGE CONFERENCE

3RD INTERNATIONAL CONFERENCE ON GEOLOGY & EARTH SCIENCE

APRIL 10–11, 2019, VALENCIA, SPAIN

Author: Mr. Suryapratap Bhadauria; he has been in the SPT family as an M.Tech. student since 2017 and now as a PhD scholar, working on EOR under Dr. U. K. Bhui

INTRODUCTION

Madridge International Conference is specially designed to create a platform for all the eminent speakers, scientists, business experts, CEOs/Presidents from top companies and young researchers to explore the advancements and novel innovations in the field of Science and Technology. It provides an understanding of basic principles in the application and management of the new progressions and discusses emerging concepts in the specific field.

These Scientific events in imparting, sharing scientific knowledge across the world. This conference is for all those who are in pursuit of the scientific research. Madridge conference is one of the most trusted conference organiser which value free circulation of the scientific knowledge for the sake of the development or enhancement of the scientific perception, ideologies, or formative notions etc in the heart of the science across the world.

SPECIAL FEATURES

- Plenary Sessions
- Keynote Presentations
- Well organised workshops, symposiums and short courses
- Renowned speakers and scientists across the world
- Poster presentations
- Panel discussions & Interactive sessions
- B2B meetings
- Partners and Associations

CHRONOLOGY OF THE EVENTS

Day 1: Opening Ceremony

Keynote Forum- Venkatachalam Ramaswamy, Princeton University, USA and Alexandr I Chernykh, TsNIGRI, Russai

Session 1: Marine Geosciences and Oceanography & Mineral Exploration & Surface and Borehole Geophysics & Seismology & Carbon Farming and Carbon Cycle

Session Chair: Siasi Kociu, SIAS, Albania and Venkatachalam Ramaswamy, Princeton University, USA

Day 2:

Keynote Forum- Dr. Manoranjan Mohanty, Director, Department of Science and Technology, India

Session 2: Geochemistry and Economic potential of Rocks & Petroleum Engineering and Petroleum Geochemistry & Petroleum Geology & Fossils and Palaeontology

Session Chair: Michal Woszczyk, Adam Mickiewicz University, Poland

Session 3: Poster Presentations

Judge: Alexandr I Chernykh, TsNIGRI, Russai



Awarded by Michal Woszczyk, Poland



With the Dignitaries of the Conference



With other Dignitaries of the Conference

CONCLUSION

This International conference on Geology & Earth Science provided opportunities to meet experts, professionals, academicians and researchers from all over the world. These peoples show their efforts towards their research works of particular domains. At last each presenter whether of oral and poster presentation is awarded with certificate from judge and respected panel.

SPT MARKS ITS PRESENCE AT WORLD PETROCOAL CONGRESS 2020 – NEW DELHI

World PetroCoal Congress is the world's only congress combining the Petroleum, Coal and Gas industries with a focus on Synergy for Energy. The 10th edition of this international conference was scheduled from February 15th to 17th, 2020, focusing on 'Energy, Environment, Efficiency, Equity & Entrepreneurship for a Greener Planet', where ideas were communicated with global energy industry leaders, financiers and business experts. Speakers and delegates from Australia, France, Germany, Indonesia, India, Japan, Malaysia, Norway, Singapore, Spain, South Africa, United Kingdom, USA apart from key executives of many national energy companies had participated in the conference along with many students.

The WPCC-2020 was organized with the support of the Ministries of Petroleum & Natural Gas, Coal, Power, Earth Sciences and the Department of Science & Technology, Government of India.

The Congress had a large number of high-profiled global speakers and industry leaders in Plenary sessions, interactive Keynote sessions, CEO's Forum, thought-provoking panel discussions and poster sessions to provide the focal points for translating knowledge into action. Activities of business matching, B2B meetings, especially focusing on key industry issues and emerging energy solutions while pursuing business building and networking were encouraged and discussed crucially in the conference.

Furthermore, the 'Energy and Environment Foundation Global Excellence Awards' were conferred on to honor and recognize those who have made an outstanding contribution and demonstrated excellence creativity, innovation and applied best practices in the energy industry.

From the School of Petroleum Technology, two faculties namely, Dr. Uttam Kumar Bhui and Dr. P. Sivakumar, along with five students from PhD, M.Tech. and B.Tech. courses namely, Archchi Sarkar, Etchu Bertrand, Samip Umaretiya, Yatri Shah and Suraj Chauhan, had attended the conference as delegates to represent PDPU.

The conference was hosted at the Convention Centre (NDCC), Parliament Street, New Delhi, India. The inauguration took place at 10.00 AM on February 15th,

*written by: Archchi Sarkar
edited by : Hitakshi Kubavat*

led by Shri Dharmendra Pradhan, the Hon'ble Minister of Petroleum & Natural Gas, Government of India.

It was a great opportunity for knowing the industrial views on the emerging new technologies and the solutions to counter difficulties in production in the conventional energy sectors like Petroleum and Coal. The conference also provided a great opportunity to create a network and connect with several outstanding personalities from the industries.



SPT Students and Research scholar with International Delegate



SPT faculties and students with delegates of repute at WPCC

PETROCUP 2020 OBSERVES ENTHUSIASTIC PARTICIPATION FROM SPT STUDENTS

written by: Shivam Paliwal
edited by: Hitakshi Kubawat
Eshaan Verma

Umang Thapa (Table Tennis Captain) says- Pandit Deendayal Petroleum University every year organizes an Annual Inter-College Sports Festival – “PETROCUP” which boasts as a messenger to spread an aura of sportsmanship, intensity, and competition. PDPU also had international participants taking part in Petrocup. This year we saw many players from School of Petroleum Technology (SPT) taking part in various events. To the fact, Captains of 4 different sports were from SPT.

Kartik Umat (Khokho)

Vaibhav Chaudhary (Kabaddi)

Umang Thapa (Table tennis)

Aditya Radia (Football)

This shows that not only in academics but SPT also has a box full of talent in sports as well. SPT has a very good record in Intra sports events as well. PDPU believes that if academics and sports go hand in hand then the only output is creating a better individual. We congratulate all the players for their performances and wish them all the luck for the future.

Kartik Umat (Kho-Kho Captain) says-

I have been fortunate enough to have been getting this opportunity of being a captain of this beautiful team of 12 members. Being a captain of this team was a rollercoaster experience as it had many ups and downs. I have had the experience of this position for 3 years before but this was my first time in this college. Getting the gold medal under my captaincy was the proudest moment for me. Being a captain isn't just about wearing the cap or being the boss or even just cheering your friends on. It includes the desire to lead by example, a passionate belief in team spirit, the ability to handle the conflicts that invariably arise when a team is under pressure, the desire to put more input in planning the team's strategies and many more. Overall, I loved to be on this position and I feel privileged to still have one more year to be able to be the captain of this team.

Vaibhav Chaudhari (Kabaddi Captain) says-

I feel proud to represent PDPU at different sports cup in various universities. All the seniors till now were very supportive. It's more like a family rather than just a team. Also, all the players are very dedicated to the game.

Representing the team for various tournaments is the best part for me, that motivates me to keep playing for the game and university.

The memories that I have made during these 4 years will be the biggest take-away for me.



Sports enthusiasts of SPT displaying their talent at various sports in PETROCUP 2020

STUDENT CHAPTER EVENTS

reported by: Kavya Patel
edited by : Anirudh Bardhan
Eshaan Verma

SPE PDPU STUDENT CHAPTER



Drilling Mud Workshop

Drilling mud is extremely crucial to the drilling operation and plays a significant role in the profitable and quality extraction of oil and gas from the reservoirs. On that note, SPE PDPU Student Chapter had organized a Drilling Mud Preparation Workshop under the banner of SPE Week 14.0. The workshop was conducted by Mr. Anirudh Bardhan, a Teaching Assistant at PDP.

The main objective of this workshop was to enable students to get hands-on experience of preparing a drilling mud and understand the various aspects of utilizing a drilling mud. It also aimed at helping out the students to realize the importance of processing the required drilling mud for a particular formation.

Initially, the students got acquainted with characteristic properties of an efficient drilling fluid and learned why it plays such a vital role in drilling process. Thereafter, they were enlightened with the procedure of preparation of the mud. Through this illuminating workshop, participants received a chance to see the preparation of drilling mud which also facilitated them to boost their knowledge about the advantages, applications and importance of an adequate drilling mud. The event was also successful in training the fresh minds for future inter-college competitions based on drilling mud.



Social Initiative

SPE PDPU Student Chapter has always wished in contributing towards the betterment of the society. The chapter wants children to go forward to achieve success which could only be possible by proper education. But children of slums and rural areas are deprived from education due to the poverty. The poor rural families don't have enough funds to buy them study material which leads such children to a darkened life. Therefore, with a desire of spreading smiles among the underprivileged kids, as a part of SPE Week 14.0, the coordinators and officers of the chapter went to the nearby village Valad.

The chapter distributed stationary kits among the students of a primary school in the village in order to promote education in the rural areas. The stationary kits included some basic essentials like pens, pencils, scales and other such school supplies. The students of the school were delighted to see the chapter members with a number of kits. The children and the teachers thanked the chapter for its generous contribution. SPE PDPU tried to justify their right to education and equality by this initiative and made an attempt to promote access to education for every child of the nation.



Mr. Samyak Jain delivering an enlightening lecture

Guest Lecture: Oil-o-nomics

Sand production is a global problem that can cause losses worth billions of dollars due to delayed or lost production and workover costs. SPE PDPU Student Chapter had conducted a distinguished guest lecture as a part of SPE Week 14.0 on 'Maximizing Sand Control Reliability in Openhole Completions' by Mr. Samyak Jain currently working as Sand Control Consultant at Dune Front, Agra. He has a vast experience in the Sand Control field. It was an honor for the chapter to host such an experienced and knowledgeable person.

The lecture was specially focused for 5th and 7th semester students. It aimed to highlight the importance of Sand Control in Oil and Gas Industry. Mr. Samyak Jain began the lecture discussing about the basics and causes of requirement of sand control in the petroleum industry. He then went into deep discussion about various aspects and methods of sand control.

In the concluding part of the lecture Mr. Samyak Jain discussed about the use of software and data analytics in controlling sand production. He also showed the students the demonstration of PackPro, a software used for sand control simulation, evaluation and optimization, which will be very useful for the budding career of the students. It was an interactive session and all the doubts were cleared in the session by Mr. Samyak Jain with utmost enthusiasm.



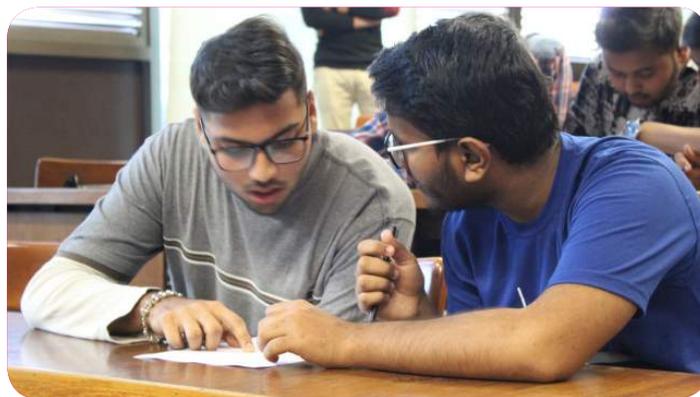
Partakers presenting their solution to the case study

Quizard

As a part of SPE Week 14.0, SPE PDPU Student Chapter successfully conducted Quizard: The Quizzing competition. The purpose of this contest was to test the understanding of the aspiring petroleum engineers and also to enhance their knowledge regarding the oil and gas industry.

The contest consisted of objective questions with options and one word answer questions based on the most fundamental concepts of Petroleum Engineering which engaged the students for two hours. The quiz was divided into 3 rounds based on different aspects of the industry. Students were able to answer most of the questions with full enthusiasm and energy. The chapter further helped the students in expanding their knowledge through the quiz.

The event saw massive participation from the students and was a thriving success. It was an intense competition. The participants of the contest thoroughly enjoyed it which was evident because of the exuberance in the atmosphere. SPE PDPU Student Chapter encourages and motivates the students to broaden their knowledge horizons through participation in such enlightening contests so that they can bring out the best in them and gain achieve progress in their technical expertise.



Participants solving the quiz

Enigma

Enigma: The Case Study Solving competition, an influential event of PDPU SPE Week 14.0 was organized on 6th February 2020. The competition aimed to test the theoretical understanding of the aspirants and apposite application of the principles related to the Oil and Gas Industry by them. The aspirants were provided with the case study two days before the competition by Dr. Pawan Gupta, Assistant Professor at SPT, PDPU and were required to solve the real-time oil and gas industry problem.

The respective teams came up with presentations to explain probable solutions corresponding to the problem given based on their technical know-how and visionary understanding. They were judged based upon the viability of their solutions, reasoning, and requisition of their knowledge along with the feasibility of the explanation to apply the solution.

APTACON- The Aptitude Test

"APTACON"-The aptitude test was organized by the FIPI PDPU student chapter in collaboration with Endeavor Careers Ltd. Aptitude is defined as an innate, learned or acquired ability of an individual to perform certain tasks. It is imperative to reveal that one can work with numerous individuals, without any conflict. Generally, the major purpose of an aptitude test was to examine one based on abstract reasoning, manual deftness, verbal and numerical skills, clerical work, general awareness, mechanical ability, and speed. A large number of student participation was observed in the event who wished to test their aptitude and also enhance their grasp over a few critically essential basic concepts.



Students solving the questions of Aptacon- the aptitude test

ECOSCRIBE - ONLINE BLOGGING COMPETITION

ECOSCRIBE - Online Blogging Competition was organized to provide a platform for budding writers and environment lovers to elucidate awareness about environmental degradation taking place around us because of single-use plastics. This competition's theme was "Single-use plastics in day to day life" and participants were asked to write blogs and try their caliber best. We posted all the blogs received from participants on our social media pages such as Facebook and Instagram. The winners were judged by how many likes and shares their blog received. It was an initiative from the FIPI PDPU student chapter to sensitize and help fellow humans take a step towards identifying these issues and share it amongst others to shed some light and increase awareness on such significant matters.

PETROSPECT -

Technical quiz Competition

To scrutinize the Technical knowledge of the participants, a mind-tingling competition 'PETROSPECT -Technical quiz Competition' was organized by FIPI PDPU SC.

vThe questions covered in this competition spanned across fundamentals of core petroleum engineering disciplines like drilling & production practices, reservoir engineering, as well as recent trends in the oil and gas industry. Each team had two or three participants in this competition where they had two rounds to overcome before a winning team would emerge.

The first round was a basic screening round in which eight teams proceeded to the second round of the quiz competition. The second round ocused more on the practical aspects and introduction of time limits for responding to each question ramped up the difficulty level for the teams. "The questions were based on analytical as well as practical knowledge", commented one of the finalists after the quiz. Teams of Asir-Jigar, Lijo-Sayban and Dixit-Harshil-Kapil acquired the first, second and third positions respectively. A total amount of 2500 rupees were given to the three winning teams.



FIPI committee ending Petrospect - the technical quiz with a group photo of the organisers

Guest lecture on “Well Test Interpretation” by Shri Inderjeet Gill

Well-test analysis includes well test design, pressure data acquisition and interpretation, and dynamic description of the oil/gas reservoir. By considering the evident importance, FIPI PDU SC organized a guest lecture on well test interpretation by Shri Inderjeet Gill, Manager (Reservoir), SST ONGC Ahmedabad asset.

The session started with a brief introduction of well testing and its importance in the petroleum industry. Mr. Gill covered a plethora of topics like Pressure build-up test, Drawdown test, flow regime based on time dependency and reservoir geometry and many other relevant topics. He also introduced the participants to many exclusive examples and challenges while making the well-test interpretation based on pressure data and production data. He dynamically explained the various topics while answering the doubts of curious minds. Indeed, it was a thought-provoking session enjoyed by each member present and exuberance shown by students kept the session two way and interesting. The lecture was received with admiration by the students as they found it very interesting and informative. The session concluded with honoring the speaker with a memento.



Mr. Inderjeet Gill delivering their knowledge on Well Testing



Students in rapt attention as the lecture is delivered

Distinguished Guest lecture on “Offshore Drilling” by Shri A. K. Mishra

As offshore oil and gas production is more challenging than land-based installations (owing to the remote and harsher environment), much of the innovation in the offshore petroleum sector concerns overcoming these challenges, including the need to provide very large production facilities. To give brief insights into this technology and the corresponding challenges, FIPI PDU SC organized a guest lecture on ‘Offshore Drilling Technology’ by Shri Arun Kumar Mishra [Former Executive Director- Head of Drilling Services for offshore & onshore Drilling, ONGC]. He is one of the most eminent personalities of this field and holds the glory of serving the petroleum industry for over 37 years.

Dr. R. K. Vij (Director – SPT, PDU) delivered the Welcome address. The guest lecture was preceded by an informative talk giving out a brief overview of the history of offshore drilling. He explained the environment of offshore drilling and various challenges associated with it, types of the rig and its selection criteria. He also presented various videos of the construction of the offshore rig. The students, as well as the faculty members, had actively participated in this interesting session by expressing their doubts and got them clarified. The lecture was received with admiration by the students and they also found it very interesting and informative. The session ended with a vote of thanks and felicitation of Shri A. K. Mishra by Dr. R. K. Vij (Director - SPT).



Dr. R.K.Vij, Director SPT, felicitating Shri A.K.Mishra for imparting knowledge about Offshore Drilling Technology to fellow students

written by: Jindal Basu
edited by : Hitakshi Kubawat

GUEST LECTURE: DRILLING AND WELL COMPLETION

SEG-SPG-EAGE PDPU Student chapters had organized a guest lecture on 4th December 2019 from 9 am to 1 pm. The lecture was delivered by Mr. MVSV Prasad who is a Drilling and Completion Workshop manager in Reliance industries Pvt. Ltd. The session was conducted on a topic of "Drilling and Well Completion basics". He covered many topics like Drilling operations, Well Completions, Oil field Casing design etc.

Sir had explained "drilling objectives and phases of well planning" in a lucid way. He included safety consideration and how to minimize overall cost in drilling operations. Under "phases of well planning", he included Well Planning program, Well Design, Drilling Operations, Formation Evaluation and Well Completion. He also shares knowledge about the design of the offshore platform and offshore completion and safety. Also, he provided current and historical data on the number of drilling rigs working in various parts of the world.

This information is valuable because the drilling sector, being at the leading edge of oil and gas development activity, is particularly sensitive to such factors as oil price fluctuations and economic conditions of the industry. He explained the drilling technology and showed the procedure known as making a connection of drill pipes. In between the guest lecture, sir also shared some interesting facts relating to the evolution of drilling technology.

This knowledge-sharing platform had driven students to an insightful pathway as it disseminated all the students. Sir has also inspired all students to do their best and to ensure safety. It was an inspiring and advantageous lecture for everyone. we felt privileged to have Mr. MVSV Prasad at the campus for inspiring young budding technologists.



PARTICIPATION IN SPG CONFERENCE, KOCHI, 2020

We are delighted to announce that our committee members Mr. Pranav Hajariwala (Logistics Head) and Mr. Suraj Chauhan (Public relation head) had recently participated in 13th Biennial International Conference & Exposition of Society of Petroleum Geophysicists, India which was held at Lulu Bolgatty International Convention Centre (LBICC), Kochi, Kerala on 23-25 February 2020. The theme for the Conference was "Energy Sustainability: Challenging New Frontiers". The students' programme had been an integral part and one of the highlight events of the conference. 3 Interactive events were organised during the conference:

SPG Mastermind 2020: The Quiz Contest, featuring two contestants from each student chapter, was the showpiece event of the students' programme wherein the questions featured from Geo-Sciences / Petroleum Industry and General Awareness, including sports, music, film, literature, history, current affairs etc

Presentation by Students' Chapters: Every participating Student Chapter were required to make a presentation of the activities conducted by it between Nov. 2017 to Feb. 2020 wherein students used their innovative ideas and presentation skills to showcase the same.

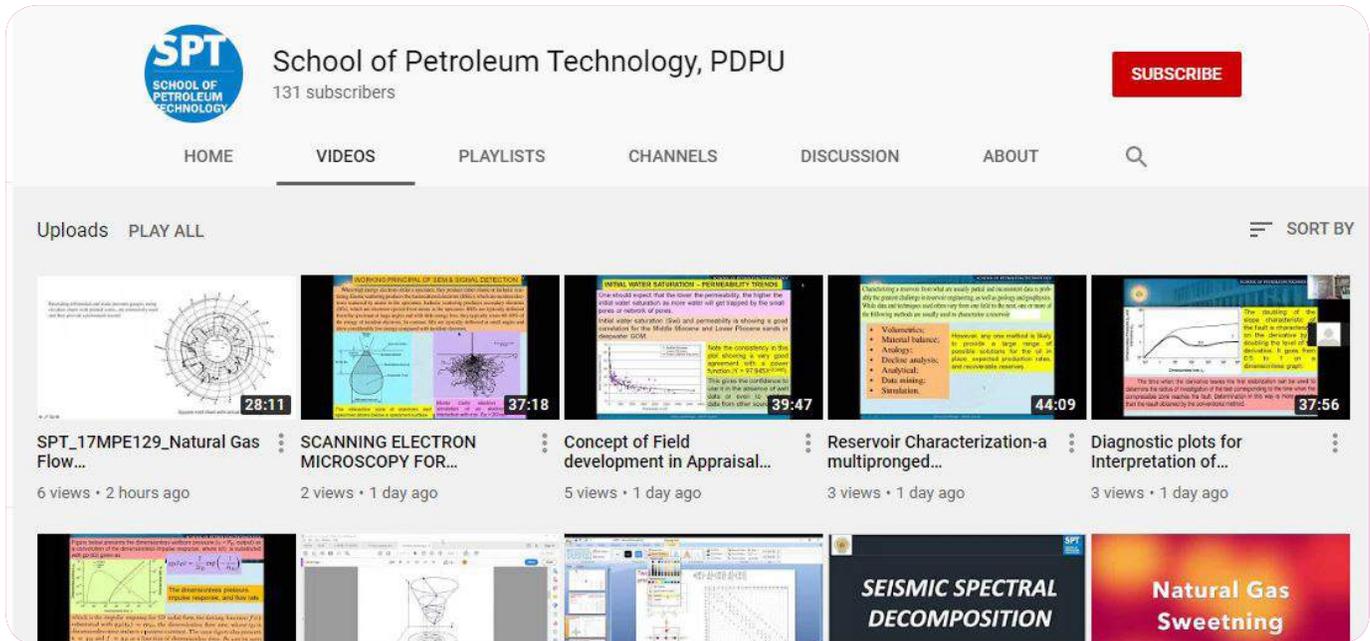
Business Game for Prospect Evaluation: To give the students a feel of Petroleum Industry practitioners, students were provided with case situations for Hydrocarbon Prospect evaluation based on basic knowledge of petroleum geology, geophysics and well log interpretation wherein the students have to rationally analyze the strength of each prospect with the inputs provided and decide on the best prospect.



LEARNING AT THE TIME OF COVID-19

TEACHING NEVER STOPS AT SPT

written by: Mrs. Namrata Bist

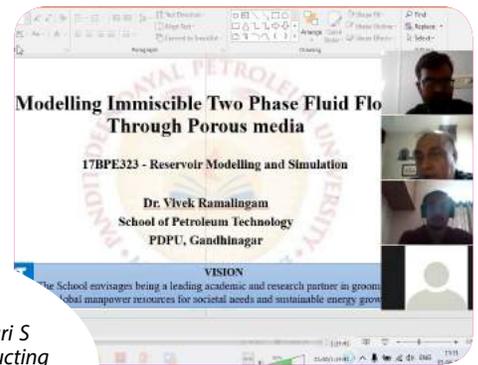
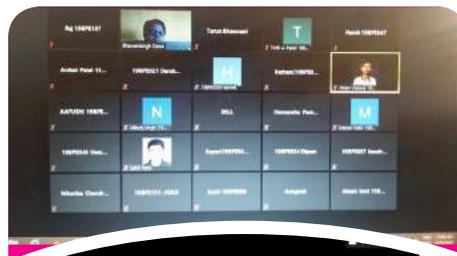
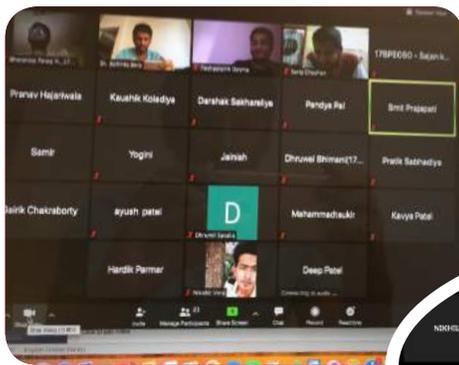


YouTube channel of School of Petroleum Technology has about 92 videos and new videos are being uploaded everyday to keep students adept with the course and technology

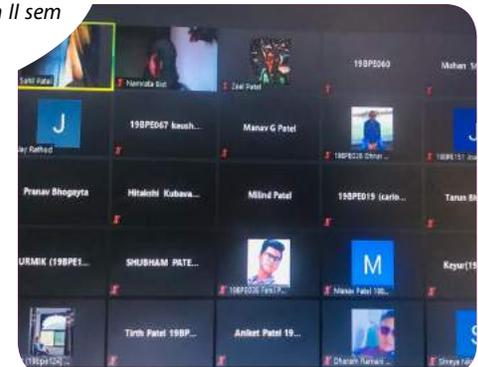
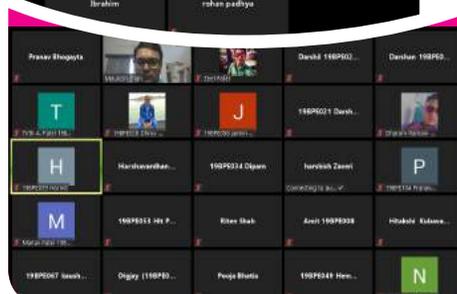
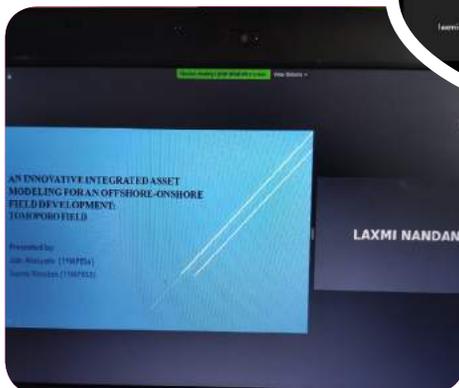
Dr. Achinta Bera conducting class for B.Tech. VIth semester for pipeline engineering

Dr BhawaniSingh Conducting class for BTEch II Sem on Sedimentary and Petroleum Geology

Dr Vivek R Conducting class for BTech VI sem on Reservoir modelling and simulation



Mr Hari S Conducting class for MTEch II sem



Dr Shanker Krishna Conducting flip class for MTEch II sem

Mr Maunish Shah conducting class for BTEch II Sem on Elements of Eng Drawing

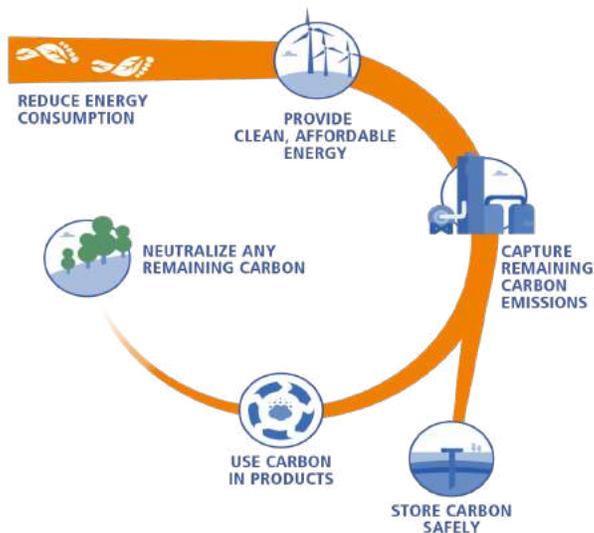
Mrs Namrata conducting class for BTEch II Sem on Introduction to Petroleum Engg

Oil and Gas Industry initiatives to mitigate Climate Change

Author: Bhavarth Shah, 4th-year student of B.Tech (Petroleum Engineering) at SPT

Climate change is taking place due to a long-term rise in the average global temperature of Earth. This phenomenon is due to the increase in the concentration of greenhouse gases viz. Carbon Dioxide, Methane, Nitrogen Oxide in the atmosphere. However, the oil and gas industry is working actively to mitigate climate change and has demonstrated several initiatives to fight against the risk of climate change.

Firstly, an initiative against climate change began with Oil and Gas Climate Initiative (OGCI) which is a voluntary CEO-led initiative taking practical actions on climate change. Oil giants like BP, Chevron, ExxonMobil, Saudi Aramco, Shell, Total, Equinor, Petrobras, Repsol, and others—have banded together in this OGCI, which has a billion-dollar war chest to fund with initiatives to reduce climate change emissions. The main agenda of OGCI is described in the figure below:



For the above actions, the CEOs of major companies have come forward together leaving their market competitions behind to develop efficient and economical technologies to reduce greenhouse gas emissions. Along with that, there are huge investments in billions of dollars to monitor these emissions and deploying the proper technology to reduce them.

The OGCI is encouraging investments mainly for the following sector:

- Recycling Carbon Dioxide (CCUS)
- Reducing Methane Leakage
- Reducing Carbon Dioxide

The main aim is to discuss how governments and industry can deploy recycling carbon dioxide technology to create clean and sustainable industries by capturing carbon dioxide from oil and gas production and re-use it. Moreover, the CCUS technique encompasses technologies that prevent carbon

dioxide emissions from reaching the atmosphere by capturing, transporting, and permanently storing underground or converting emissions into useful products.

The carbon captured can be stored using the CO₂ sequestration (underground permanent storage) process. Also, the CO₂ can be useful for the various oil field operations such as for gas injection or Enhanced Oil Recovery (EOR) process.

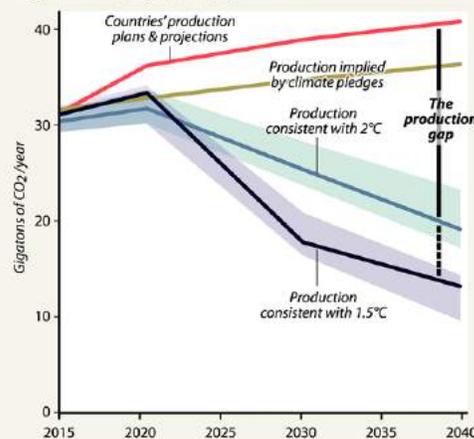
- A division of Chevron Corp. is exploring the potential with Vancouver, BC-based Svante Inc. to add a 10,000 metric ton/year (mty) carbon capture unit that would reduce emissions at a California facility. The unit, modeled after a Svante demonstration plant in Saskatchewan that captures 10,000 mty from a natural gas steam boiler, is expected to be completed before the end of June.

- The Oil and Gas Climate initiative's

The Fossil Fuel Production Gap

A new report released by the United Nations found a significant gap between the emissions pathway needed to keep global warming under 2°C and the emissions that would come from countries' current oil, gas and coal production plans.

GLOBAL FOSSIL FUEL EMISSIONS
In gigatons of CO₂ per year, 2015 projected to 2040



SOURCE: The Production Gap Report 2019 PAUL HORN / InsideClimate News

Figure 1: As of year, 2018, only 30 million tonnes of carbon dioxide are captured and stored or used. According to the International Energy Agency, to reach the below 2°C goal, the world needs to capture, store or use ~850 million tonnes of carbon dioxide annually by 2030.

\$1 billion-plus investment fund, Climate Investments LLP, of which Chevron is a part, also invested in Savante. The Chevron news follows the filing for a permit by fellow major ExxonMobil to build a \$263 million carbon capture project at the LaBarge natural gas field in Wyoming.

Talking of transition, currently, the Oil and Gas industry is believing in the energy transition towards renewable and more investments are also made for the exploitation of natural gas. As the emissions corresponding to natural gas are less to none.

The Oil and Gas companies are itself working to control the climate change process and are currently doing its best to achieve a healthier, safer and cleaner environment for the future generation.

“Think Green and Live Green”

“An Approach to Improve Wellbore Stability in Active Shale Formations Using Nanomaterials”

Author: Vyas Vishal Kumara, 2nd-year student of B.Tech (Petroleum Engineering) at SPT

INTRODUCTION

Drilling through active shale formations has been a challenging practice in the oil and gas industry for a long time, given the complexity of shale structure and its interaction with Water-Based Muds (WBM). In this Article, a new WBM formulated by nanomaterial was proposed to stabilize active shale layers during drilling. A series of rheological, density, filtration loss, bentonite dispersion, and shale recovery tests were conducted on the mud samples formulated by Nano silica and Nano Glass Flakes (NGFs). The results indicated that NGF, as a cheap but effective nanomaterial, can significantly reduce the filtration loss without posing any significant impacts on the density and the rheology of WBMs. It also appeared that the bentonite molecules were incapable of either hydrating or dispersing in the drilling fluid system in the presence of NGFs. It seems that NGFs can stabilize clay minerals and reduce the filtration loss as a remarkably efficient additive, but caution must be taken to ensure that they are properly dispersed in the WBMs.

CAUSES OF WELLBORE UNSTABILITY IN ACTIVE SHALE FORMATION

SWELLING OF SHALE

Adsorption of water content from the drilling mud (while drilling of the borehole) due to some factors like hydration factor, Dipping angle of shale formation, Abnormal Pressure of Shale formation by ion exchange process resulting in expansion of its structure and

ultimately sloughing into the hole. Some problems that occur by swelling of shale like stuck of pipe, logging problem, wellbore enlargement.

FILTRATE LOSS IN SHALE

The combination of saturation and low permeability, where only a small volume of filtrate penetrates the wellbore, leads to an increase in pore fluid pressure near the wellbore. Consequently, this creates a less stable wellbore condition that can be devastating. In Figure 1, a well-preserved Marcellus core was exposed to freshwater at 150° F. After several days, fractures with widths between 5 and 45 μm were observed, primarily parallel to the bedding

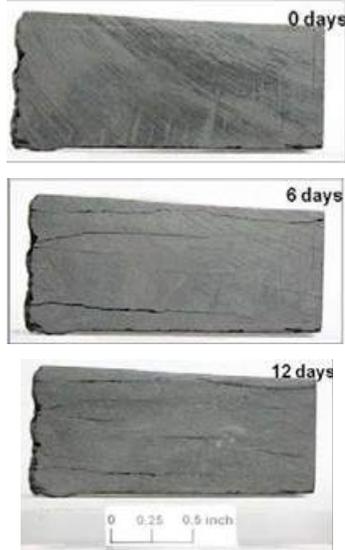


Figure 1: Marcellus shale micro-fracturing in freshwater at 150°F

plane. These results illustrate how the Marcellus shale is not very reactive with water but still prone to fracture, which can lead to wellbore instability, especially in long horizontal wells.

NANOPARTICLE FOR PREPARATION OF MUD TO PREVENT WELL BORE STABILITY

NANO SILICA

Nanosilica (NS) was used for this study given its potential application as an additive, which can improve the filtration control and inhibit swelling of shales. This nanomaterial had a purity of 99.5% with a particle size of 15nm to 20 nm and a surface area of 170-2000 m²/g. It had a density of 2.40 g/cm³ with a melting temperature of 1600°C. Thus, it could be a great asset to HPHT drilling conditions. However, nano-silica is a hydrophilic material that can absorb water and increase the viscosity of the mud. Thus, caution must be taken to prevent significant rheological changes or circulation issues once NS is added. It would also be a wise practice to ensure that the amount of the added nano-silica will not significantly increase the cost of the drilling mud. Figure 2 shows the transmission electron microscope (TEM) image of NS in the solution without dispersion.

NANO GLASS FLAKES (NGF)

Nano Glass flakes (NGF) are transparent planar platelets with smooth surfaces that are made of silicon dioxide (SiO₂). NGFs used in this study were in 100 nm particle size with a nominal thickness of 1 micron, as donated by Glassflakes limited, England. They have a density of 2.60 g/cm³ and a melting temperature of 950°C. They can resist the abrasion and technically recognized as a corrosive

Mineralogy	Shale A (Brittle)	Shale B (Ductile)
Quartz (wt%)	33.56	23.00
Muscovite (wt%)	0.68	8.90
Smectite (wt%)	8.46	51.00
illite (wt%)	18.95	5.40
Chlorite (wt%)	28.07	6.80
Kaolinite (wt%)	2.38	0.00
Total Clay Present (wt%)	57.86	63.20

Table 1: Mineralogy of shale

barrier for chemical and moisture interactions [29]. Given the structure arrangement and parallel configuration of this nanomaterial, it can create a compact impermeable layer around the solid surfaces and reduce the filtration control during drilling. Moreover, it can close the nanopore throats, reduce water hydration and improve the wellbore stability particularly in shale formations

Mud Samples	LPLT Filtration @ 30min		HPHT Filtration @ 30min	
	Filtrate Volume (mL)	Mud cake Thickness (/32 inch)	Filtrate Volume (mL)	Mud cake Thickness (/32 inch)
Base fluid	20.8	3	19.4	1
Base fluid + SiO ₂	28.0	3	27.1	2
Base fluid + NGF	17.5	3	16.4	3

Table 3. At LPLT and HPHT Filtration loss of Difference Mud Sample

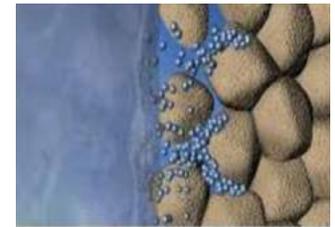


Figure 3: Shale inhibition mechanism by nanometer shale inhibitor (Source Baker+Hughes)

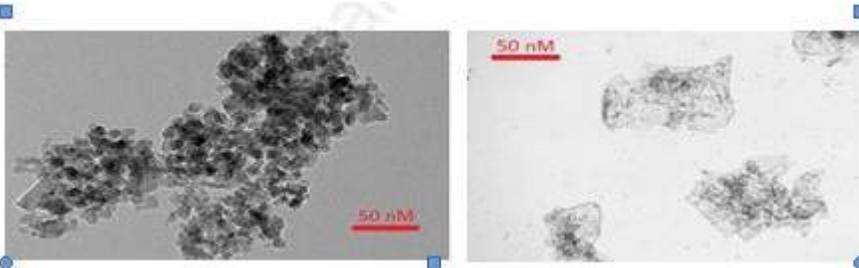


Figure 2: Nanosilica (left) and nano glass flakes (right) under the transmission electron microscope (TEM)

PERFORMANCE OF NANOPARTICLE IN TERMS OF RHEOLOGY

Table 2 give the results obtained from the rheological tests on the mud samples.

The highest plastic viscosity was observed in the samples with nano-silica. This could be due to the size of nanoparticles and their high surface to volume ratio which increases the friction between particles and absorb water. Given the fact that the particle size of nano-silica (15-20 nm) was smaller than NGFs (100 nm), the mud samples with nano-silica had a higher increase in the viscosity compared to those with NGFs.

The yield point is changed by the electrochemical activities of the colloidal particles in the drilling fluid. Thus, the surface charge of the dispersed particles changes the yield point in a variety of different ways. For instance, the strong repulsion force between the negatively charged nanomaterial and the negatively charged bentonite particles may increase the yield point. Looking at Table 2, it also appears that nanoparticles can improve the capacity of the mud to carry more cuttings but may need huge shear stress to circulate in the annulus space.

EFFECT OF NANOPARTICLE ON MUD BENTONITE INHIBITION TEST

Bentonite inhibition (As a shale inhibition) evaluates the efficiency of shale inhibitors

against the bentonite swelling in the aqueous states. This test is carried out to simulate a steady integration of yielding clays in the bentonite fluid. According to these, nanoparticles reduced the permeability of the shale significantly, and fluid invasion into the shale decreased dramatically.

The reason for this was that these nanoparticles were small enough to penetrate and seal the pore throats in shale, and built an internal mud cake, resulting in the reduction of fluid penetration into the shale. Using these nanoparticles based drilling fluids to seal the shale was a very powerful and economical approach for enhancing borehole strength in problematic shale formations. In the future, this drilling fluid system might hold potential application prospects to resolve shale instability problems figure 3 shows this physical mechanism for shale inhibition of Nano additives.

FILTRATION LOSS

Filtration loss tests under LPLT and HPHT conditions were done on the mud samples to determine the amount of mud loss into the formations and obtain the thickness of the cake generated during drilling in permeable formations. It should be noted that the fluid control of the mud samples can be improved by adding fluid loss additives

such as polymers (Resinex) which can help to close the pore throats of formations and provide encapsulation. Many of these additives also have a surface charge with a short-chain structure. This surface charge can help de-flocculation of clay (bentonite) particles. As a result, clay particles will be properly dispersed in the solution and can reduce the filtration loss by creating a thin mud cake. Nanomaterials can do the same by blocking the pore throats of subsurface formations and inducing negative surface charges to the colloidal solution. Thus, they might be a good substitute for polymers

CONCLUSION

Attempts were made to show the application of nanomaterial in mud designs where reduction of filtration loss and improvement of shale stability is a great concern. The results indicated that nano-silica may unfavorably increase the viscosity and the yield point of the WBM which might be related to its surface charges. NGFs, on the other hand, as a cheap nanomaterial with no impact on the rheology, could reduce the filtration loss and inhibit shale swelling. Further studies should be carried out on the application of NGFs in WBM especially under HPHT conditions. It is also suggested to see the performance of this nanoparticle once its size reduces to 10-15 Nm as the interaction may differ once the size of particles decreases.

Mud Sample	Plastic Viscosity (cP)	Yield Point (lb/100ft ²)
Base fluid	5.0	9.0
Base fluid + SiO ₂	5.0	15.0
Base fluid + NGF	6.0	10.0

Table 2: The rheological properties of the mud samples formulated for this study

“Mitigation Strategies & Predication approaches for Trapped Annular Pressure (TAP) in Deepwater Oil and Gas Wells”

Author: Dudhat Kaushalkumar, Gondaliya Brijesh, 3rd-year student of B.Tech (Petroleum Engineering) at SPT

INTRODUCTION

The evaluating methods and mitigation techniques for Trapped Annular Pressure (TAP) have importance in the field of deepwater drilling, completion, testing, production and injection to increase the life of wells. The main objective is to design the well by considering parameters according to the TAP conditions to improve the well safety & integrity. The study involves the reasons for TAP, consequences and ways to mitigate the TAP. The new approach is based on new technologies for mitigation such as vacuum insulated tubing to minimize heat transfer, advanced types of spacer fluid & foams and equipment. Accurate prediction is necessary for appropriate mitigation design. Risks associated with the TAP have resulted in a decrease in strength of casing and wellbore integrity. Numerous mitigation approaches are available depending upon the cost and effectiveness of the operations. Suitable design can minimize the number of mitigation casing while maintaining strong mitigation effect.

To generate TAP, two basic conditions are there: (i) presence of heat source to redistribute wellbore temperature and (ii) trapped annulus filled with a liquid.

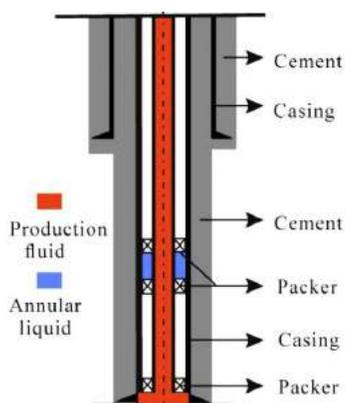


Figure 1: Schematic representation of trapped annulus between packers (Modified Zhang et al. 2019).

CAUSES OF TRAPPED ANNULAR PRESSURE:

OIL AND GAS WELL WITH MULTIPLE PACKERS

The trapped space will form between packers which is shown by fig. and also between liner hanger and the packers, allowing the development of TAP. TAP is generated because of trapped fluid between packers as shown by fig. 1.

HORIZONTAL WELLS IN SHALE GAS RESERVOIR AND STEAM INJECTION WELLS

Poor cement quality and low displacement efficiency can lead to TAP in horizontal wells and steam injection wells. As demonstrated by fig. 2, the long horizontal section of the shale gas well having a decentered hole.

DURING THE DRILLING PROCESS

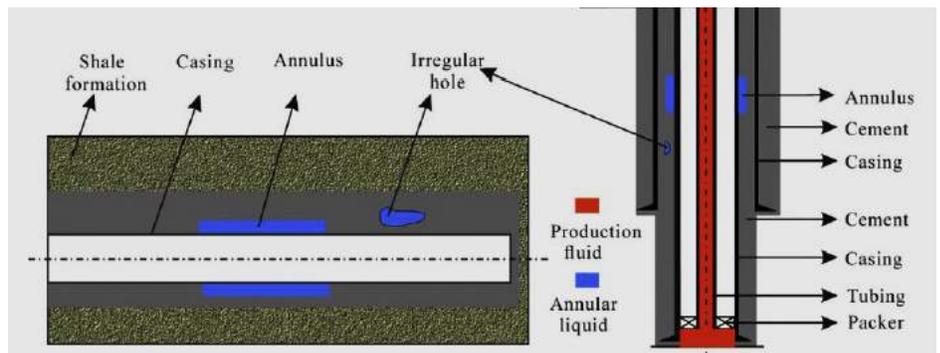


Figure 2: Schematic of annulus caused by cement lack (Modified Zhang et al. 2019)

TAP which is generated during the drilling process is divided into 3 types, well structure, cement technology and cement quality. Well structure is related to the casing and wellhead. Cement technology is related to the annulus nearby the packer and cement quality is related to the trapped space generated because of poor cement quality. As shown by fig. 3, the solid deposition occurs at annulus between the production casing and surface casing.

CONSEQUENCES OF TAP:

TAP can attain the value of 10,000 -12,000 psi or more. It causes well safety & integrity problems such as the collapse of casing and tubing. The main risk associated with the TAP is given as:

THE RISK ASSOCIATED WITH CASING STRENGTH AND DESIGN

There are mainly three aspects for the impact of TAP on casing: First is casing collapse or deformation. The second aspect is that the casing stability is reduced. The third aspect of TAP is that corrosion intensifies with pressure, which reduces casing strength

THE RISK ASSOCIATED WITH WELL SEAL INTEGRITY

TAP damages cement sealed integrity as

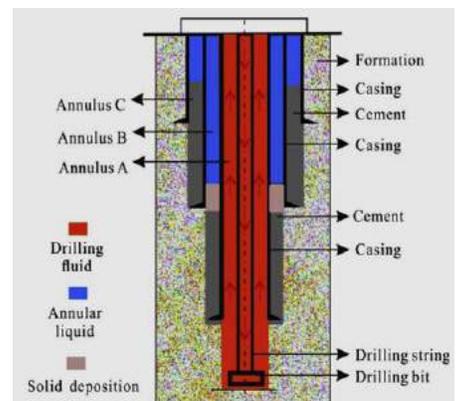


Figure 3: Schematic representation of TAP during drilling (Modified Zhang et al. 2019).

it causes changes in wellbore inner pressure. There are mainly two types of the failure of cement sealed integrity: micro annulus and micro-fractures. When radial stress exceeds the cement shear strength it will cause micro-fractures due to multiple changes in annulus pressure as shown in Fig. 4.

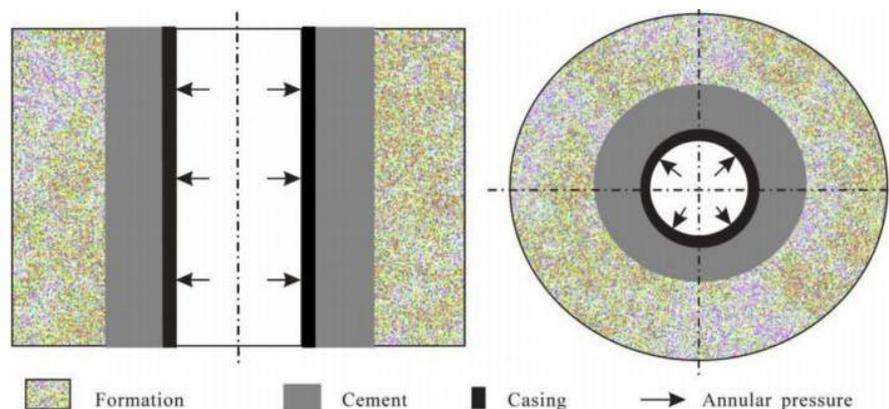


Figure 4: Impact of TAP on the casing-cement-formation system (Modified Zhang et al. 2019)

A wellhead is to be lifted up due to higher TAP. Thus, it is essential to conduct risk analysis and evaluation. Most of the accidents are related to casing damage. Thus, the design of casing should be concerned with the TAP, as well as geomechanical, natural fracture and corrosion.

MITIGATION MEASURES OF TRAPPED ANNULAR PRESSURE

It can cause severe problems if mitigation measures are not taken for trapped annular pressure. Active mitigation and Passive mitigation are two types of mitigation measures. Active mitigation measures are taken to prevent the generation of trapped annular pressure. Passive mitigation measures are taken after the trapped annular pressure has been generated. Mitigation generally aims at avoiding the generation of micro annuli, increasing the strength of casing, providing the extra space for the annulus liquid to expand, controlling the wellbore temperature. One of the most common mitigation measures is to have good primary cement job.

THERMALLY INSULATED PIPES AND INSULATED ANNULAR FLUID

One of the ways to prevent the trapped annular pressure is to reduce the thermal conductivity of the casing, tubing and the annular fluid. This is a remarkable method

to reduce the expansion of the annular fluid as low thermal conductivity leads to decrease in trapped annular pressure.

MEASURES BASED ON THE RELEASE OF TRAPPED ANNULAR PRESSURE

The remedial measures to have the release of trapped fluid are Rupture disc, Cement shortfall and Sacrificial casing. A rupture disc is a membrane installed in the casing nipple joint as shown by fig. 5. Rupture disc will break and connect the formation and annulus. The trapped annular pressure will drop by escaping of the trapped fluid in the formation.

Sacrificial casing involves a short section of casing (lower strength than required) placed at the predetermined depth (fig. 6). So, when the trapped annular pressure



Figure 5: Rupture disc (Modified Payne et al., 2007; Sathuvalli and Pilko, 2016)

exceeds the strength of casing, the casing will collapse and hence the leakage of trapped fluid in the wellbore will occur.

MEASURES TO PROVIDE EXTRA ANNULAR SPACE FOR THE EXPANDED ANNULAR FLUID

Extra annular space can be provided by

hollow glass sphere (size ranging from 19.00 μm to 38.10 μm .), syntactic crushable foam wrap and additional chambers. These hollow spheres are placed into the annulus and get rupture due to presence of high pressure in the annulus. Thus, extra space will be generated and hence the trapped annular pressure will drop.

NITROGEN FOAM

Nitrogen is used as it is inert in nature, usually injected along with the cement slurry. After allowing the cement slurry and nitrogen mixture to settle, a layer of nitrogen will form above the cement slurry in the annulus. As compressibility of nitrogen is higher than the annular fluid, the trapped annular pressure will reduce.

CONCLUSION

The authors have been concluded that the main mechanism behind the causes of trapped annular pressure (TAP) is an expansion of the trapped annular liquid. The consequences of TAP decrease the life of well, increase the well integrity issues and affect the economic aspect. Hence, analysis and prediction of TAP are very important in well completion design. Mitigation techniques depend on formation property, well structure and well annulus condition. All of the mitigation techniques will be able to eliminate the TAP. But from all of the mitigation techniques, rupture disc and nitrogen foam have a high potential to prevent hazards (Failure of casing string) caused by TAP and also it will be economically favourable.

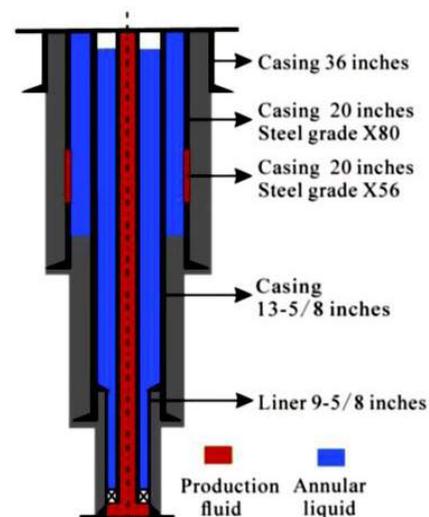


Figure 6: Sketch map of the sacrificial casing (Modified zhang et al. 2018, 2019)

“GAS OPEC : Dream or Reality?”

Author: Mrs Namrata Bist Rawat, Assistant Professor at School of Petroleum Technology discusses about distant dream of formation of gas OPEC

For almost 20 years the world’s gas producers have been trying to form an organization similar to OPEC (Organisation of petroleum exporting countries) that would offer stability to gas prices & give producers some control over security of supply & demand. There is Gas exploring centres forum (GECF) which was established in 2001 consisting of 11 of the world’s leading natural gas producers (Algeria, Bolivia, Egypt, Equatorial Guinea, Iran, Libya, Nigeria, Qatar, Russia, Trinidad and Tobago and Venezuela). GECF focuses on creating dialogues between producers, consumers, governments and energy related industries and promotes a stable and transparent energy market. Though GECF is generally thought to be equal to OPEC, it is not.

Since its formation, there has always been speculation that some of the world’s largest producers of Natural Gas (Russia & Iran) intend to create a gas cartel equivalent to OPEC which would set quotas & prices. Time and time again the topic of formation of gas OPEC has been raised but all the steps have been futile. Many researchers suggest there are many factors which are affecting the formation of gas OPEC:

- 1) Main obstacle is the lack of international spot trade that reflects current supply-demand dynamics.
- 2) Elasticity of demand & anti-trust policy.

Gas is traded through medium and long term contracts

for pipeline delivery, with gas price linked to the price of oil. This trend is changing with recent growth of LNG trade on the spot market and increase in gas output from North America, Middle East and Africa. For the past few years, there are many studies that believe gas is the solution for cleaner energy, but few believe that the momentum for renewable in the wake of heightened concern over climate change could push gas to the sidelines. The idea of NG as a transition fuel to renewable is strange but many experiments have proven it to be a true model. However a few major concerns such as gas leakages/gas emissions and flaring can stop gas to sell as “GREEN” fuel. Majority of the world culprits in this are in Russia, Iran and Iraq with USA on the growth.

However mitigation steps like CO₂ injection and Carbon capture, utilisation and storage (CCUS) can help to overcome this drawback. Various companies like Equinor, Total, Aker etc are already working in this direction and have setup CO₂ injection R&D projects. These would turn the dream of “Subsea factory” into a reality. It would also remove many of the financial burdens, increase recovery rates and extend the life of the field.

With more thrust in the direction of moving towards gas as the major fuel, the momentum to get a gas OPEC is on the rise and possibly would be formed soon.



GECF Members at the 21st Ministerial Meeting of the Gas Exporting Countries Forum

“Lubricants in Water-based Mud”

Author: Dr. Pawan Gupta, Assistant Professor at School of Petroleum Technology discusses about lubricating and rheological properties of High-performance water

In drilling oil and gas wells, the exact location is targeted in the reservoir to improve the recovery. Improved technologies, such as horizontal and multilateral wells also contribute to increased oil and gas production. However, drilling in deeper more deviated targets results in high torque and frictional effects. Drill string stuck in the formation is a frequent problem encountered in drilling. Clay swelling results in wellbore instability, caving-in, stuck pipe, bit balling. During tripping in and out, excess over pull or drag is experienced due to increased friction and sometimes results in the closure of the wellbore. The subsequent fishing operation may not always be successful and may result in additional cost. To avoid such issues, lubricating additives play a significant role in improving the performance of the drilling operations.

Lubricating and rheological properties of the mud are extremely important in designing the mud for any suitable application. The rheological property of drilling mud is important in transporting the drill cuttings and suspending them during shutdown conditions, while lubricating properties will minimize the chance of drill string stuck and help in the formation of filter-cake for

reduced filtrate loss. Superior lubricating properties help to reduce the friction effects such as drag, torque, and reduce wellbore damage. The lubricating additives pose high surface activity which improves surface adhesion and enhances lubricity. The selection between solid and liquid lubricants require careful consideration. The efficacy of lubricants gets reduced due to the abrasive matter present in the drilling fluid. The effectiveness of liquid lubricants primarily depends upon their ability to form a continuous and strong thin film over the metal surface of casing or tubing.

Oil-based muds (OBMs) acts as a superior mud system as they provide wellbore stability, less torque and drag, excellent fluid loss control, lubrication, and thin filter cake quality, with suitable rheological properties for drilling. OBMs typically have the coefficient of friction from 0.1 - 0.4. However, OBMs lacks environmental compatibility and hence are being rapidly replaced by water-based muds (WBMs) with enhanced lubricating properties.

The ester-based lubricants have been found to reduce torque, drag, and increasing the drilling rate for WBMs for drilling deviated wells. High torque and drag



Figure 1. Lubrication is mostly important in deviated wells

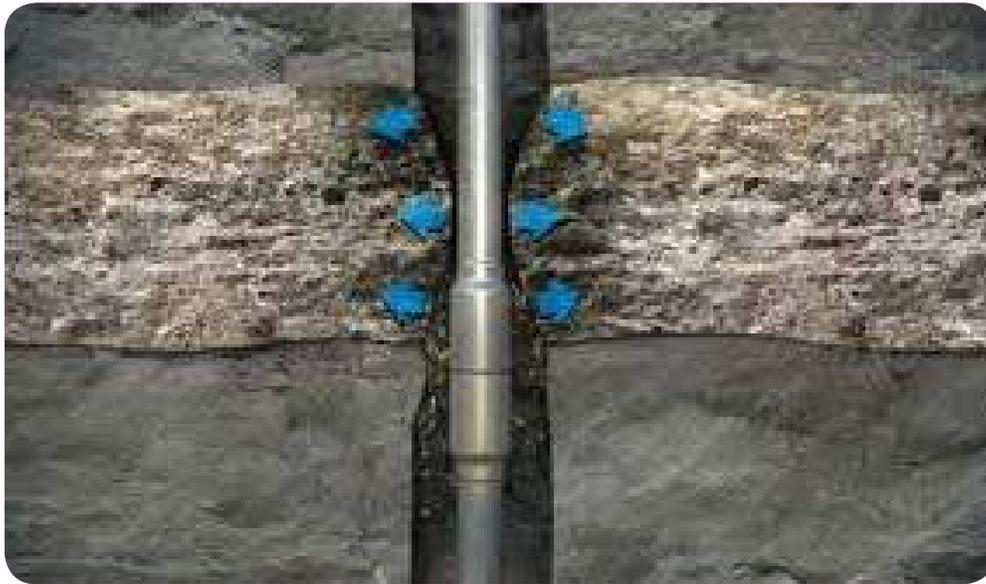


Figure 2. Pipe struck problem due to clay swelling using water based Mud

are important factors to be considered for drilling directional and extended-reach wells, particularly when water-based drilling fluids are being used. The typical lubricants used are hydrocarbons and fatty acids but it has now been shifted towards the use of esters and vegetable oils. Polymer-based drilling fluids also provide good lubricity, thin filter cake. Additional lubrication is required in the case of extended deviated wells to have better penetration. With the latest advancement in nanoparticle technology and numerous studies have evaluated the possibility of using nanoparticles in the petroleum industry.

Nanoparticles can be used as an additive to modify the properties of drilling fluid. Nanoparticles have a high surface area to volume ratio giving improved surface dependent material properties. This concept has introduced the use of nanoparticles in increasing the thermal conductivity of the base drilling fluid into which they are dispersed. Silica and clay nanoparticles have shown a positive effect on the rheology of the drilling mud. Additionally, it has been observed that

nanoparticles can considerably improve the filtration property of the drilling, controls the alteration in fluid properties and prevents any wellbore communication caused by reactive shale formations. Few studies have also demonstrated that nanoparticles are effective in enhancing the heat dissipation, modifies in viscosity, and improved lubrication performance. Spherical nanoparticles when used in drilling muds, can reduce differential pipe sticking by making a thin-film and may help to efficiently hold and lift the drilling cuttings which tends to aggregate near the base of drilled well. Carbon nanotubes in drilling mud improve thermal conductivity and rheological properties. Nano (graphene) water-based mud with trade name Scomi®, reported a better torque reduction/enhanced lubricity, improve ROP, prevent bit balling, improve bit's lifespan, and improves fluid thermal stability.

Hence, the development of high-performance water-based drilling fluids at par with that of the invert emulsion/Oil-based drilling muds is the need of an hour.

NEWLY INDUCTED FACULTIES



Mr. Hari S

Mr. Hari S is currently serving as an Assistant Professor in the School of Petroleum Technology at the Pandit Deendayal Petroleum University. He received his B.Tech degree in mechanical engineering from the University of Kerala in 2012. He has worked as an Engineer(QA) with HAL, a PSU under Ministry of Defence for 3 years and 4 months. He was involved in several projects and technical committees and was in-charge of Calibration lab. He has completed his Master of Science (by research) from IIT Madras at Ocean Engineering Department under the petroleum engineering program. He is currently pursuing his Ph.D at IIT Madras. He was selected for carrying out research on shock wave enhanced oil recovery at the shock wave laboratory, RWTH Aachen University, Germany under the UGC-DAAD program. He also has one international patent and three Indian patents filed in the field of petroleum and offshore engineering.



Mr. Abhijit Kakati

Abhijit Kakati is an assistant professor - on contract at School of Petroleum Technology, PDPU. His research interest primarily lies in the area of enhance oil recovery (EOR). Abhijit's current research focuses on understanding the 'low salinity water-flooding process' and optimizing smart water chemistry for various reservoir types. Apart from low salinity water flooding he has published papers in different EOR technologies e.g. surfactant flooding, polymer flooding, heavy oil recovery by emulsification etc. Before joining PDPU Abhijit was a PhD scholar at IIT Madras. He holds an M.Tech degree in Petroleum Exploration and Production from Andhra University and a B.tech degree in Petroleum Engineering from Dibrugarh University. Abhijit was a visiting research student at Molecular Engineering Laboratory of National Taiwan University.

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