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Improving Liquid Slug recovery in Plunger Assisted intermittent gas lift wells through Transient Modeling.

Rajeev Bansal, H Duara , Rajan Jairam, V B Rao

Institute of Oil & Gas Production Technology, ONGC Phase-II, Panvel , Navi Mumbai,India

E-mail: bansal_rajeev@ ongc.co.in

Abstract: Geleki field is a solution gas driven reservoir. As the reservoir pressure declined, continuous gas lift was replaced by intermittent gas lift to keep the injection GLR within economic limits. In intermittent gas lift the injected gas expands and penetrates the body of the oil slug as it travels upward, causing fluid fall back. The fluid fall back is to the extent of 5 to 7 percent of the starting slug volume per thousand feet of lift. Thus deeper the wells, greater is the fluid fall back, resulting in less liquid slug recovery. Plunger lift a cyclic method of production similar to that of intermittent gas lift operation minimizes the liquid fall-back and reduces injection GLR. Frequency of plunger can then be regulated and optimized with the proper tuning of intermittent gas injection and plunger operation. It is a challenge to keep the Plunger lift optimized under dynamic field operating scenarios. In this paper the Plunger assisted intermittent gas lift well has been modeled and analyzed for different parameters. The effect of injection gas rate, wall friction, well deviation and plunger weight on plunger travel has been studied. The conclusions derived will help in optimizing lift and give an insight in proper designing of plunger lift.

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NEW INITIATIVE IN DRILLING DEPLETED LOW PRESSURE HORIZON USING FOAM AIDED POLYMER-POLYOL NDDF

APPA RAO,A and Dr A.K.PANDEY
ONGC, RAJAHMUNDRY, INDIA
Email : anipindi_ar@yahoo.com

Abstract: THE PAPER ADDRESSES THE CASE HISTORY OF DRILLING A SUB HYDROSTATIC PRESSURED PAY ZONE OF THE PASARLAPUDI STRUCTURE IN KRISHNA GODAVARI BASIN FOR EXPLOITATION OF SAND-16. FOR A LONG THE PROPOSAL TO DRILL THE LOCATION 'PSDL' HAS BEEN KEPT IN ABEYANCE FOR WANT OF SUITABLE TECHNOLOGY. VARIOUS OPTIONS LIKE USE OF HOLLOW GLASS MICRO SPHERES, SOBM, TWO PHASE FOAM / AERATED MUD SYSTEMS WERE CONSIDERED. KEEPING IN VIEW OF TECHNO ECONOMIC AND FEASIBILITY , IT WAS DECIDED TO USE FOAM AIDED NON DAMAGING DRILLING FLUID. THE TASK HAS BEEN METICULOUSLY TAILORED TO ACHIEVE THE DESIRED OBJECTIVE OF MAINTAINING THE SPECIFIC GRAVITY OF THE DRILLING FLUID IN THE RANGE OF 0.90-1.00, USING THE FOAM AIDED MUD SYSTEM.PILOT TESTS WERE CONDUCTED ON FOAM AIDED MUD SYSTEM TO MAKE IT FIT FOR THE PURPOSE , AND THE RESULTS WERE ENCOURAGING PAVING THE WAY FOR SUCCESSFUL APPLICATION OF THE SAME AT THE LOCATION 'PSDL' OF PASARLAPUDI STRUCTURE, WHERE IN PRESSURES PREDICTED WERE SUB HYDROSTATIC.THE CANDIDATE WELL WAS PLANNED TO BE A 'S' PROFILE DIRECTIONAL WELL WITH 4 CASING POLICY ISOLATING THE LOSS PRONE ZONE (BHIMANAPALLI FORMATION)IN THE III PHASE THUS LEAVING SELECTIVELY LOW PRESSURED PAY ZONE IN THE FINAL PHASE. THE BASE NDDF WAS PREPARED IN KCL BRINE WITH PREGELATANISED STARCH, XANTHAM GUM , POLYANIONIC CELLULOSE AND POLY GLYCEROL. SUITABLE FAOMING AGENT WAS ADDED OF REQUISITE QUANTITY. FOAM WAS GENERATED BY INTRODUCING AIR THROUGH HOPPERS AND STABLE STATE OF FOAM WAS ACHIEVED THROUGH RIGOROUS GUNNING/AGITATION AND OCCASSIONAL MIXING OF DRY POLYMERS TO WITHSATAND THE DRASTIC CONDITIONS OF DRILLING. THE SPECIFIC GRAVITY OF THE CIRCULATING FLUID WAS STABLE IN THE RANGE OF 0.98-1.03 AT SURFACE. DRILLING PERFORMANCE WAS QUITE REMARKABLE WITH IMPROVED DRILLIING PENETRATION RATES, GAUZED HOLE AND EXCELLENT CEMENT BOND. THE WELL WAS ACTIVED ON FIRST COMPRESSOR APPLICATION PRODUCING GAS

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SIMULATE GAS SWEETENING UNITS FOR OIL & GAS INDUSTRY USING MASS TRANSFER RATE BASED MODELS

Anirban Pandit, Rohit P. Kulkarni,
Larsen & Toubro Limited, Vadodara, India.
Email : anirbanpandit@Intenc.com

Abstract: The removal of hydrogen sulfide (H₂S) and carbon dioxide (CO₂) from natural gas, LPG or sour gas treatment units using alkanolamines is practiced extensively in the oil and gas industries. The design of acid gas-amine contactors are often based on equilibrium stage models. These models assume that vapor and liquid phases attain thermodynamic equilibrium and then design engineers resort to correction factors such as tray efficiency or HETP to account for any departure from equilibrium. A further advancement in this direction includes empirical modelling of reaction kinetics using an adjustable parameter (H₂S and CO₂ tray efficiencies and/or liquid residence times), that forces the simulation to reproduce a treated gas composition. However, the model prediction viz. CO₂ slip may deviate when the amine sweetening unit is put in actual operation and the treated gas may not meet the desired product specifications. This could be avoided at the design development stage only using the robust non-equilibrium stage mass transfer rate based models. These models include additional transport equations i.e. i) solute equilibrium across interfaces, ii) the effect of chemical kinetics on mass transfer rates, particularly in the liquid phase, and iii) mass and heat transfer rate models for transport across interfaces. Thus, it is possible to capture the actual performance of the columns. The present work brings out the superiority of these models over the equilibrium stage models using the actual simulation case studies with Hydrocarbon-H₂S-CO₂-MDEA system.

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POWER SOLUTION TO OFFSHORE INSTALLATIONS USING TIDAL ENERGY : A FEASIBILITY ANALYSIS FOR ONGC

Shashank Patil , C . Jagdees

Oil and Natural Gas Corporation Limited (ONGC) Infocom-RO, 6th Floor, Vasudhara Bhavan,

Bandra (East), Mumbai – 400 017, Maharashtra, INDIA

Email : patil_sp@ongc.co.in

Abstract: This paper tries to look into the feasibility of harnessing tidal energy to meet the power requirement at offshore fixed installations existing in ONGC's western offshore. ONGC's offshore production in Bombay High is carried out with 11 process complexes, two converted process platforms and 163 associated unmanned platforms. In process complexes, power requirement is met through gas turbines, each with average capacity of 12 MW. The power requirement for utilities varies from 0.5 MW to 2 MW. The average requirement at an unmanned platform is about 3500 Watts. How much of this can be contributed by tidal energy is the case of study in this paper. Tidal energy is generated by the relative motion of Earth, Sun and Moon which interact via gravitational forces. Electricity generation is done by installing a tidal energy generator. At offshore, sea tides are available and can be harnessed adjacent to the offshore production installations to feed to the power grid. The power available from a tidal system is a function of turbine efficiency, density of the water, sweep area of the turbine and the velocity of the tidal flow. This type of marine tidal generator is in use at Portugal, Ireland and England. Based on the above, a feasibility analysis is attempted regarding deployment of tidal energy turbines at these offshore installations to meet the partial requirement of power or as an alternate source, so that gas turbine capacity can be scaled down and provide renewable energy with minimal environmental hazard. As the technology is still in its infancy, modifications could be incorporated to install efficient systems in a more cost-effective manner in the future.

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Heat flow inferred from base of gas hydrate stability field on the continental margin of India

Uma Shankar¹

, *Michael Riedel², A. V. Sathe³*

*1. National Geophysical Research Institute, Uppal Road, Hyderabad – 500007, India
(Council of*

Scientific and Industrial Research, New Delhi).

*2. Natural Resources Canada, Pacific Geoscience Center, Geological Survey of Canada,
9860*

W. Saanich Rd. Sidney, B.C. V8L 4B2, Canada.

*3. Oil and Natural Gas Corporation Ltd., KDM Inst. Of Petroleum Exploration, 9 Kaulagarh
Road, Dehradun 248195, India.*

Email : umashankar_ngri@yahoo.com

Abstract: The Base of gas hydrate stability field representing the bottom simulating reflector are observed over a very close grid of multichannel seismic profiles in the Krishna Godavari Basin of eastern continental margin of India. The data reveals that gas hydrate occurs in the Krishna Godavari Basin at places where water depths exceed ≈ 750 m. The thickness of the gas hydrate stability field inferred from the bottom simulating reflector on seismic section ranges from ≈ 125 m to 260 m. Geothermal gradients were determined from the depth of the bottom simulating reflector, that is interpreted to mark the thermally controlled base of a gas hydrate layer. Ground truth for the assessment and thermal constraints were provided by downhole measurements obtained during the National Gas Hydrate Program Expedition-01 at various sites in Krishna Godavari Basin. A simple conductive model is used to deduce heat flow from the depth of the bottom simulating reflector, utilizing the seismic data and borehole information. A regional bottom simulating reflector derived heat flow trend is observed, in which heat flow increasing towards deep sea across the basin. Consistent local variations were also observed with low heat flow values over prominent topographic highs and high heat flow values over the flanks of the topographic highs. This variation may be due to focusing and defocusing effects of the topography alone, and indicates the importance of carrying out topographic corrections to heat flow in this region. However, local heat flow patterns may be due to dynamic effects, including the displacement of isotherms by faulting and the upward migration of fluids. Geothermal modeling of observed bottom simulating reflector shows a close match with the base of gas hydrate stability depths.

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Cost Effective Solutions for Field Development: San Cristobal Field, Petrolera Indovenezolana, Venezuela

P G Sudhakaran

Diógenes Lugo, Petrolera Indovenezolana, PDVSA, El Tigre, Venezuela

Email : sudhakaranp@pdvsa.com

Abstract: Petrolera Indovenezolana is a joint venture of OVL with PDVSA, Venezuela producing about 33,000 BOPD heavy oil from San Cristobal field, situated in the Orinoco Heavy Oil belt. The production is from 44 horizontal wells drilled from 6 clusters spread over the field. The approximate area of the field is about 160 sq KM. The development of the field so far has been very cost effective and with minimum facilities which we could adopt for cost effective development. Currently the wells completed with progressive cavity pumps connected to six clusters with bare minimum facilities and a well fluid line to a main cluster or minimum processing facility station. Instead of the conventional Manifold use of Multi port valves which can connect up to 6 wells, two phase separation, third phase being separated at an existing facility at a distance of 32 KM, use of multi phase pumps to reduce back pressure, use of SCADA for monitoring of wells, disposal of produced water through disposal wells with minimum treatment, etc. Result of all these has resulted in a per barrel production cost of less than 2 USD. Adopting such innovative and cost effective solutions can go a long way in monetising some of the marginal fields which are awaiting Development.

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Solar Thermal Absorption Cooling Systems- A Case Study of ONGC Jaisalmer

Ashish Jain

Chief Engineer(E), Drilling Services, ONGC Tripura Asset, Agartala, India

Email : ashish_34@yahoo.com

Abstract: A climate crisis is inevitable unless all countries limit carbon emissions in the near future. This will only happen if low-carbon technologies become cost competitive, because subsidies for clean technology cannot sustain it in the long term. Success will require focusing on strategic investments that create a market cost advantage for clean power. This paper focuses on a leading investment candidate, solar thermal or concentrating solar power (CSP), a technology that uses direct sunlight and mirrors for chilling requirements. Under adequate conditions, solar and solar-assisted air conditioning systems can be reasonable alternatives to conventional air conditioning systems. Such systems have advantages over those that use problematic coolants (CFCs), not to mention the incidental CO₂ emissions that are taking on increasingly critical values. Cooling consumes between 20-30% of the electricity produced in India. Oil industry typically has a very high air-conditioning load, given its spread in varied geographical locations and sophisticated instrumentation and control systems. Against this backdrop, a study was undertaken for using solar thermal absorption cooling systems in select installations at Jaisalmer Forward Base, ONGC. This paper presents the possibilities and technology of solar air conditioning and will also cover the results of an initial assessment. The following factors may position solar thermal absorption cooling systems as a competitive alternative to conventional electric driven air conditioning: . Recent technology advances have occurred in concentrating solar thermal direct flow vacuum tube-type collectors. . Increasing electricity rates. . Use of renewable energy powered cooling systems can lead to lower electric demand and reduced power plant emissions. . CDM benefits Initial assessment results show that solar thermal cooling systems are feasible in areas with a confluence of high solar insolation, high cooling demand, and high electric rates, achieving payback of less than 8 years.

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Field examples of advanced ultrasonic image interpretation in complex borehole environments

M M Panigrahi, S Hazra, Jaipal Singh and Soma Chatterjee

Oil and Natural Gas Corporation limited, Assam Asset, Nazira -785685, and India

Email : jatinamit@yahoo.co.in

Abstract: Well casing integrity is vital for the safe operations of oil wells and also to the success of side track, work over and re-completion operations. Failure to detect well casing defects can cause myriad of problems which have the potential to compromise safe operation and control of the well. It is therefore, imperative to adopt a conservative strategy to plug damaged wells prior to casing failures on the basis of down hole inspection. The intent of running ultrasonic tool is to measure both internal and external casing corrosion by locating, identifying and quantifying damage for most casing sizes. This paper will demonstrate cased hole applications of ultrasonic scanning tool run in Lakwa field of Assam Asset. Examples are presented of different problems encountered during drilling and completion stages. Field logs are presented from environments containing different well bores, casing and cement slurry types. Three different case studies are discussed in this paper. Case study-A, illustrates how during hole clearing operation, scraper tool got held up with mud traces during circulation. Ultrasonic device was run and casing damage identified. In Case study-B, sanding was observed during well activation. Casing damage was suspected and ultrasonic tool was run. However, the tool got held up and could not go below the suspected damaged portion of the casing precluding its identification. In case study-C, packer was tried to set several times but failed. After pulling out, packer element was found damaged and suspected that there may be casing damage. Based on ultrasonic log results, heavy damage was indicated in about 18 m of casing. In all the above cases, the goal was to increase overall production and reduce production costs by minimizing rig time, curtailing work over jobs and performing subsequent remedial work on wells that still had production potential.

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Flow Assurance studies for development of Deepwater field Vasishta in the east coast of India

.Ravishankar, Rajan Jayaram & C.P.Singhal
Institute of Oil and Gas production Technology, Oil and Natural Gas Corporation Ltd,
Phase-II,
Panvel, Maharashtra –410221
Email : ravis_burla@yahoo.com

Abstract: ONGC has many discovered fields which are marginal in size and spread in the Deepwater's off the East coast of India. Since no infrastructure is existing in the close proximity stand alone development needs to be envisaged. Many technical challenges have to be overcome to develop these structures techno economically. There is a pressing need to monetize these assets to meet the overall energy shortfall/requirements. Vasishta is one such structure which is in the anvil for development. The structure lies south east of Kakinada city of Andhra Pradesh in 550 ~ 700 mts of water depth. Of the development options considered, subsea tie back to shore was selected after detailed study. Low subsea temperatures, long offset distance to shore with a steep fall of the seabed from around 50 to 400 mts throws flow assurance challenges for evaluation during both steady state and transient operating conditions. The present paper describes the various flow assurance issues likely to be encountered during the lifecycle of the field and the strategies to predict the likely hood of Hydrate formation, means for mitigation and remediation; extent of slugging during both steady state and transient conditions through the simulation studies using the industry standard transient multi phase flow simulators.

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Buildings as tools of Energy Security & Climate Change Mitigation

Mukul Bhatnagar, Ajay Kumar, H K Sethi
ONGC, N Delhi, India
Email : mbhatnagar.15@gmail.com

Abstract: Energy related Carbon di Oxide emissions from the buildings sector were 8.6 Gt or 33% of the global total in 2004. As per IPCC Assesment report of 2007, emissions from buildings can be reduced by 29% by 2020 at no net cost. However, as a sector, building is a complex sector where non technological features are as important as technological features. Buildings & Built environment have a great role to play in energy security & climate change which is substantiated by a case study of design of Green Buildings in ONGC. An insight is provided into the various techniques that reduce the energy consumption and carbon emissions in case of new buildings. It demonstrates how holistic design, technological features and information technology can save upto 65% of energy consumption, 35% of water consumption besides reducing solid & liquid wastes and improving occupant comfort. The role of embodied energy and material selection to minimize energy consumption during construction phase is also addressed. How Green Buildings can be a source of revenue generation through sale of Carbon credits is also discussed in the paper. The paper shall provide guideline to the industry in general and oil industry in particular in design and construction of low energy and environment friendly buildings besides discussing some of the common pitfalls that may be encountered.

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Evaluating Options for LPG recovery in Refinery Gas Plant

Raj Bhadra Singh, Abhishek Sinha

Fluor Daniel India, New Delhi, India

Email : raj.singh@fluor.com

Abstract: Refinery processes such as Crude Distillation, Hydroprocessing, FCC and Delayed Coking produce light end material in addition to the desired products. These light ends include hydrogen, methane, ethane, ethylene, propane, propylene, various butanes etc. Economic incentive in recovering LPG from this stream depends on several factors including costs involved in recovery, refinery needs as well as potential external marketing opportunities. Catalytic Cracking and Delayed Coking units produce enough light ends to justify integral gas plant, but even for these integral gas plants the decision on the extent of LPG economically recoverable will depend on several factors. This paper presents a systematic methodology to evaluate the options in LPG recovery for refinery gas plants. Options studied in configuring the Absorber/ Stripper arrangement include: 1. Selection of solvent from the available refinery streams 2. Solvent flowrate 3. Operating Pressure of the Absorber/ Stripper 4. Number of trays in the Absorber and Stripper sections 5. Number and duty of intercoolers on the Absorber The impact of each of these on the LPG recovered is presented. A preliminary estimate of equipment and operating costs for the above options is also carried out. LPG recovered is valued in terms of the difference between the fuel gas and LPG prices for the refinery site. Impact of other factors such as the Crude Distillation Unit overhead configuration is also covered. A sensitivity analysis is carried out to show the impact of a different LPG price. Based on this analysis a methodology is suggested to evaluate and optimise the refinery gas plant design.

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Attracting, Developing and Retaining gen-Next : A Major Challenge Facing Hydrocarbon Industry Worldwide

Dr. Mahendra Pratap

ONGC, Mumbai, India

Email : mpratap01@gmail.com

Abstract: Hydrocarbon Industry, an input deterministic but output probabilistic industry, is facing unprecedented challenge because of changing socio-economic geo-political relationships amongst developed and developing nations globally. This challenge is increasing manifold due to continuously growing demand and supply gap of energy mainly driven by population growth and strong desire of developing countries like India, China and Brazil to achieve economic prosperity. World population is expected to grow from 6.5 to 8 billion people by 2030 increasing worldwide energy demand from 230 to 285 million BOE/D. To keep pace with such challenging requirements, human resource, especially the bright young professionals , gen-Next , is going to play a significant role in the times to come. In this knowledge based industry, role of technology is crucial but unfortunately technology does not invent itself. Industry requires to attract , develop and retain the talented, creative and innovative gen-Next to invent appropriate technologies, develop and utilize them optimally in pursuit of oil and gas business objectives. Author has analyzed various factors contributing in today's environment wherein our young professionals rarely consider oil and gas business as a long term career opportunity. Need of the hour is to make the gen-Next aware of the limitless opportunities using cutting edge technologies and possibilities of working in multi-disciplinary, multi-locational teams across the globe. Author has proposed a Human Resource Management Model to create and nurture a positive and creative corporate environment and culture focussing on providing vibrant careers not just jobs to gen-Next in hydrocarbon industry. The proposed model provides integration of various tools and techniques which may help ensuring the gen-Next a work environment filled with job happiness, job security, proper work-personal life balance coupled with future growth and accelerated competency enhancement opportunities at least at par if not better than other vibrant growing industries globally.

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Implementation Of “Enterprise Wide Scada System For Uran-Trombay Gas And Crude Processing Operation, Transportation And Metering System.

H S Nayak, B. Sahu , R S Yadav
ONGC Uran Plant, Mumbai-India,
Email : nayak1968@gmail.co

Abstract: Oil And Natural Gas Corporation Limited (ONGC) is India's premier organization & Navratana Company, engaged in exploration and exploitation of hydrocarbons is making significant contributions to the industrial and economic growth of the country. The operations of ONGC in India are organized and managed through geographically distinct Assets, Basins, Forward Base, Regional & Corporate office. ONGC aims at revamping of these existing systems in Offshore; deploy new systems in all onshore production & drilling facilities and Plants and developing an integrated "Enterprise Wide SCADA system for Production and Drilling facilities". This integrated system shall acquire Real-time Production and Drilling data, which, apart from efficient day-to-day operations, shall also be used for supporting scientific and business decisions. Three-tier system architecture consists of Tier-1 at different Production and Drilling Installations, Tier-2 at Different Asset Head Quarters and Tier-3 at corporate level. Tier-1, SCADA Systems, which acquires data from field Instruments, store real-time and historical data for processing the data for generating alarms, events and reports. Tier-2 is a Data Center, which acquires data from all the production, & Drilling. Installations of that Asset have GUI, Alarming and Reporting functionalities and Interface with various applications. Key Performance Indicators are being sent to Corporate Layer Tier-3 for presenting it to corporate level users. Total crude oil production of Mumbai high is 14 to 15 mmt per annum and total gas production is around 50 mmscmd. Natural gas is processed and value added products viz. LPG, Naphtha, C2 - C3 are extracted from natural gas and dry gas is sent to various consumers thro' GAIL. To dispatch crude oil from Uran a 36" Å, x 24 km pipeline goes to Trombay Terminal. From Trombay Terminal one 36" Å, x 4.5 km line goes to Jawahar Dweep for ship tanker loading for different coastal refineries viz. MRPL, IOC Vadinar, CPCL, KRL, HPCL Vizag. One 24" Å, line goes to local refinery BPCL and another 24" Å, line goes to local refinery HPCL. 98% of total Mumbai high crude oil is being dispatched to Mumbai Refineries (HPCL & BPCL) and to different coastal refineries. Around 3.25 mmscmd of natural gas is being dispatched to consumers. Presented paper discusses the objectives and achievements of the project which include the state-of-the-art SCADA systems in Uran-Trombay process and transportation and metering of oil and gas including satellite metering stations viz HPCL, BPCL, JD and JNPT for efficient monitoring of required process and metering parameters in the real time domain from related production installations. Historization, data archiving has helped to provide useful summarized and aggregate information to management as well as third party enterprise applications for supporting various decisions and management processes of the organization by interfacing with instrumentation Control, monitoring and measurement systems with the help of OPC-Server at JD/JNPT/Uran and Ethernet / mode at HPCL/BPCL/Trombay & Uran .

Paper ID : 20100216

Oil Field Microbial Induced Corrosion Control: Potential of Cow Urine

Meeta Lavaniaa, , Anil Agnihotrib, Vijay Kumar Jainb, Ajoy Kumar Mandala Priyangshu Manab

Sarmaa and Banwari Lal*

*a*TERI, Darbari Seth Block, India Habitat Center, Lodhi Road, New Delhi 110003

b Oil and Natural Gas Corporation Limited, Corporate Health Safety Environment Scope Miner

Building, South Tower, 8th Floor, Lakshmi Nagar New Delhi 110092

Email : meetal@teri.res.in

Abstract: In this study, we compared the efficacy of cow urine with other biocides (tetrakis(hydroxymethyl) phosphonium sulfonate, benzyl trimethyl ammonium chloride, formaldehyde and glutaraldehyde), to control microbial induced corrosion which are already known to the petroleum industry. Two efficient corrosion-causing bacterial strains were isolated and identified by 16S rRNA full gene sequencing as *Desulfovibrio vulgaris* and *Desulfovibrio gigas*. The efficacy of biocides against consortium of these two strains *Desulfovibrio vulgaris* and *Desulfovibrio gigas* were monitored in experimental pipes by continuously circulation in close loop for 90 days measuring cell counts (planktonic as well as sessile), hydrogen sulfide production, iron reduction, production of extrapolymeric substances and biofilm structure on metal coupons using an electron microscopy. The cow urine treated consortium of *Desulfovibrio vulgaris* and *Desulfovibrio gigas* had the lowest planktonic cell count (2.3 log units) as well as sessile population (1.9 log units), followed by treatment of same culture with tetrakis(hydroxymethyl) phosphonium sulfonate, benzyl trimethyl ammonium chloride, formaldehyde and glutaraldehyde as compared with the control (6.7 & 5.8 log units) respectively. Though sulfide production was observed with all of the tested biocides, the concentration was lowest with cow urine (0.08 mM), followed by tetrakis(hydroxymethyl) phosphonium sulfonate (0.72 mM). Similarly, after 90 days of treatment, Fe (III) reduction was also found to be lowest with cow urine (2 mM), followed by the tetrakis(hydroxymethyl) phosphonium sulfonate (7.95 mM). The scanning electron microscopic study of the metal coupons indicated that the biofilm formation was inhibited and structure of biofilm was distorted by biocides. Production of extrapolymeric substances by consortium was also inhibited by cow urine. The active compound was identified as D (-)- α - aminobenzyl penicillin. These results demonstrate that cow urine could control the catastrophic effects of microbially induced corrosion, and this is indicative of its potential as a viable substitute for toxic chemical biocides.

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Under pressure synthesis of *Gum ghatti* and acrylamide based hydrogels for the selective removal of saline from different petroleum fraction-saline emulsions

B. S. Kaith*, *Rajeev Jindal* and *Hemant Mittal*

*Department of Chemistry, Dr. B. R. Ambedkar National Institute of Technology,
Jalandhar (Pb.) 144 011 India*

E-mail : bskait@yahoo.co.in

Abstract: Hydrogels are the superabsorbent materials which have got a large number of applications in diversified fields viz. sustained drug delivery, controlled fungicide delivery, flocculants for removal of colloidal particles from water and desalination of water. Removal of saline from the crude petroleum during its extraction and refining process is one of the major problems faced by petroleum industries. Keeping in view the absorption capacity of Gum ghatti and technical applications of hydrogels, in this research work, we have synthesized a superabsorbent from Gum ghatti and acrylamide in the presence of potassium persulphate as an redox initiator and N, N'-methylene-bis-acrylamide as a crosslinker for the selective removal of saline from different petroleum fraction-saline emulsions. Various reaction parameters like reaction time, reaction pressure, amount of solvent, pH of medium and initiator ratio were optimized as a function of percentage grafting whereas concentrations of monomer and crosslinker were optimized as a function of percentage swelling so as to get maximum absorption capacity of the crosslinked polymer. Candidate polymer was found to be pH, temperature and electrical field stimulus sensitive. Synthesized graft copolymer was characterized by using different characterization techniques like FT-IR, SEM, TGA, DTA, DTG and XRD. The superabsorbent formed has been found to go for selective removal of saline from different petroleum fraction-saline emulsions like kerosene-saline, petroleum ether-saline, petrol-saline and diesel-saline emulsions. It has been observed that the hydrogel could absorb 667.22, 596.64, 646.82 and 680.46% saline from kerosene-saline, diesel-saline, petrol-saline and petroleum ether-saline emulsions respectively.

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Innovative Chemical Treatment Solution to Mitigate Crude Oil Tank Bottom Sludge Deposition Problem in Oil Industry for Environment Compliance

V. K. Saxena and A. Bhattacharya

Oil and Natural Gas Corporation Ltd. Trombay Terminal (Uran Plant), Mumbai Region, Mumbai, India

Email; vksmumbai@gmail.com

Abstract: In petroleum industry throughout the world removal of heavy organic deposition in production activities, is a costly process. Non polluting removal of oil residue (Sludge) from storage tanks is still a challenge today. Over the course of time, highly viscous components of the oil accumulate on the bottom of these storage tanks, which generally have a capacity of several thousand cubic meters. The most usual method of cleaning these storage tanks is the mechanical removal of highly viscous or solid components prior to refilling the tanks with oil. Similar to tars, these residues have to be disposed of and can result in polluting the environment to a considerable extent. Heavy organics means paraffin/wax, asphaltenes, and resins. Its deposition hampers production from wells, restricts flow in oil trunk lines, and reduces ullage in crude oil storage tanks. The main cause of sludge deposition is the asphaltenes flocculation & micelle formation. Various factors affect this process like type of crude oil, temperature, pressure etc. It is a big challenge how to handle the sludge in crude oil storage tanks, flow lines etc. These heavy organics are mainly paraffin / wax, resin, asphaltenes, diamonoids, mercaptans, organo-metallic compounds. These compounds interact at various conditions. Various forces act together in helping precipitation of these compounds. Solid particles suspended in crude oil also play a role. It may stick to the walls of the conduits, reservoir. Toughness of the precipitate depends on the quantity of asphaltenes present in the crude oil which may be in very minute quantities. Asphaltene is a highly polar compound act as a glue and mortar in hardening the deposits. Besides the deposition problems in the well bore, production tubing, pipelines and storage vessels, the most important is the disposal of these deposits. Physical and chemical means either don't let the deposition to take place or remove the depositions on the regular basis but asphaltenes and waxes do show their presence during storage. The heap piles of deposits cause decrease in the effective storage capacity and also cause problems relating to instrumentation for accurate measurements that lead to loss of revenue while accounting during custody transfer of crude oil. The problems are more serious in nature in floating roof tanks as compared to that in fixed roof tanks. The other problem faced is loss of heat efficiency in these tanks during winter operations. Presented paper discusses problems confronted in Uran Plant, ONGC, Mumbai Region, where floating roof storage tanks annually store 16-17 mmt of Mumbai Offshore Crude Oil, Problems encountered are discussed in detail and viable solutions to mitigate deposition problems are also suggested. Chemical tank cleaning & recycling offers a viable solution to execute scheduled fast tank cleaning compared to mechanical solutions. Innovative Chemical formulations , developed in house has an effect on recycling sludge and have potential to protect environment as sludge does not need any further special treatment or disposal for better environment compliance .

Paper ID : 20100221

**/H Crude Oil through Marine Tankers Loading Operations at
Jawahar
Dweep &
Implementing Advanced Measurement System for Custody
Transfer of M
JNPT Terminals - A Case Study**

Amitava Bhattacharya

*Oil and Natural Gas Corporation Ltd., Trombay Terminal (Uran Plant) Chembur,
Mumbai Region, Mumbai -400 074*

Email: amitabh_58@rediffmail.com

Abstract: New technologies in flow measurement in oil industry are being introduced in petroleum industry for custody transfer of petroleum and petroleum products for accurate measurement of quantity and quality. In the era of market Driven Price Mechanism (MDPM), introduced by govt. of India in April 2002, it becomes important to adopt advancements in flow measurement in order to remain competitive in open market for quantification of Petroleum liquids. Various systems of oil, gas and water measurement were introduced at different times with accuracy and least counts, which were acceptable in the regime of Administered Price Mechanism when custody transfers were mostly with the public sectors. Turbine meters and Ultrasonic Flow meters are the latest entrant in this sector and are being looked upon as a very reliable method of measurement due to the fact that it offers some measurable benefits to users in the Hydrocarbon industry. Turbine meters offer many advantages over PD Meters in terms of accuracies involved during flow measurement. Traditionally, Tank / level dip method of measurement was followed in hydrocarbon Industry to measure the quantity of liquid hydrocarbon when they are transferred from one location to another. PD Meters were used for crude oil custody transfer from Jawahar Dweep, ONGC to the costal refineries. Recently these PD meters replaced by an state of the art technology Turbine Flow Metering System at Jawahar Dweep and JNPT for Crude Oil Custody Transfer. When Turbine Meters were introduced, and soon they became user's choice for custody transfer applications in large diameter pipelines due to its simple construction and capabilities to handle large flow rates. Presented paper discusses advantages of a state of the art technology Turbine Flow Metering System over PD Meters for custody transfer of crude oil. The advantage of online small volume Proving System during each batch transfer facilitates confidence between Seller and buyer. The purpose of this paper is to examine the factors that should be considered when selecting turbine meters for the custody transfer measurement of crude oil by developing a basic understanding of the measurement characteristics of turbine meters in general and to consider peculiarities of crude oil. For accurate measurement, it is very important to maintain stable operating conditions (flow rate, pressure, and temperature). The turbine meter should be recalibrated frequently if conditions are changing only slightly for accurate measurement. ONGC has commissioned recently this Turbine Flow Metering System at two locations Jawahar Dweep and JNPT for custody transfer of Mumbai offshore crude oil to costal refineries as this technology has been the fastest growing of all industrial flow meter technologies in the world today.

Paper ID : 20100224

Prime Well Success depends on Drilling Fluids Management - Parametric and /or Symptomatic?

Krishna Haldar, Shivendra Garg,
ONGC, 11 High, Bandra Sion Link Road, Mumbai 400017, India
Email : haldarramkrishna@yahoo.in

Abstract: Defining -"Successful Drilling of a Well " entails us to look not just to the hermetical success but at what budgeted cost , with or without complications and how far the well was drilled within the set parameters .Normally a big percentage of wells worldwide as well as in India are drilled normally following the Geotechnical order /parameters ,but some wells require special attention to well behavior , indications and specific attention to symptoms exhibited .In Drilling and Drilling Fluid system well behaviour are Key Performance Indicators (KPI) which cannot be ignored. Many a times the operation level management may miss well signs,minor observations waived off, practices relaxed and thereby increase exposure time and well cost. Drilling and Drilling Fluid Management with parametric control is accepted generally , but when well conditions are tough , Symptomatic approach using well observations and indications can act as a tool , evolve into a method to solve well issues and anticipated well complications. This paper showcases typical case studies of wells drilled which were both challenging in their own way, requiring best Drilling Fluid, but at the end operators approach to address the well problems and react to well behaviour was important. The paper discusses the importance of a parametric control approach in a few exploratory HTHP well in Eastern Offshore of India and to the Symptomatic approach adopted by the same operator for success of some deep horizontal well through unstable shale and lenticular sand section .Also highlighted are other distinct success factors applicable in each case. The data collected through supervision of wells in different fields with scientific studies carried out have in itself made it possible to evolve a Concept Plan which is being used significantly and successfully .

Metabolic Diversity of Methanogens in unminable coal seams

R. Ganapathia

M. Lavania, D. M. Kaleb, P.M. Sarmaa, T.R. Mishrac, M.P. Sarbhaic, Banwari

Lala

aEnvironmental and Industrial Biotechnology Division, The Energy and Resources Institute

Darbari Seth Block, Habitat Place, Lodhi Road, New Delhi - 110 00, India.

b Oil and Natural Gas Corporation Limited, Scope Minar Building, South Tower, 15th Floor, Lakshmi Nagar, New Delhi 110 092

cInstitute of Reservoir Studies, Oil & Natural Gas Corporation Ltd., Chandkheda Campus, Ahmedabad – 380 005

Email : ramya.ganapathy@teri.res.in

Abstract: Methanogenic activity was investigated in coal seam samples by using a series of substrates viz. acetate, format, methanol, Isopropanol and H₂/CO₂ to isolate different groups of methanogenic Archaea. Furthermore, the community composition of methanogens in coal, formation water and sediment samples was explored by denaturing gradient gel electrophoresis (DGGE) of 16S rRNA genes amplified with the Archaea-specific primers. Substrate consumption and methane production during laboratory testing suggested that 3 different physiologic types of methanogens were present: methanol, Isopropanol and H₂/CO₂ utilizers. The selected thermophilic methane-producing consortium CBM 65-10 showed methane production in the range 42-50% in all the treatments i.e. with coal as sole substrate and coal along with and without respective carbon sources, whereas no methane production was observed when no substrate/carbon source was provided. CBM 65-10 was tested with different types of coals (lignite, sub-bituminous and bituminous) at different temperatures (45, 50, 55, 65 and 70 °C). The consortium CBM 65-10 showed 50% biogenic methane production at 65 °C with bituminous type of coal. No methane production was recorded at higher temperatures. The results suggest that both acetoclastic and CO₂ type substrate consuming methanogens are likely to be involved in the terminal step of hydrocarbon degradation, while methanogens from methanol plays a minor role. DGGE profile further indicates similar archaeal community compositions in coal, formation water and sediment samples. The combination of hydrogeological and molecular methods employed in this study provides improved information on the community and the potential activity of methanogens in coal seams.

ID : 20100227 Paper

Under Balanced Horizontal Drilling – The Technology Plan to get additional 10% Oil & Gas from Offshore Field of India

K.Khnaris Pratap, R.K. Haldar

233, 11-HIGH, ONGC, Bandra-Sion link road, Mumbai-400 017.

Email : kkpratap@gmail.com

Abstract: Under Balanced drilling (UBD) has now come of age with the unique facilitating factor of firm establishment of Horizontal drilling. Drilling under balanced horizontally in a pay zone has removed the hole instability as a contra indicator of UBD. Multiple applications of UBD have brought out vividly the substantial gains that UBD gave to oil operators round the world ranging from 30% up to 1000%. In UBD each drilled meter starts producing in real time as it is opened, building up most accurate reservoir knowledge leading to strategic planning, Many operators in the world have drilled Cost Neutral wells of UBD and take a long term view of Reservoir Development by evaluation of UBD's value enabling capabilities, direct through solving complications of stuck pipe, lost circulation, formation damage and uplifting of production; indirect through reservoir learning. UBD technology has opened up newer way of looking at poorly understood reservoirs and managing higher water cuts. It is believed that UBD, in combination with Horizontal drilling, is the next technology breakthrough allowing man to take out yet another substantial chunk of oil from mother earth. Today, the drilling and the productivity gains of UBD are given in each trial but the greatest benefit is the reservoir knowledge towards improved field management. This paper discusses the UBD world wide results and explains the plans and rationale for ONGC's firm plan to drill a host of pilot wells in loss prone depleted reservoirs in Mumbai high and Neelam fields. The objectives are to establish the UBD not only as a tool to arrest the severe lost circulation and gain productivity improvement but to view UBD as the future technology to maintain production through greater Reservoir Knowledge and zero formation damage safely.

Paper ID : 20100228

Scale up of H₂ production by bacterial consortium (TERI BH05) isolated from riverbed sediments

Sneha Singh, Priyangshu Manab Sarma, Sanjukta Subudhi, Ajoy Kumar Mandal, Banwari Lal

Environmental and Industrial Biotechnology Division, The Energy and Resources Institute, Habitat Place, Darbari Seth Block, Lodhi Road, New Delhi 110003, India.

Email : snehas@teri.res.in

Abstract: Due to the renewed interest in finding sustainable fuels or energy carriers, biogenic hydrogen from biomass is a promising alternative. Dark fermentation is one of the better strategies for utilization of waste resources for producing bio hydrogen. The present study investigated fermentative hydrogen production performance of bacterial consortia from Yamuna riverbed sediments. Based on the initial screening of seven consortia, hydrogen production of TERI BH05 was up-scaled from 30ml experimental bottles to 10 litre Bioreactor. Initial up-scaling experiments were conducted in a 1.5 L bioreactor. The cell growth (2.3 -2.7 OD at 600 nm) and protein concentration (3.1-3.5 g/L) were monitored and the results demonstrated that as fermentation progressed, the cell mass increased, glucose concentration decreased and pH decreased from 7 to 4.3 with respect to time with increased accumulation of hydrogen in the headspace. The results showed the highest hydrogen production obtained with 1.5 litre bioreactor was 935 ml hydrogen per litre of medium (2.4 mol of H₂/mol of glucose) and with 10 litre bioreactor was 500 ml hydrogen per litre of medium (2.0 mol of H₂/mol of glucose) through acetate/butyrate pathway. Further experimentation in 10L bioreactor is currently under process with modified design of water displacement gas collector system to increase the hydrogen accumulation.

Paper ID : 20100230

Design and Field Implementation of Cost Effective Chemical Formulation for Successful Management of Flow Assurance Constraint in Asphaltic oil fields of Mehsana Asset, North Cambay Basin

U.B. Singh, J. K. Srivastav, A. K. Gupta

Dr B R Ambedkar Regional Geoscience Laboratories, Western Onshore Basin, Vadodara

Email : udaibhan.singh@gmail.com

Abstract: Mehsana Asset is facing serious problem in producing asphaltic oil from Becharaji, Lanwa, Balol and Santhal fields. The share of oil from these fields is around 35-40% of the total Asset production. Many wells of Asset are producing with poor influx due to high well head pressure and very poor flow characteristics especially during winter season, resulting substantial reduction in production from the field. The present work is on design of chemical formulation for mitigation of flow assurance constraint being faced by the Asset. The viscosity profile and rheological studies at simulated conditions (temp.; 60 to 20 0C & Shear rate 0.1 to 10 Sec-1) of flow suggested it to be highly viscous (Viscosity-10,000 to 80,000 cps). The extensive laboratory studies on asphaltene inhibition and dispersion for improving the flow characteristics has resulted in the design of formulation consisting of synergistic mixture of Anionic surfactants, Nonionic surfactants, Alkyl phenol resin, polar solvents and mutual solvents. Over sixty formulations were designed and evaluated. The final design was able to reduce the viscosity by 80-90%, resulting in the marked improvement in the flow characteristics at low temperature. The designed formulation was 35% cheaper than the existing proprietary formulation in use by the ASSET. The field trial of the formulation was carried out in Becharaji, Lanwa & Balol fields in eight cluster wells. It has given very good results and substantial reduction (50%-60%) in the line pressure was observed. The Asset is replacing the expensive proprietary formulation with the formulation designed by RGL. The study carried out by RGL has thus contributed significantly in successfully managing the longstanding flow assurance problem in a cost effective manner and thereby sustaining and enhancing the production from the Asset

ID : Paper 20100232

Formation Damage and Return Permeability Studies for Optimization of Drilling Fluids for Sandstone Formations

MS Rautela, D. Mnodal*, DC Tewari* ,T.R. Misra*

Institute of Biotechnology and Geotectonic Studies Jorhat, Assam,India

**Institute of Reservoir Studies, ONGC, Ahmedabad-380005, India*

E-mail: rautela_ms@ongcl.com

Abstract: Drilling fluid is not only factor during drilling for formation damage as widely thought of. When we drill the hole a lot of cuttings are generated simultaneously. Sizes of these cuttings vary in wide ranges. Some act as bridging particles, some as fine particles may penetrate into the formation and damage it. About 5% of clay stone is usually found in the producing formation. This clay and other fines might play vital role in impairing the formation when the Bit just cuts the formation. A well designed and well maintained Drilling fluid protects the producing formation from damage as a good mud cake acts as a Kavach. But a well designed but poorly maintained drilling fluid would not serve our purpose. Even well maintained conventional drilling fluids give return permeability of 90%-95%. Drilling fluids having solid and liquid can be made least damaging to the formation during spurt loss period. It better to choose appropriate drilling fluid for drilling the well as preventive measures to formation damage. The paper presents the results of laboratory studies for assessing the effect of drilling fluid systems PHPA-Polyglycol, CL-CLS, IDMOL, Clay Free Saturated Salt Drill-in Fluid in terms of degree of formation damage induced by each system on sand stone formations of Linch Pay (Jotana # 99) and Sand- 24 (Vijayapuram # 6) during drilling operations. A concept is also put forward to assess the depth of damage by solid particles, correlating spurt loss volume to pore volume of the core plug.

ID-20100233 Paper

Successful Multilateral Drilling with Swell Packer Completion of wells Paid Reach Dividend in Improving Recovery from Gas cap Area of Mumbai High North Field

Rudal Singh and T.E.Sivaramakrishnan

Mumbai High Asset, ONGC, Vasudhara Bhavan, Mumbai, India

E-mail: rsingh53@hotmail.com

Abstract: Mumbai High North field discovered in 1974 has been on production since 1976. The upper part of L-III carbonate sequence comprising of A1, A2-I to A2-VII, B, C & D sub layers form the main reservoir. Water injection commenced in the field in 1984. Being on continuous production for last 32 years, the field is in mature stage of its producing life. The oil production rate from the field was of the order of 130000-bopd during 1982 to 1989. During early and mid nineties the field had entered a crucial decline phase and production level dropped to about 63000-bopd by Dec.1993 due to rise in GOR, injection water break through and closure of some high GOR and high water cut wells. Currently the field is producing about 80000 bopd. The need to adopt advanced drilling and completion technology has been driven by the need for intervention less long term improved well productivity. Complexity of flow and potential gas/water production reduced the sustained productivity from horizontal wells which have no proper annular isolations. Multilateral wells were drilled to improve economics and increase recovery from L-III reservoir. Simple in construction and easy to apply, the Swell packers' technology has been used in Mumbai High effectively to complete multilateral wells with GOC. Swell packers were run on blank and perforated pipe, spaced out across individual zones. These completions has resulted in producing wells with normal GOR and sustained long term productivity. This has resulted in better reservoir management, enhanced production deliverability, and a positive impact on overall North field performance. The oil recovery from Mumbai High North L-III reservoirs has till date been of the order of 22%. It is estimated that with continued adoption of these advanced drilling and completion technologies will help in improving recovery of Mumbai High North field to 32%.

Paper ID : 20100241

Vapour Recovery System For Utilizing Fugitive Emission From Crude Oil Tanks At Oil Installations

Rajesh Kumar, Bijaya Nanda Sahoo

Oil & Natural Gas Corporation Limited, Ahmedabad, India

Email : rkumar001234@hotmail.com

Abstract: Background: Crude oil is stored in more than a hundred storage tanks of various capacities in Ahmedabad asset of ONGC. The temperature of crude oil in these storage tanks can be as high as 80 degree celcius leading to emission of fugitive gas and lighter hydrocarbons from these tanks to atmosphere. There are more than forty Heater Treaters installed at various installations of Ahmedabad asset. Pressure maintenance of these vessels is being done by introduction of natural gas in these vessels. Surplus gas is released to flare. Application of Vapour recovery Unit (VRU): Recent study conducted by an international agency in Ahmedabad asset shows considerable gas emission. It is estimated that approx. 30,000 SCMD of fugitive emission is released from storage tanks and 30,000 SCMD of gas from heater treaters. Fugitive emission need to be arrested to achieve following three goals: 1. Revenue generation 2. Environment Protection 3. Avoidance of fire, health and safety hazards at installations Constraints: Reason for non-utilization of the fugive emission is non-availability of technology at cheap cost. Many instances of failure in implementation of available technology were due to intermittent emission of fugitive gas. Secondly available technologies are not cost effective since these installations are scattered over different geographical locations. Conclusion: Natural gas being valuable non-renewable energy course is scarce in nature and needs to be prudently used. VRU can help in arresting its wasteful expenditure. Secondly, this plays an important role in protectig our fragile environment. Government should encourage use of VRU by subsidizing import of equipments and technology. Advanced countries should come forward to help developing countries by transfer of technology and financial aid. Technical Contribution: This system is related to protection of environment and utilization of natural resources to its fullest use. ONGC as a responsible corporate has a role to play.

Paper ID : 20100252

Deepwater Flow Assurance - Evaluation of Existing Concepts and Emerging Trends: An Indian Perspective

Rajiv Nischal, Neeraj Lal & Sunil Arora
ONGC, New Delhi
Email : nischalrajiv@gmail.com

Abstract: With the future of India's energy security lying in deep water, ensuring flow of well fluid from reservoir to reception facility assumes increasing importance. Flow assurance goal is to assure reliable and economic production by overcoming issues of complex reservoir characteristics, extreme external hydrostatic pressures, low ambient temperatures, long-distance tiebacks etc. With increasing water depth, system operability like hydraulic flow instability becomes an area of concern as multiphase fluid has to be transported from well bore to surface facilities. These concerns are normally associated with transient operations, which, if not properly managed, can lead to increased downtime and high remediation costs. Flow assurance impacts every phase of field development, affecting a production system's concept selection, design and operating strategy. No single flow assurance solution exists and a combination of prediction, prevention and remediation techniques are necessary to ensure unhindered production over the field life. ONGC has a host of potential deep and ultra deep water discoveries in East coast like GS-29, G-4, G-1, S-1, Vasishtha from PEL blocks and discoveries in KG-DWN-98/2 NELP block, which it plans to monetize in a record time through integrated East Coast hub. First oil from project Manik is expected in 2011-12. Gas production is expected to start in 2011-12 and reach 37 MMSCMD by 2015-16. The gas fields are proposed for development from sub-sea to shore and oil fields by deploying FPSO. Paper discusses flow assurance challenges likely to be faced during development in the form of paraffin/waxes/asphaltene from oil discoveries and hydrates from the deep sea gas discoveries. This paper focuses on flow assurance issues associated during development phases, their avoidance through design and their mitigation and management through operational strategies and procedures.

Paper ID : 20100253

Environment Audit - An Effective Tool in Improving the Effluent Quality- A Case Study

Harendra Singh, Narain Lal

Oil and Natural Gas Corporation Limited, New Delhi, India

Email : singhharendra2@rediffmail.com

Abstract: ONGC is exploiting the underground reservoirs to extract crude oil for commercial use. Water is coproduced along with crude oil and subsequently separated from oil during processing of oil and gas. This water termed as 'produced water', is the major source of effluent generation during production of oil and gas. The major pollutant in produced water is traces of crude oil in free or emulsified form. For treating effluent to make it fit for reuse/disposal as per prescribed norm, Effluent Treatment Plants (ETPs) are operating in the onshore& offshore Assets. A significant quantity of oil, a valuable resource may be wasted because of improper functioning of effluent treatment plants. Also improperly treated effluent disposal poses problems of reduced water injection, higher injection pressures due to choking of formation, injectivity loss, higher pump maintenance down time etc. resulting in overall decline of cumulative oil production in addition to the violation of statutory norms. Therefore, it is necessary to have periodically check on performance of Effluent Treatment Plants (ETP) and effectiveness of effluent treatment processes. The audit is an effective tool to bring out process deficiencies in a systematic manner and enlist top management support in improving the effluent quality and abate environmental pollution. ONGC has been conducting ETP audits both through inhouse expertise as well as through external expert agencies regularly. One such audit was recently completed across ONGC Assets with the objective of finding the status of existing ETP with respect to design versus actual, analysis of functioning of each process unit of ETP and finding areas for improvement in performance thereof. In the present paper, an attempt has been made to bring out critical findings with respect to design, process/operation and chemical treatment etc. of the ETP and major improvements achieved due to follow up on audit observations thereafter.

Paper ID : 20100258

WHETHER THERE CAN BE THE EQUILIBRIUM IN GLOBAL POWER

Nikolay P. Zapivalov

Institute of Petroleum Geology and Geophysics, Siberian Branch of the RAS, Novosibirsk, Russia

Email : ZapivalovNP@ipgg.nsc.ru

Abstract: Crude oil to nation is what blood to Human (Pt. Jawaharlal Nery) Any increase of an energy potential is a survival, independence and prosperity of each nation in the system of chaotic globalisation, but the energy Mantra of the separate nation isn't the Mantra of global cooperation. Each country solves energy problems according to natural possibilities, a level of development of economy, a science and new technologies, and also national traditions. There are countries, which use only fossil fuel (Saudi Arabia, Denmark), in other countries hydropower resources prevail (Brazil, Iceland). France and Belgium in the power balance have prevailing value of an atomic energy. So each country chooses the power strategy itself. Power multipolarity is obvious. It is clear that oil, gas and coal remain a scale and defining primary energy source in the world for a long time. The author asserts that hydrocarbonic resources on our planet are inexhaustible. It is possible to consider oil and gas as renewed power resources and they still remain a core of economy, a policy and uncompromising collisions. Simultaneously we note the accelerated development of alternative and renewed energy sources. In the different countries and regions they are various, but the requirement for them everywhere is high. Researches and works on renewed and alternative energy sources became more active in many countries of the World. Already more than 50 countries have programs of development of non-polluting renewed energy sources. Certainly, each country should develop its power market itself and it'll be the contribution to global power, but there won't be a global equilibrium and equal prosperity. Russian saying "Your own shirt is more close to your body" that means "Self comes first" remains defining in this life yet.

Paper ID : 20100259

Formation Evaluation and Characterization of CBM Reservoir Rocks from Well logs of Jharia Coalfield, India

R. Chatterjee*, **S. Paul***, **P. K. Pal**** and **V. K. Srivastava***

** Indian School of Mines, Dhanbad, India and **Exploration Division, CMPDI, Ranchi*

(Former

CGM Exploration, India

Email: rima_c_99@yahoo.com

Abstract: This paper presents the results of evaluation of reservoir properties of coal seams of five coalbed methane (CBM) wells in Jharia coalfield, India. The analysis of well log data reveals multilayered CBM reservoirs, having different porosity and permeability. Analyses of geophysical logs provide quantitative estimates of the petrophysical characteristics of the lithounits comprising the CBM reservoir. Natural gamma, electrical resistivity, density, neutron porosity and sonic travel time logs were effective in delineating individual coal bed from other coal bearing rock layers like shaly coal, shaly sand, shale and sandstones. Crossplots of these logs show distinct zones demarcating the coal cluster. The short normal (shallow) and long normal (deep) resistivity logs were compared as individual traces. For major coal horizons (>1m. thick) within the CBM reservoir, short normal resistivity value is more than the long normal resistivity values. This effect attributes to the invasion of high resistive drilling mud, flushing of the original fluid (saline water) into the formation and marks the cleated coal beds. In zones, where the separation between short normal resistivity and long normal resistivity values are negligible, the condition near to and further away from the boreholes, are similar. The relative differences between shallow and deep resistivities within CBM reservoir indicate that the reservoir has higher permeability than the surrounding rocks. Permeability of coal seams, occurring at more than 1000m depth, has been calculated from well log derived porosity estimates. Permeability values show decreasing trend with higher depth. Average permeability ranges from 0.5 to 1 md. Coal seam porosity and permeability decrease with the increase of in-situ stress. The relationships, established between log derived in-situ stress magnitude, cleat volume (porosity) and permeability with depth would provide an useful predictive tool for CBM reservoir studies and design of test well pattern for CBM exploration.

Paper ID : 20100263

ECONOMIC ESTIMATION OF DEVELOPMENT OF SEA DEPOSITS IN RUSSIA

Lyudmila A. Zapivalova

Managing company "Alfa - Capital", Novosibirsk, Russia,

Email : zla_i@ngs.ru

Abstract: The essence of an economic estimation is reduced to definition of dynamic balance of incomes and expenses by design variants of working out for all term of development of reserves. Designing of working out of a sea deposit demands difficult technical and economic calculations on optimisation of variants of working out, schemes of arrangement and production transport. - Expected volumes of an oil production on shelves of the Russian Federation will make by 2010 - to 10 million tons, by 2020 - to 95 million tons; gas production volume by 2010 - to 30 billion m³, by 2020 - not less than 150 billion m³; - Expected expenses for realisation of these projects for the period since 2010 till 2020 will make nearby 20 billion dollars; - The expected volume of the involved investments into development of sea ship-building complexes, will makes about 50 billion dollars; The hydrocarbonic potential of a continental shelf of Russia as a whole is capable to provide high levels of extraction which under favorable conditions could make to 20% of all prospective volume of an oil recovery and to 45% of all volume of a gas production in the country. Certainly, resource base of a continental shelf will extend. Huge expenses for a construction of surface platforms and approach ways are required. There is possible only one variant - to leave under ice, i.e. all constructions, including chisel both trade platforms, and all infrastructure with inhabited modules, should be under ice or mainly at the bottom. Working capacity and life-support maintenance should be accompanied by submarine fleet. Scientific, technological and innovative break is necessary for this purpose. If there are no such things, the big oil and the huge gas of the Arctic seas of Russia will remain dream and non-realised strategy.

Paper ID : 20100265

Wet - H₂S Corrosion Mechanism and Control Strategies in Refining Industry

B. S. Negi

*Chief Inspection Manager, Indian Oil Corporation Limited, Refineries Division,
Maintenance &
Inspection Dept., Indian Oil Bhawan, A-1, Udyog Marg, Sector-1, NOIDA – Uttar Pradesh,
INDIA*

Email : bnegi@iocl.co.in

Abstract: Carbon steels are the predominant materials for equipment and piping in the refining industry. Refinery operation involves exposure to aqueous environments containing hydrogen sulphide. This wet- H₂S environment is mild corrosive to carbon steels. However, hydrogen liberated during corrosion reaction, in presence of sulphide scale, penetrates into steels and causes hydrogen blistering and cracking. As a result, the mechanical properties of the steel are deteriorated and reliability and integrity of equipment is reduced. Hydrogen blistering, hydrogen induced cracking (HIC), stress oriented hydrogen induced cracking (SOHIC) and sulphide stress corrosion cracking (SSC) are common to refinery equipment that contains greater than 50 ppm H₂S in water, between ambient temperatures and 150°C. The welded pressure containing components are more susceptible to wet-H₂S corrosion. The extent and types of damages depend upon H₂S concentration, pH, contaminants, temperature, steel quality, fabrication practice and corrosion control practices. The damages are surface and sub surface oriented. Visual inspection, wet fluorescent magnetic particle testing and ultrasonic flaw detection are the common non destructive testing (NDT) methods for detection and evaluation of damages. The correct evaluation of these damages and using suitable repair procedures, integrity of equipment can be restored. This paper focuses on the wet-H₂S corrosion mechanism, repair procedures and control strategies to be followed for enhancing the reliability and integrity of equipment.

Paper ID : 20100267

OFFSHORE OIL AND ECOLOGY

Elena V. Zapivalova, *Novosibirsk State University of Economy and Management, Novosibirsk, Russia,*
Email: zelena@mail.cis.ru

Abstract: The variety of opinions, how the sea oil and gas complex is dangerous from the point of view of wildlife management and biological resources of the sea, amazes. All opinions concerning ecological safety or danger of an oil recovery and gas on a sea shelf can be reduced finally to three basic positions which remind traffic light signals. Alarmists consider that this original disaster for wildlife and resources of the sea which are already seriously undermined by man, and urge to stop oil expansion on a sea shelf - (red light). As arguments more often are used reminders on the catastrophic floods of the oil causing in memory of a picture of beaches covered with oil, perishing sea birds and animals and other disturbing associations which remain in public consciousness for a long time. Optimists, on the contrary, believe that no ecological risk in this case is present. If there is any damage to the nature, than it's blocked by those economic gains, which shelf oil gives to us (green light). Finally, last (usually numerous) group finds it difficult to give a definite answer and prefers to occupy neutrally-waiting attitude - (yellow light). Polarisation of opinions is characteristic also for the corridors of power and officials when they are obliged to make decisions concerning this or that project of development of sea oil and gas deposits. Let remind that in a narrow strip of a land adjoining to the sea, width to 50 km, now lives more than half of population of the Earth and about 50 % of a total national product of many countries are made. Perhaps, the most correct way - the organisation of the thought over and effective ecological monitoring on each oil object.

Paper ID : 20100271

Energy Of Deep Layers Of The Earth. Whether It Is Necessare To Drill Super Deep Wells?

Andrey N. Zapivalov

The Research-and-production enterprise of the geophysical equipment, Joint-Stock Company

NPP GA "Looch", Novosibirsk, Russia.

Email: ZapivalovNP@ipgg.nsc.ru

Abstract: Practically in any point of our planet it's possible to use heat of the Earth. Abyssal study of geothermic conditions and hydrothermal resources in particular can become the important component of power balance of many countries of the World. Resources of geothermal energy are divided on hydrothermal and petrothermal. The first are presented by heat-carriers - underground waters, steam, steam-and-water mixes. The second represent thermal energy reserved in heated up rocks. By the most modest estimations forecast reserves of thermal waters with temperature 40-250°C in bowels of Russia (to 3 km) make 21-22 million m³/day that's equivalent to 200-280 million tons of standard fuel in a year. Forecast reserves of a steam-air mix with temperature 150-250°C on Kamchatka and Kuriles make 500 thousand m³/day. Petrothermal energy makes 99% from the general resources of underground heat. The general resource of thermal energy reserved in 10-kilometer layer of the Earth is equivalent to thermal potential of burning of 34,1*10⁹ billion tons of standard fuel that in some thousand times more thermo-produce abilities of all known reserves of fuel on the Earth. Certainly, on a way of using petrothermal energy of the Earth there are many problems which can be overcome by an investment of considerable money and efforts in development of technology of extraction of intraterrestrial heat, actually in development of a new power direction. For realisation of this direction it's necessary to get into depths of the Earth as it becomes in an outer space exploration. Drilling of super deep wells to 10-20 km should become the first stage. Probably, then there'll be also underground "ships". The mankind should make it by the developed countries. It also will be Global Energy Equilibrium!

Paper ID : 20100275

Enhancing Reliability of Centrifugal Pumps in Refinery Service: A Case for Proactive Engineering

Dr. Barun Chakrabarti, Rajeev R. Singhai, S. V. Herwadkar
Larsen & Toubro Limited, R&D – E&C Division, Mumbai (India)
Email : bc@LNTENC.com

Abstract: Centrifugal pumps are critical assets which significantly impact the operating performance of Refineries and Process Plants. In-service problems such as high vibration / noise often adversely affect the operating performance of such pumps, even though compliance with Codes such as API-610 is attempted during design and testing. Machine-structure interaction problems involving the pump, its foundation and piping system are responsible for most cases of pump vibration and failures. Based on field experience, this paper proposes a proactive strategy from system design approach that can "design out" such problems in the engineering stage. The major design and analysis tools proposed here involve 3D Modeling and Finite Element Analysis (FEA) of the pump / foundation system, modal analysis to predict the system natural frequencies and modal testing to validate the predicted results. This is further supported by detailed vibration signature analysis during Shop Acceptance Test (SAT). All these analytical and testing tools can easily be adopted as part of overall engineering and testing methodology for mission-critical pumps. The paper presents several case studies involving vibration problems in large centrifugal pumps in Refineries. The site investigations performed, diagnosis made and remedial actions taken are highlighted. In most cases the root cause could have been detected and rectified during or prior to shop acceptance test, if a systematic design / analysis procedure had been adopted. This underlines the importance of performing system design checks during detail engineering. The primary contribution from this work is the development of a structured design / analysis approach that can be adopted by EPC Contractors and Vendors to eliminate potential problems in critical pumps. The tools and techniques recommended here are well-established and easily available in industry. It is hoped that the recommendations made here will enable pump designers, engineers and operators to achieve better performance and reliability.

Paper ID : 20100277

Bioleaching of spent petroleum catalyst using *Acidithiobacillus thiooxidans*

Bina Singh, Priyangu. M. Sarma, Ajoy. K. Mandal, Banwari Lal

The Energy Resources Institute, Habitat Centre, Lodhi Road New Delhi 110003 India

Email : binasingh28@gmail.com

Abstract: Bioleaching of Nickel from spent catalyst of hydro-processing catalyst was attempted in the second stage after growing the bacteria with sulfur in the first stage. The bacteria utilise elemental sulfur (S₀) for growth and produce sulfuric acid as key metabolite. When grown on elemental sulfur, Acidithiobacilli produce several intermediate sulfur species with high reducing power including thiosulfate and sulfite. The sulfite so formed can be oxidized by oxygen action catalysed by bacteria. Such bacteria can thrive on low pH and tolerate harsh conditions. The effect of time, spent catalyst concentration, amount of elemental sulfur and reaction temperature were studied in detail for two step process. Chemical leaching with sulfuric acid was compared with bacterially produced acid solution, and suitability of sulfur oxidizing Acidithiobacilli for leaching of Nickel from spent catalyst was studied. Process involved transformation of elemental sulfur particles to sulfuric acid through an oxidation process by Acidithiobacilli bacteria. The growth of bacteria was carried out using 10g/L elemental sulfur as the substrate. The initial pH of the medium decreased with increase of incubation period. The cell number attained stationary state after one week of incubation. The oxidation of colloidal sulfur particles decreased the pH of the solution (pH= 0.9-1.0) due to formation of sulfate (SO₄²⁻) ion. In the second stage, the acidic medium was utilized for the leaching process. Spent catalyst containing Nickel as NiO in 20%, CaO in 5%, and Al₂O₃ 75% was obtained from petroleum refinery. Experiments were conducted at varying reaction time, solid/liquid ratio, amount of sulfur and temperature. At 1:20 spent catalyst concentration and 1:40 solid liquid ratio elemental sulfur, 88.3% Ni was recovered after 4 hrs of stirring at 32 degree C.

Paper ID : 20100278

A NOVEL APPROACH TO USE IN-HOUSE CHEMICAL FORMULATION FOR KEEPING STICKY/VISCOUS CRUDE OIL MOBILE

Vishesh Nath, Uday Singh, Ram Kumar & J D Nath
Surface Team, ONGC Ltd, Ahmedabad Asset, Ahmedabad, India
Email: revish67@yahoo.com

Abstract: Kalol field of Ahmedabad contributes 1200-1400 M3 of crude / day. It is difficult crude due to high contents of wax, resins, asphaltenes and hard emulsion. Crude has high Pour Point which create exorbitant problems during production and transportation due to its sticky and viscous in nature. The waxy crude gets crystallized rapidly when temperature goes below 30 o C. Such crude oil is not quickly cleaned up by normal stimulation jobs or by any solvents. Similarly the crude with more asphaltene contents has ability to flow even at low temperature due to low Pour Point and API but over a period of time the inner space of tubing or pipe line become narrow due to deposition of asphaltene. Considering the gravity of the problem, immediate attention was drawn by Surface Team of Ahmedabad to find out remedial measures for trouble free production and transportation for such crude and provided samples of few wells from A,B,C,D which were very good producer in the initial stages but over a period of time, the production get reduced due to high viscosity and high resistance to flow. Accordingly, a chemical formulation was designed using flow improvers and solvents so as to enable to take production from these wells. This formulation not only reduces pour point and disperse the wax and asphaltene but also improve the productivity of field and ensure flow. This papers attempts to provide a complete solution for such kind of problems as the formulation designed by us attack on the back bone of wax/Asphaltin and reduce effect of stickiness of crude and improve its flow properties for taking out smooth production and the same formulation can be used all over ONGC particularly in this sort of wells to enhance the trouble free production.

Paper ID : 20100282

WATER SHUT-OFF GEL TREATMENT FOR PRODUCING WELLS OF NARIMANM FIELD OF CAUVERY ASSET, KARAİKAL.

NAYAL.R.S, V.K.MOORTHY

Well Services, Cauvery Asset, Neravy complex, ONGC, Karaikal

Email : dr_rsnayal28@yahoo.co.in

Abstract: ABSTRACT: The objective of the present study is to analyse the effectiveness of polymer gel treatment to achieve shutting off unwanted water and improving oil recovery from producing wells in Narimanam field of Cauvery Asset. The Narimanam field of the asset is producing with high water cut. Currently it is nearly 88% in 2009. Excessive water production in natural water derive producing wells in Narimanam field is understood to have been due to upward movement of OWC . The Narimanam field is the best candidate for the water shut off gel treatments . For strategic gel placement the cause for the excessive water production should also be determined , for instance - 1. Is it water coning through matrix rock or are there conductive fractures present that extend from well bore to an underlying aquifer. 2. Is it water channelling through high permeable matrix or through fractures from a water injection well in a water flood. This paper deliberates on experiences gained from polymer gel treatment of wells for controlling unwanted water . The wells treated with gel are 1. NRM#47 , 2 . NRM#29, 3 . NRM#09 The success of gel treatment depends very much on the right selection of type of gel formulation for specific reservoir type that may reduce unwanted water production by 90%. The polymer gel applied to well NRM #47 has reduced water production by 67%, which may be considered as the most suitable formulation for controlling water production from wells . **CONCLUSION:** 1. The strategic WSO treatment of wells in NARIMANAM field may enhance oil production appreciably from the present high W/C wells. 2. This success achieved with gel treatment of producers well will increase oil production with reduction in effluent water production .

Paper ID : 20100283

“Causes of Tubing Failure in Oil Well-A Case Study”

Sangeeta Rani Prasad, Viju Cherian and M.V.Katarki

Materials & Corrosion Section, Institute of Engineering & Ocean Technology, Oil & Natural Gas

Corporation Limited, Panvel, Navi Mumbai, 410221, (India)

Email: SangeetaPd15@gmail.com

Abstract: The tubing pulled out of the well during work over was found to be severely corroded in the Indian offshore. The tubing failure was observed after an operating life of 8 years of its commissioning. Detailed failure analysis/extensive laboratory investigations of these tubings were carried out to identify failure mechanism and to suggest remedial measures to prevent such failures in future. The visual inspection revealed severe internal corrosion leading to the formation of numerous pits and large holes. In-order to identify the corrosion mechanism that led to the failure, detailed laboratory investigations and analytical studies were carried out. Studies like visual inspection, metallurgical analysis, hardness testing, compositional analysis, corrosion product analysis, gravimetric corrosion studies under simulated conditions and Corrosion rate evaluation by expert system have been carried out. The corrosion product analysis showed them to be Iron oxide, with presence of carbonates and some sulfides. The tubing material was found to be as per the specifications with respect to chemical composition and hardness. Corrosion rate evaluation for the tubing material was carried out by gravimetric studies under simulated conditions and found to be considered high, which shows that the well condition is highly corrosive. Based on these observations of corrosion mechanism, this very high corrosion rate under existing operating conditions established that the use of carbon steel without any mitigative mechanism is not an economically viable option. The studies carried out on flow velocity revealed that at the present flow conditions the minimum cross sectional area required to prevent erosion is not available, this leads to cause erosion corrosion. The chief mechanism governing the failure of tubing was found to be CO₂ corrosion, which was further aggravated by the existing flow conditions. The parametric studies carried out by using the software NORSOK M 506 showed that the upper half of the well length has the most corrosive environment. In view of this it is recommended that carbon steel tubing should be used along with continuous treatment of imidazoline type corrosion inhibitor compatible for use at high temperatures. The inhibitor injectors in the well may be achieved by transporting it along with the lift gas through the annulus and the gas lift valves into the tubing to mitigate the corrosion of the tubing. Alternatively the tubing material may be upgraded to 13 Cr metallurgy to achieve enhanced operating life. It is advisable that corrosion damage assessment of the tubings should be carried out by ultrasonic wall thickness measurement technique/by magnetic flux leakage technique.

Paper ID : 20100284

Management of In-Situ Combustion Project in Santhal Field of Mehsana Asset

A C Bhandari, Amit Chauhan & S K Khadia

ONGC Mehsana Asset, India

Email : ajit2809@gmail.com

Abstract: Santhal field, having 53 MMt of Initial Oil in Place is one of the heavy oil fields of Mehsana Asset. This field, along with Balol and Lanwa fields, is part of a single structure spread over along south to north and west-east dipping monocline structure, abutting at Mehsana Horst in the west and supported with active edge-water from east direction. Heavy nature of crude with strong aquifer support causes severe water fingering resulting into low primary oil recovery of 17%. Detailed laboratory investigations and encouraging results of pilot ISC in the Balol field, led to commercialisation of the ISC process in Santhal field also. The envisaged EOR recovery through ISC process is around 36% over primary and till date 21 % of oil in place has already been produced from this field. ONGC is successfully handling the largest in-situ combustion project. Energy efficiency of ISC process in Santhal is much better with Air Oil Ratio of 800 m³/m³, compared to world average economic limit of 3000 m³/m³. More than one decade journey of commercial in-situ combustion process has been quite encouraging with number of operational challenges like high temperature and high pressures in producers, handling of hazardous gases (H₂S, CO, CO₂), corrosion in tubular of injectors, complications related to drilling and work-over operations etc. Change in fluid dynamics in reservoirs with progress of ISC process has necessitated not only reengineering of the project with change in air injection strategy from pattern to line drive in Santhal but also review of the geological setting with use of 3D seismic information. This paper deliberates chronologically various surface and subsurface related challenges and mid-course corrections undertaken from time to time over a period of decade to produce the field optimally.

Paper ID: 20100286

Successful fishing operations of Production Logging Tool with innovative modified tool have saved costly work over operations and enhanced production – a case study.

N. K. Nigam , V.N. Singh, R.S. Tirkey and A.K. Srivastava
Well Services, ONGC, Mumbai, India
E- mail: nknigam2004@yahoo.co.uk

Abstract: Production logging is done in wells for conclusive identification of Oil, Water and Gas entry points. Production logs are most commonly run either on e-line or slick line to diagnose down hole problems when surface flow rate anomalies occurs. In well no. SY #1, during PLT operation while pulling out dummy from the well the tool string got stuck-up. Several attempts were made to release the tool string but string could not be released and finally tool string got sheared leaving Rope socket along with tool and wire inside the well. Total fish length was 29.27 ft (8.92 mtrs). Fishing operation was challenging in order to fish out PLT tool as well as to restore well production as early as possible. First fishing operation was carried out with conventional tool like overshot etc, but could not get success. Innovative modification of 1.5" JDS tool was carried out to accommodate the rope socket with 1" braded wire. Core of the pulley tool was machined to reduce the core length and new thread were made in workshop to catch the fishing neck. The tool was tested at surface prior to run in the well. This modified tool was used at well no. SY#1 to execute fishing operation. The operation was quite successful and could recover the entire fish in the record time period of one and half days only and restored the production fast. This paper described in details about the methodology used in fishing out complete PLT dummy from the well and resumed production from the well and also have saved the very costly Work over operations in a very short period without any barrier.

Paper ID : 20100287

**CORROSION AND ITS CONTROL IN WATER INJECTION
SYSTEM: A
CASE STUDY FROM NAWAGAM AND KALOL FIELDS OF
WESTERN ONSHORE BASIN, INDIA**

Y.K. Mathur, B.K. Sharma and B.K. Shukla

**Dr B.R. Ambedkar Regional Geoscience Laboratories, Western Onshore Basin, ONGC,
Baroda-**

390 009, INDIA

Email : yogesh_k_mathur@yahoo.co.in

Abstract: The continuous liquid production from aging oil fields lead to significant depletion of reservoir energy requiring application of pressure maintenance schemes to augment the depleted energy for enhance oil recovery. Nawagam and Kalol oil fields of Ahmedabad Asset are such depleted reservoirs where subsurface injections of produced effluent along with surface water have been implemented for pressure maintenance. The major problems being faced in these fields are frequent reduction of injectivity and damages to subsurface tubulars of injection wells. The various problems have been studied by collecting and analyzing the data related to different injection wells. The injection water quality is also seen in terms of its impact upon the metallic systems handling it. The corrosion behavior of the water has been studied in in-situ conditions to find out suitable treatment to control its corrosive tendency. Several forms of corrosion protection are employed in oil fields operations, ranging from electrolytic to chemical surface passivation. Chemical means are widely used for water injection schemes. The recent trend of employing an inhibitor for corrosion control is the application of chemical substance which decreases the corrosion rate when present in the system at a suitable concentration without significantly changing the concentration of any other corrosive agent. This excludes chemicals which can reduce the corrosion rate by affecting the composition of the environment like oxygen scavengers, chemicals that alter the pH and change the hardness or scale forming properties. The present work describes the injection system and discusses the formulation of an efficient chemical treatment program consisting of supplemental application of organophosphonic acid and organic corrosion inhibitor based upon the corrosion inhibition studies under static as well as dynamic conditions. Chemical deoxygenation and proper control of microbial activity using periodic slug dose of bactericide have also been envisaged in inhibition program.

Paper ID : 20100288

Auto/Natural/In-situ Gas Lift – A new Artificial lift approach for production of hydro carbons from isolated pools of B&S Asset in Western offshore, Mumbai - A case Study

Limbachiya V. S., Nigam N. K. & Srivastava A. K.

Oil and Natural Gas Corporation Limited, Well services, 11 High, Mumbai-400063 INDIA

Email : vinodlimbachiya@yahoo.com

Abstract: Majority of wells of Western Offshore fields are on artificial lift due to depletion of reservoir pressure and more than 80% wells of these wells are on Continuous Gas lift which is one of the most widely used artificial lift methods. Some wells of isolated pools of Bassein and Satellite Asset were drilled anticipating sufficient pressure to come on self flow but it was observed later that the reservoir pressure is not enough to lift the liquid to the surface and require additional energy to lift. Gas pipeline network and Gas compressor were not available, arranging these facilities takes long time and getting production from these wells without delay was a big question. After a long Brain storming, an idea evolved to make use of high pressure natural gas from the gas reservoir which was above the oil bearing zone. The well was completed on Natural/auto gas lift system with new modified completion design/technique over conventional one. This system uses gas from a gas bearing formation to lift fluid from producing zone artificially. The produced gas is bled into production tubing to reduce the produced fluid density thereby reducing hydrostatic head in the production conduit and increases the inflow from the oil zone. This paper discusses in detail about, (i) Natural /auto/In-situ gas lift phenomenon (ii) Candidate well selection criterion / Reservoir parameters like productivity indices, Reservoir pressure, Fluid compositions which justify the application of in-situ gas lift. (iii) New modified Well completion design of the well of B&S Asset of western offshore. (iv) Merits of natural gas lift completion over conventional gas lift completion.

Paper ID : 20100289

MANAGEMENT OF E&P WASTE vis-à-vis STATUTORY NORMS: A CASE STUDY FROM WESTERN ONSHORE OIL FIELDS

Naveen Raj, K.M. Ginoya and N.N. Ray
SECTORAL HSE, ONGC, Baroda, India
Email : drnaveenraj@gmail.com

Abstract: The progressively increasing level of government and public environmental awareness lead to environmental management as a key component in the overall management of hydrocarbon exploration, development, and production, which in upstream petroleum industry are invariably associated with the adverse impact upon the environment. The greatest impact arises from the release of wastes into the environment including hydrocarbons, water contaminated with oil, solids contaminated with hydrocarbons and a wide variety of chemicals. The largest volume waste stream in the upstream petroleum industry is produced water followed by solid wastes generated. For matured oilfields, the volume of produced water can be several times greater than the volume of produced oil. Addressing these environmental problems is often cost intensive and requires development of simple, newer and cost effective treatment technologies therefore, most of the oilfields have setup their own effluent treatment plants and evolved effluent recycling processes in areas of their operations. The oil fields in Western Onshore Basin produce around 35,000 m³/day of associated water with an average water cut of 50-75% in most of the fields. Implementation of improved EOR techniques involving polymer, surfactants, various gases and thermal recovery schemes adversely affects the interfacial properties of the produced waste waters resulting in stable reverse emulsions on surface. The incorporation of emerging technology at design stage of forthcoming surface treatment plants and optimization of the processes & selection of better chemical formulations for existing Effluent Treatment Plants provide the best options for meeting ECT requirements for environment protection. This paper discusses the environmental status of oil field operations in Western onshore oil fields, environmental practices around its operational bases, environmental management systems in place & compliance levels achieved and elaborates technological improvements implemented based upon the periodical monitoring carried out in fields to ensure safe disposal of E&P wastes.

Paper ID : 20100293

Improving Economies And Design Will Further Boost *para*-Xylene Profitability

Robert A. Lentz, UOP LLC, Des Plaines, IL USA

Email : bob.lentz@uop.com

Abstract: While petrochemical markets swung erratically in the latter half of 2008 and continued to do so for much of 2009, para-xylene remained profitable for the majority of producers throughout that volatile period. This is a strong testament to both the robust cost position and flexibility of today's integrated, Parex-based, aromatics complex to readily match operations and production to meet changing market needs. Appreciating that UOP's continued success as the leader in high purity para-xylene production technology requires on-going innovation, cross functional design/development teams were formed at UOP during the recent economic downturn to investigate how even further strides could be made toward both reducing the capital investment per metric ton of p-X for both grassroots and expansion capacity while further dropping the energy component of the variable cost of production. These efforts have already produced substantive new developments which will prove to sustain and extend the superior economics of producing para-xylene by means of the UOP Parex based aromatics complex. This presentation will discuss the added benefits that these design features continue to contribute to the ever improving competitiveness of the UOP aromatics complex and how to take best advantage of today's CCR Platforming™ Process, Sulfolane™ Process, Parex™ Process, Isomar™ Process and Tatoray™ Process units.

Paper ID : 20100298

EVALUATION AND IDENTIFICATION OF WATER SEALANT PRODUCTS AS GAS BLOCK ADDITIVES FOR HPHT WELLS

Ravi Rastogi, K.M.Suyan, Vinod Sharma and S. Dutta,
ONGC, Dehradun-India
Email : rastogi_ravi@ongc.co.in

Abstract: Drilling through gas formations poses unique risks such as annular gas flow after cementing. Annular flow related to cementing has been credited mostly cause of poor cement bond resulted annular casing pressure in outer casing strings. When zonal isolation of gas wells is not achieved, gas can migrate behind the casing, thus charging shallow formations. These shallow gas formations become a costly problem when they are drilled into unexpectedly. They can also become a formidable challenge when the fracture gradient and pore pressure become nearly equal. In these situations, gas can broach the casing and cause a blowout. Clearly, well plug-and-abandonment is complicated when casing annulus squeeze cementing becomes necessary to eliminate gas migration. To address this problem effort has been made to identify and evaluate the indigenously available latex based water sealant products, used in large scale in concrete industry as gas tight sealant/gas block additives, applicable to oil well cementation of HPHT wells. Comparison of conventional and non-conventional gas tight additives were evaluated for specific gravity (1.90 and 2.30) cement slurries for high bottom hole temperature (BHST 120 and 1650C) and pressure conditions. The laboratory study revealed that 3-5% gas block additives does not provide the gas tight cement slurry with conventional and non-conventional latex based gas block additives(Tapecrete, Super Latex, Raintite), even keeping the API fluid loss below 50 ml/30 min. Increase in gas block additives to 6-10% in cement slurry enhanced the capability of slurry to control gas migration. This study revealed that indigenous non conventional gas block additives gave similar results as obtained with conventional gas block additives, are cost effective and can be field trial. This paper also elaborates the use of three component process to eliminate the gas migration.

Paper ID : 20100299

Mobile Asset Management –An Effective Solution for Onsite Data Recording

S.K.Bhatia, S R Rao and C M Tripathi

Oil and Natural Gas Corporation Limited, Project ICE, 13th floor, Core 4, Scope Minar, Laxminagar, Delhi -110092, India

Email : Bhatia_sanjeev@ongc.co.in

Abstract: The huge number of installations/establishments of ONGC located in vast geographical spread necessitates deployment of tools and techniques for efficient data recording in respect of its valuable assets and equipments onsite. Activation of Mobile Asset Management (MAM) feature of Plant Maintenance module of SAP system is a proactive initiative to fulfill this long felt requirement. Presently, the implementation scope of MAM includes Inspection of Fire Extinguishers and calibration of Custody Transfer Meters. This will facilitate onsite recording of information in hand held device in online or offline mode, offline being the most widely used. Mobile Asset Management solution will replace the legacy system of manual recording of inspection/refilling details of Fire Extinguishers. Based on inspection schedule, an order gets generated in SAP system and when synchronized, it gets reflected in Mobile device. On swapping of the barcode tag, the fire extinguisher gets recognized by the Mobile device and thereafter the inspection findings against the respective order are recorded in mobile device. Subsequently, the device is again synchronized to transfer the data into SAP system. In case of Custody Transfer Meters, the calibration data recording has already been facilitated through user friendly customized screens in SAP but it is only in offline mode as the meters are installed in remote locations. This requires manual recording and subsequent entry of information into the SAP system. The MAM solution facilitates onsite recording of calibration data along with signature of involved parties in the mobile device which is subsequently transferred to SAP backend as in case of fire extinguishers. The MAM solution will facilitate onsite recording of data and provide analytical reports through already in place SAP system. MAM therefore has great potential in enabling reliable and efficient service and has got immense application in Oil and Gas sector.

Paper ID : 20100301

Integration of process technologies for enhanced production of bio-hydrogen: Concepts and Application

Dr Priyangshu, M Sarma,
The Energy and Resources Institute
Email : priyanms@teri.res.in

Abstract: The humanity will be soon facing a challenging drop in access to oil resources as well as a need to set up the future economy on renewable and environmentally friendly resources. Hydrogen can be considered as a fascinating alternative particularly because its combustion provides high amounts of energy with water as the by-product, can be integrated to conventional and microbial fuel cells. Further if integrated with a microbial electrolysis cell, treatment of wastes can also be achieved with process integration to form a close loop with low carbon emissions. There is a worldwide collaborative effort to where attention is drawn towards microbial interventions that could lead to clean and renewable sources of hydrogen. Biological systems provide a wide range of approaches to generate hydrogen. However each processes comes with its own limitations. Considering the advantages of dark fermentation, TERI initiated research in this area using waste as substrate but as it is not a thermodynamically viable it causes lower hydrogen yields. There were considerable advancements in Microbial Fuel cell along with the concept of 'Electrohydrogenesis'. This process enhances hydrogen production efficiency with introducing an external voltage and opened avenues to couple with waste water treatment. However inherent issues like high electrode costs involved in this process. The possible solution for this problem would be low cost electrode of microbial origin or microbial cathodes. The group is working on understanding microbial induced corrosion in oil and gas pipelines these anaerobic microbes cause electron transfer or cathodic depolarization. This physiological process of the selected microbes can be exploited to replace platinum cathodes in MFC or MECs. Thus a polyphasic approach can help in mitigating the current issues to hydrogen and renewable energy problem and it will be a combination of processes that would give economical hydrogen as an energy source

Paper ID : 20100303

Expanding the frequency spectrum of CSEM in shallow & ultradeepwater areas – Insights from 1-D Modeling

Souvik Sengupta

Indian School of Mines, Dhanbad, India

Email : geoscience.souvik@gmail.com

Abstract: In marine CSEM (controlled source electromagnetic) exploration and SBL (SeaBed Logging), the seabed subsurface is investigated by emitting low-frequency signals from a horizontal electrical dipole source close to the seabed. The resulting electromagnetic (EM) field is recorded by receivers that usually sit on the seafloor. The main goal is to describe possible thin resistive layers within the conductive surroundings beneath the seabed. In the present scenario the applicability and resolution power of multi-frequency Controlled-Source Electromagnetic (CSEM) data in shallow and ultra-deep water environments are studied on typical CSEM benchmark models. Here for modeling the LÄ, seth and Ursin, (2007) code has been followed. The paper basically shows different 1-D modeling examples in varied geological setup using, multi-frequency ($f \sim 0.001$ Hz to 10 HZ) CSEM. It also aid information that how variegated frequency can be used to increase the resolution of the subsurface resistivity models and in essence to remove the airwave effect (masking of reservoir) in shallow water. From the modeling it is evident that in shallow water, the anomalous reservoir response is weak at high frequencies, but it is stronger at near-DC frequencies (e.g., <0.05 Hz), at which the airwave effect is weak. In ultra-deep water , the anomalous response is stronger at higher frequencies. However, the signal attenuates at higher frequencies, and its level at longer offsets becomes closer to the noise floor, which makes these data difficult to interpret/invert.

Paper ID : 20100304

Air with enriched Oxygen in oil well, potential hazards to explosion- A case study.

Deka. B.K. , Srivastava A. K.

Oil and Natural Gas Corporation Limited, Mumbai-400017 INDIA

Email : dekabiren@yahoo.co.in

Abstract: An explosion is a rapid transformation of potential, physical or chemical energy into mechanical energy and involves expansion of gases. Chemical explosions are due to reaction between species within their flammable limits and are more violent at or near Stoichiometric levels. A methane/Oxygen is Stoichiometric when the molecular ratios are $CH_4+O_2=CO_2+2H_2O$. A very fine mist from H-C liquid may act as a pure gaseous substance. These aerosols may become an explosive mixture at temperature that is far below the liquids flash point. Normally liquid does not ignite except few reactive or unstable substances. The vapor, liberated from the surface of the liquid ignites. Liquid gives off vapors at a rate which is proportional to temperature and the rate of vapors defines the volatility of liquid. In oil well lighter fraction of H-C Methane is liberated and if mixed with air enriched Oxygen (>21%), within flammable limits becomes explosion hazards. Explosion caused pressure build-up within closed system or oil well may results severe damage. This has been clearly witnessed at one of the well (Wasna#38) of Ahmedabad Asset where air compressor was applied intermittently and annulus kept closed. This has been confirmed from the extent of damage when rig was deployed for work over operation. This paper explains in detail the technical aspects associated with potential hazards in oil well having air with enriched oxygen, the paper also covers the precaution , procedure and safety aspects.

Paper ID : 20100308

Occupational Health Management on SAP- A Proactive Initiative

Dr Surinder Kumar, R R Dash, C M Tripathi

Oil and Natural Gas Corporation Limited, Project ICE, 13th floor, Core 4, Scope Minar, Laxmi

Nagar, Delhi -110092, India

Email : kumar_surinder@ongc.co.in

Abstract: ONGC is an organization that is utmost concerned about Good health and safe working environment for its work force. In addition to impetus on age based Periodical Medical Examination (PME), ONGC has taken lead and is first organization amongst the Public Sector undertakings in India to implement Occupational Health (OH) component of SAP to ensure hazard based PME also, in order to achieve the objective of high Occupational Health & Safety performance. The paper describes how SAP platform will help ONGC to manage occupational health in the most efficient way through integration with Industrial Hygiene & Safety (IHS) & Human Resources (HR) modules by maintaining online physical and laboratory tests, examinations, age as well as hazards based protocols and their frequencies, monitoring examination schedules and centralized repository of all medical service data. The personal details, personal and family history, chronic disorders, accident/incident, examination/investigation data shall also be populated in the customized PME report to keep track of the complete medical history of the employees. The proposal list for the health surveillance protocols shall be generated automatically on the basis of age profile and through comparison of predefined trigger levels for the health surveillance protocols with ratings of the employee's personal exposure. The employees will undergo PME on the basis of assigned protocols and the test results shall be recorded and reports, scanned documents, X-Rays etc. would be attached in the medical service. The online centralized employee health data will facilitate critical analysis and evaluation of the health patterns of work force and also suitable remedial measures to enable full scale health management for the benefits of individual employees as well as efficient running of the enterprise, particularly in Oil and Gas sector operating in hazardous environment.

Paper ID : 20100312

Mathematical Modeling and Parametric Evaluation of Fixed Bed Gasifier

Supreet Talikoti, Parag Panwala, PV Balaramakrishna

R&D – E&C Division, Larsen & Toubro Limited, Mumbai-400 072, India

Email : pv_balaramakrishna@Intenc.com

Abstract: India has the third largest coal reserves in the world (approximately 90 billion ton), which supplies about 50% of the nation's energy demands and is responsible for about 70% of the electricity generated in India. Coal gasification is one of the clean coal technologies that can be used to address the environmental concern while meeting the future energy requirements of India. India has large deposits of coals with high ash and moisture content and fixed bed gasifier may prove to be of significant advantage compared to other types of gasifier as it has successfully gasified coals of similar type. This paper is an effort to understand the processes and conditions in the fixed bed gasifier through modeling and simulation. A two zone, steady-state fixed bed gasifier model is developed where drying and devolatilization is clubbed into one zone, then gasification and combustion as the other. This model is capable of calculating temperature and composition profiles of both gas and solid along the length of the gasifier. A Functional Group - Semi Empirical Tar Model is considered for describing the devolatilization process. A detailed set of equations with a two point split boundary conditions were formulated and algorithm was developed to solve these equations using MATLAB. Parametric analysis was done by varying the coal to steam ratio, coal to oxidant ratio, feed gas temperature etc and its effect on the exit gas composition was studied. The combustion zone was distinguished from the gasification zone from the plots obtained. It can be concluded from these studies that devolatilization and the tar formation are very critical in predicting the syngas composition. H₂ to CO ratio can be varied according to the requirement by adjusting the operating parameters. The model can predict the location and the value of the peak temperature.

Paper ID : 20100313

Design Optimization & Application of Cofferdam for Jack-Up Rig Refurbishment

Shrivardhaan Jois#, R. V. Kulkarni, Anand S

R&D – E&C Division, Larsen & Toubro Limited, Mumbai - 400072, India

Email: SHRIVARDHAAN_JOIS@LNTENC.Com

Abstract: Drilling Rig availability is a major bottleneck for Oil & Gas exploration. Hurricanes in GOM have damaged many Jack-Up rigs. Jack-Up rig refurbishment is generally carried out on Land or in Dry Docks. However due to lack of availability of facilities & resources refurbishment in afloat mode was necessitated, leading to use of unconventional methods like cofferdam for refurbishment. This method was adopted for FD-VII Jack-Up rig refurbishment. Cofferdams provide dry environment / work area for submerged hull portions. Generic concept was developed so that the cofferdam can be used for different models of Jack-Up rig. The final size of cofferdam was 18m dia. This comes under large size cofferdam. The detail design engineering of cofferdam from the vendor indicated the weight to be 127MT compared to the estimated 75MT. Hence in-house optimization exercise was undertaken using Finite Element Method which helped in reducing the weight to 105MT. The sizes of the plate girder stiffeners were not fabrication friendly & would have led to extensive material wastage & more welding effort. Hence further optimization exercise was carried out which saved substantial material & fabrication effort. Sealed & Adjustable buoyancy tanks of the cofferdam were checked from operability point of view. Cofferdam attachment to the Rig generates huge amount of buoyancy forces (700MT). This needs to be balanced by ballasting the appropriate tanks in the hull. Some of the tanks in damaged condition imposed unavoidable constraints. Real time support for the hydrostatic stability of the rig was provided to the yard which helped in successful application of cofferdam for refurbishment of Jack-Up Rig. This paper discusses the above aspects.

Paper ID : 20100319

Challenges and Opportunities for Development of Marginal Fields through Cluster system: A case study from Western Offshore Basin, India

A K Maji, B Mudiar & Narayana Swamy
ONGC, Mumbai, India
Email : akmaji@gmail.com

Abstract: Development of marginal fields in recent time is gaining popularity in view of higher crude oil prices and declining production from existing mature fields. The discoveries of large fields in mature basins world over are increasingly rare with time. Crude oil production in India is mainly contributed by Western Offshore Basin fields and is undergoing steady decline. To support and sustain the production, smaller fields which have been discovered and left undeveloped for economical reasons during discovery are being taken up for development utilizing existing nearby facilities. With improved infrastructure and innovation in technologies like Sub-sea completion, minimum facility well platform, availability of Floating Production Storage & Offloading, Mobile Offshore Production Unit, multi phase pumps, host of other new ideas available and utilization of various lift technologies will make these smaller discoveries economically viable. A cluster of five marginal fields (BHE, B-59, B-127, B-157 and B-15) located east of Mumbai High field is the case study for adoption of innovative technologies for development vis-à-vis early monetization. BHE field was discovered in the year 1976 and other fields in early nineties, lying in the bathymetry range of 40-60m. Hydrocarbon accumulations are proved in multilayered reservoirs within Bassein and Panna formations. These are generally thin, heterogeneous carbonates, clastics and silty sandstone having in-place volume of the order of 20-40 MM bbl. O+OEG. Inter distances of the fields are in the range of 10-30 km. Development of these fields are uneconomical on standalone basis, however, they may become economical if developed through cluster system with innovative technologies under the prevailing geological set up. This paper presents the technical and business challenges that are critical for profitable development of these smaller prospects. Innovative alternatives are discussed from both technological and commercial standpoints that can benefit the economical development of marginal fields in cluster system.

Paper ID : 20100320

Social Risk Management Through CSR Initiatives at Uran Plant, ONGC, Uran

S. C. Pandey, Chetan Singla, U. S. Deshmukh
Oil and Natural Gas Corporation Limited, Mumbai, India
Email : drsarvesh_58@yahoo.co.in

Abstract: This paper attempts to describe the genesis of Social risks and management approaches to address them optimally. The study is focused to examine social risks with the help of Social Risk Component Model incorporating Issues, Stakeholders, Perception and Means. Globalized world sets forth new expectations and opportunities for organizational growth and sustainability. Interconnectedness and interdependence of organizations in terms of linkages such as trading relationships, supply chains, international financial flows, migration, and information communications have given rise to challenges in risk management emanating from social and environmental issues. The paper highlights the probable Social risks including human rights, reputation, security, land, scarcity of water, environment, public health, indigenous rights to community and underrepresented groups, working conditions, and supply chain management. Contributing factors in emergence of social risks are due to rise of civil society, and influence of transnational corporations, human rights group, and nongovernmental organizations on business organizations. These broad suite of social and environmental issues along with risks attributed by traditional inhabitants of business ecosystem need to be part of business strategy in order to anticipate, design a course, and navigate successfully through changes and challenges in emerging global operating environment. CSR-A crucial tool for managing Social Risks: Uran Plant renders due care to Social and Environmental issues through Corporate Social Responsibility(CSR) Initiatives encompassing education promotion, health care, entrepreneur development, community development, formation of Self Help Groups, participation of contractors in risk perception, stake holder engagement, supply chain management for creation of shared value, sound environmental management system and vigilant security system. Uran plant pays due attention to social and environmental risks by maintaining connectivity with stakeholders, information sharing befitting to Social License to operate (SLO).

Paper ID : 20100337

POLYMER / GLASS BEADS – A NEW CONCEPT TO REDUCE STICKING SEVERITY IN DRILLING AND CASING LOWERING

Dr. V K Singh, A K Barthwal & . Vinod Sharma

IDT, ONGC, Dehradun, India.

Email : kumarsinghvipin@yahoo.co.in

Abstract: Manifestation of friction between drill string and formation is as old as drilling itself. With a properly stabilized assembly in a good straight hole the effect on indicated hanging weight of drill string due to down hole friction is usually small. Any abnormal increase or decrease in indicated string weight can reasonably be attributed to poor hole conditions such as doglegs, formation of ledges, under gauge hole due to badly worn bit and excessive wall cake from poor mud. With increase in dogleg severity significant friction effect become part of general operating conditions. Situations generally leading to excessive friction and pipe sticking are key seats, differential pressure sticking and improper hole cleaning leading to pack off. In addition to these foreign objects in the hole and unconsolidated formations can also cause sticking problems. Stuck ups in drilling operations are taking toll of time and cost both. Various materials used so far for minimizing friction and for that matter reducing sticking severity include crude oil, diesel non edible vegetable oils, graphite, Sulfonated asphalt and extreme pressure lubricants. Once string got stuck it is to be released after placing spotting fluids and working on string taking a non productive long time. An interesting recent development consisting of small round glass/ polymer beads have been found useful in reducing excessive over pull, torque, drag and minimizing chances of pipe sticking. Use of these round incompressible beads apparently provide a load bearing surface that helps support the pipe and lower the friction coefficient between pipe and hole wall allowing it to rotate or slide more freely. IDT has tested number of grades of such beads and those found experimentally useful in reducing sticking severity are recommended for field use. Tentative specifications of two mesh sizes have been formulated by IDT.

Paper ID : 20100343

Preparation and characterization of zirconia catalysts for the removal of sulfur compounds in distillate fuels.

Kumar Sachin¹

, *Srivastava.VC2, Badoni.RP3*

1,3University of Petroleum & Energy Studies, Dehradun, India; 2Indian Institute of Technology, Roorkee, India

Email : sacin21@gmail.com

Abstract: Various desulfurization techniques like hydrodesulphurization (HDS), oxidative desulfurization (ODS), bio-desulfurization (BDS) and adsorptive desulfurization are being investigated world over to produce ultra clean fuels. The HDS process has reached a stage where increasing temperature and pressure is just not enough to remove last traces of sulfur without affecting the octane number. Additionally a new method as an alternative to hydrodesulphurization (HDS) to reduce the sulfur content in from distillate fuel is needed today to meet the future legislation on sulfur content .Desulfurization by adsorption faces the challenge of developing easily remunerable adsorbent with a high adsorption capacity. Adsorbents developed must have high selectivity for the adsorption of refractory aromatic sulfur compounds that do not get removed during the HDS process. In the adsorptive desulfurization technique, the active adsorbent is placed on a porous, non-reactive substrate that allows high surface area for the adsorption of sulfur compounds. Adsorption occurs when the sulfur molecules attach to the adsorbent and remain there separate from the fuel. Various investigators have utilized this technique for the removal of sulfur from various types of fuels and model oils by various types of adsorbents. Present work is based on selective adsorption of sulphur compounds on specific laboratory prepared adsorbents. Zirconia which was impregnated by sulphate ions of different strength and metal ion has worked well to remove one of the difficult sulphur molecule i.e., Dibenzothiophene. The materials prepared have been characterized and found highly acidic in nature. Modern, chemical and spectroscopic tools like GC,TGA/DTA, SEM, TEM, HRTEM, EDAX, FTIR, and EPMA were used to characterize the prepared samples.The prepared samples were tin a isothermal batch reactor using dibenzothiophene solutions in i-octane and we found effective adsorption(~58%) for these compounds.

Paper ID : 20100348

Successful Radioactive Scale Milling Adds New Dimension Of Coiled Tubing Operations At Mumbai Offshore – A Case Study

B K, Das Sunil, A.K Srivastava Kumar
ONGC, Well Services, Mumbai, India,
Email : birendra_kishore@yahoo.co.in

Abstract: Scale depositions in well bore, casing, flowlines are universal problem in any producing filed. The situation aggravates as water content in produced fluid increases with ageing of the filed. Mumbai High, the biggest offshore oil field in Western India is no exception. Scale removal by acid treatment is a regular feature to maintain the field production. Coiled Tubing stimulation has also been carried out when tubular is completely choked or injectivity is very less. However some wells contain the salts of some radioactive metals such as Stronsium and Barium, not soluble in any known acids. Even the application of DTPA (Diethylele Triamine Pentaacetic Acid) solution has given inadequate success. Limitation of platform crane and smaller tubular ID always restricted the deployment of higher sizes of Coiled Tubing with high torque PD Motor for mechanical method of scale removal by milling. Hard duty Ultra Slim PD Motor has been deployed successfully in Mumbai High along with Drop-in-Drum Coiled Tubing unit to overcome these logistic and completion limitations. A ceased well has been put on production after a successful milling of 276m hard radioactive scale, where all other methods failed. This has given a fillip for reviving many more wells of Mumbai offshore, without the deployment of costly Workover Rig. The paper describes the design, implementation and result of a scale milling operation at Mumbai High.

Paper ID : 20100353

Genetic Characterization Of Shallow Hydrocarbon Gases By High Resolution Carbon Isotopic Studies; A Case Study Of South Cambay Basin In India.

Ashok Raina, , R.K. H.C. Pande Saxena, Harvir Singh and R.R.Singh
Geochemistry Group, KDMIPE, ONGC, Dehradun
Email: ashokraina59@rediffmail.com

Abstract: The present work is an attempt to genetically characterize the natural gases from shallow reservoirs of Olpad sub-structure of South Cambay Basin on the basis of their molecular and stable carbon isotopic compositions. Gases from shallow reservoirs of Bhima, Ankleshvar, Sisodra and Katpur have also been studied for correlation purpose. Chemical and Stable isotopic composition analysis of natural gases from the Olpad and Bhima substructures indicates bacterial genesis ($\delta^{13}C$ -59.1 to -63.8%) while thermogenic origin is indicated for Ankleshvar, Katpur and Sisodra. Carbon isotopic composition of methane (-41.5 to -47.8%) for Ankleshwar, Sisodara and Katpur suggest a source within oil-window and migration of gas from deeper sources. The local sources (immature to early mature) may have contributed towards hydrocarbon generation in the Olpad and Bhima areas On the basis of isotopic studies, the gases of South Cambay basin can be classified into three groups- 1. Substructures like Olpad and Bhima contain gases of predominantly bacterial origin. 2. Substructures like Sisodra and Katpur contain gases those are oil associated with moderate maturity. 3. Ankleshwar gases are also oil associated but suggest somewhat higher maturity level. The source rock studies carried out in South Cambay Basin reveal that potential source rocks contributing oil/gas belong to Paleocene to Middle Eocene sequences of Olpad, Cambay shale and Hazad formations. But in this study the occurrence of shallow immature gases suggest charging from younger shale.

Paper ID : 20100355

CONTROL OF CO₂ VENTING INTO THE ATMOSPHERE

Rajiv Kumar

Oil & Natural Gas Corporation Limited, Ankleshwar 393010, Gujarat, India

Email : kumar_rajiv@ongc.co.in

Abstract: Carbon dioxide (CO₂) is a constituent of natural gas and its emission into atmosphere causes green house effect. In the last century, temperature has gone up by 0.6°C and sea level rose by 0.1 to 0.2 meters. Under Kyoto Protocol, carbon is a tradable commodity and control of its emission can earn revenue. During the sweetening process of sour natural gas, acid gas is generated which consists of about 98% CO₂. The latter which is approx. 6 lakh cubic meters per day in ONGC, after separation from hydrogen sulphide (H₂S) is vented into the atmosphere since it gets mixed with air during the regeneration process. A chemical composition has been developed which removes toxic H₂S from the acid gas and control CO₂ venting into the atmosphere. CO₂ can be utilized and thus helps in clean development of environment. Acid gas containing about 98% CO₂, 0.5 % H₂S, hydrocarbon and water vapours was passed through the solution of chemical composition. The unabsorbed gas was predominantly CO₂ and observed to contain H₂S less than the prescribed limit of 10 ppm. The chemical composition removes the toxic H₂S from acid gas and separate CO₂. Therefore both these harmful constituents are controlled and are not vented into the atmosphere. The removal of CO₂ & H₂S from the acid gas thus helps in environmental protection and clean development. Separated CO₂ can be utilized elsewhere, and carbon credits may be earned under Kyoto Protocol. -----

Paper ID: 20100358

Identification of Bypass Oil by using 3D Oil Saturation & Water Saturation Models for Enhancing Recovery Factor: A Case Study of SHP Sector of Mumbai High South

Pushpa Sharma & Chaman Lal
Reservoir Division, KDMIPE, Dehradun, India,
Email : s_1968@rediffmail.com

Abstract: Mumbai High field is the largest and most prolific oil field in India. The field has been divided into two blocks- North and South. A zone of relatively low permeability acts as a barrier between these two blocks facilitating independent exploitation of Mumbai High North (MHN) and Mumbai High South (MHS) fields. The field was put on production in 1976. Since then it has undergone several rounds of development during the last 33 years. It is a complex field in terms of reservoir heterogeneity. Main hydrocarbon bearing zone is L-III of Miocene age and 13 hydrocarbon bearing sub-zones separated by shales. MHS field is in mature stage with increase in water cut & high GOR. Uneven water movement due to reservoir heterogeneity and permeability differences between layers has left large portions of bypass or unswept oil. The objective of this study is to identify the bypass or unswept oil of SHP sector of Mumbai High field. Bypassed oil is oil left behind in a mature reservoir after years of production. In L-III reservoir potential areas of bypassed oil can be identified in the main producing area of an A2III Bottom layer. By using 3D oil saturation and water saturation models, it is possible to position a sidetrack well path from an existing well into a specified area. This application demonstrates the value of 3D models to asset teams for helping them produce the most oil they can from a reservoir. In present paper an attempt has been made to build a time animation of oil rate, gas oil ratio and water cut maps which will be very helpful to identify the unswept areas or bypass oil and parts of the reservoir which have been watered out, helps in enhancing recovery factor of SHP sector of Mumbai High South.

Paper ID : 20100361

Failure Analysis: Premature Failure of gas well tubing from Indian offshore-A case study

Bipin Kumar, Maushumi Kakoti Talukdar, and M.V Katarki
*Institute of Engineering & Ocean Technology, Oil and Natural Gas Corporation Limited,
Panvel, Navi-Mumbai – 410 221 (India)*
Email: kumar_bipin@ongc.co.in

Abstract: Premature failure of well tubing are highly unpredictable for the wells with changes in the chemistry of produced fluids over a period of time; and inadequacy of corrosion resistance of material of construction. Such failures lead to high annulus gas pressure at the well head, leakages at the well head leading to likely blow outs, casing failures and finally loss of wells and create safety and the environment hazards, and consequent penalties due to lost production. Work over job has to be carried out for such repairs and unplanned replacements of the tubing due to failure at bottom hole just above the packer which adds to the cost of offshore operations. Failure analysis involve the investigations of various observations recorded for the case well, and detailed laboratory analysis for the water chemistry, corrosion product assay and fracture surface features by SEM-EDS, assessing the susceptibility of the currently in use material towards the corrosion in simulated well conditions with high temperature high pressure Autoclave. The analysis assists in diagnosing the most probable corrosion mechanism and guide in selecting suitable remedial measures. In this technical paper, failure analysis methodology adopted for a case study of premature gas well failure within 3 years of commissioning at western offshore, have been deliberated. In the case study the mechanism was found to be attributed to high susceptibility of API 5 CT L-80 type I steel to localized corrosion in presence of carbon dioxide and hydrogen sulphide levels observed for the down hole conditions of case well. 13 Chromium steel conforming to API specifications has been found suitable MOC for the well conditions having partial pressure of CO₂ and H₂S of 122psi and 0.87psi respectively at the well bottom. Key words: Premature failure HSE issues, workover jobs, failure analysis, laboratory investigations, corrosion mechanism, identification suitable MOC

Paper ID : 20100362

Unconventional Means of Increasing Propylene Yield in Residue Operations

Paul Diddams, Evans Martin, Ray Fletcher
INTERCAT Inc. PO Box 412, Sea Girt, NJ, 08750 USA
E-mail: info@intercatinc.com

Abstract: The most recent paradigm shift occurring within the FCC industry is related to maximizing propylene yield with residue feeds. There are currently over 50 FCC units in design or construction with the majority being designed for residue feed stocks while targeting maximum propylene yield. Additionally, dozens of existing residue crackers are being operated for maximum propylene yield. The primary challenge faced by these operators is achieving an acceptable balance between maximum zeolite stability for minimum catalyst additions and minimum hydrogen transfer rates for maximum propylene. Maximum zeolite stability is generally achieved through moderate-to-high levels of rare earth on zeolite. Minimum hydrogen transfer is generally achieved via low rare earth on zeolite. Maximum profitability is found at the balancing point of these two competing variables. Catalyst additives provide a novel solution to finding and moving this balance point. The additive solution demonstrated in this paper has been used in several FCCUs to enable refiners to reduce the rare earth on zeolite for maximum propylene yield, while maintaining unit conversion at constant catalyst addition rates. This new technology is a significant enabling factor for residue crackers seeking maximum propylene yield. This paper describes this new technology, presents multiple commercial experiences demonstrating zeolite protection, and provides guidelines for optimal use of this technology for maximum propylene generation in residue crackers.

Paper ID : 20100363

Techniques For Troubleshooting FCC Regenerator Problems

Martin Evans, Ray Fletcher

Vice President of Engineering, INTERCAT Inc. PO Box 412, Sea Girt, NJ, 08750 USA

E-mail: info@intercatinc.com

Abstract: Governmental regulators are increasing their scrutiny of FCC stack emissions as a means of reducing the environmental impact of the refining industry on the local environment. This usually results in a requirement FCC operators to keep emissions of key pollutants below strictly defined levels. FCC operators are used to paying continuous attention to the optimization of the conversion section to ensure maximum profitability. However, few process engineers have paid the same level of attention to the regenerator, unless the operation is close to emissions constraints or is already out of compliance. The regenerator is a highly complex reaction zone, with many competing reactions. Distribution of spent catalyst and combustion air within the bed, and the combustion of flue gases both within and outside the bed add an additional level of complexity to the FCC regenerator. Several troubleshooting techniques have been developed to enable the FCC process engineer to identify and correct for non-optimal operations within the regenerator in order to minimize unwanted emissions. These techniques in conjunction with state-of-the-art additives enable the FCC operator to confidently maintain low emission levels. This paper presents several techniques for optimizing and troubleshooting the FCC combustion zone, with examples of how they have been applied in several units.

Paper ID : 20100370

Increasing FCC Diesel Production with Additives

Andrew Chambers, , Martin Evans

Regional Manager of Sales INTERCAT Inc., PO Box 412, Sea Girt, NJ, 08750 USA,

E-mail: achambers@intercatinc.com

Abstract: Throughout its over 60 year history the FCC has proven itself to be one of the most dynamic processes in the oil refining industry. The FCC has long been viewed as the premium gasoline producing engine within most refineries. However, the last 18 months have proven that the fuels market can be extremely dynamic. A refiner who is capable of quickly switching the FCC product slate between the two operational modes of maximum gasoline and maximum diesel will be the best positioned to profit from future fuel market trends. FCC catalyst technology is readily available for shifting yields from gasoline to diesel. However, the time necessary to change catalyst to a new formulation in a typical unit requires at least six months from the issuing of the Tender Request before the unit can even start adding this material. Add then to this the two to three months required for a full catalyst changeout and this time lag becomes impossible to manage. This time lag represents a lost opportunity for the refiner already desiring to profit from rapid changes in product economics. Proven catalyst technology exists in the form of bottoms cracking additives which are capable of swiftly shifting the FCC yield slate into maximum diesel mode. This can be done while still continuing with the standard, low risk catalyst selection procedures currently employed in the refining industry. This paper provides a detailed overview of the independent variables available to today's FCC operator for maximization of LCO yield, including the use of additives for making rapid catalytic shifts. This will include a review of the most common independent variables, standard catalytic selectivities plus additive usage strategies. A summary of over 13 successful commercial applications will be presented.

Paper ID : 20100375

Successful, Proactive Managed Pressure Drilling Application Brought Added Value for Extreme Narrow Operating Windows in a 10 5/8-in x 12 1/4-in Hole Section in Southern Mexico

J. C. BELTRAN, W. PERDOMO, E. GOMEZ, H. MORENO, F. GALLO, C. PEREZ TELLEZ, E.

RODRIGUEZ, L. IBARRA,

Schlumberger Optimal Pressure Drilling, Villahermosa, Mexico; Petroleos Mexicanos, Villahermosa, Mexico, Schlumberger IPM, Villahermosa, Mexico.

Email : jbccol2005@hotmail.com

Abstract: A significant number of variations of the Managed Pressure Drilling technique (MPD) have been implemented in Southern Mexico at HPHT and depleted fields, especially in pay zones, to overcome challenging narrow window drilling scenarios. Although the MPD is normally used in reservoir sections, it is also considered as a solution in other non-reservoir section where operational problems such as narrow window drilling, differential sticking and gain/losses become serious obstacles to reach TD. The paper describes a case story where the use of proactive MPD during 10 5/8" x 12 1/4" hole section was very successful solving such problems. Normally these hole sections are drilled conventionally, but the constant influxes and the subsequent partial and/or total losses of circulation during the well control events observed between 2729 m MD and 2989 m MD and related to a very narrow operating window made mandatory the use of a feasible alternative technique to resume drilling without influx/losses events. During the beginning of the phase drilled in conventional mode a pit gain was detected while drilling with 2.08 gr/cc mud density, it was then necessary to increase the mud density to 2.09 gr/cc and later to 2.10 gr/cc in an attempt to bring the well under control. The MW was finally increased to 2.12 gr/cc switching the well into loss condition. After the MPD call out, operations were restarted with an initial mud density of 2.08 gr/cc and ECD of 2.11 gr/cc, constant bottom hole pressure (CBHP) feature was also added by applying suitable surface back pressure to effectively drill this critical stage. This paper describes how the Managed Pressure Drilling allowed to successfully drill this intermediate hole section, optimizing drilling processes by decreasing non productive time (NPT) and mitigating problems seen in conventional drilling.

Paper ID : 20100379

Estimation of Methane Emission Factors for Indian Oil and Gas Sectors

A. K. PathakaKeka Ojhaa, A.K. Singhb, T. Kumara

a : Department of Petroleum Engineering, ISM, Dhanbad, India

b: Methane Emission & Degassification section, CIMFR, Dhanbad, India

Email : akhilendra_pathak@yahoo.com

Abstract: Existence of the human civilization is now being threatened by global warming resulting from increased environmental green house gas content. Methane is the second most important greenhouse gas (GHG) after carbon dioxide. Amount of methane emission from energy sector is increasing day by day with increased global energy demand. Production and processing of petroleum oil and gas is one of the major sources of methane emission. As per Economic Intelligence Service report, India (Energy, 2008), energy consumption of India increases from 97.9 MTOE in 1980-81 financial year to 413.8 MTOE in the year 2007-08. This results in marginal change in total amount of methane emission to atmosphere, though % emission of methane is reduced with adaption of new preventive technology. Methane emission not only creates threat to the environment, in addition it leads to huge revenue losses. Hence, estimation and mitigation of methane emission from oil & gas sector is very important. In present work, various sources of methane emission from upstream, middle stream and downstream of oil & gas sectors are identified and categorised as per IPCC-2006 guidelines. Data were collected from various oil & gas sector like (i) exploration & production of oil & gas (ii) supply through pipelines (iii) refinery throughput & production (iv) storage & transportation (v) usage. Methane emission factors for various categories were determined applying Tier-II and Tier-I approach using the collected data. Total methane emission from Indian Oil & Gas sectors was thus estimated for the year 1990 to 2007. It was observed from the results that the estimated methane emission factors for various categories lie within the limits specified by IPCC guideline 2006 for the developing countries. However, intensive investigations are necessary to achieve the new limit decided in Copenhagen, 2009.

Paper ID : 20100383

Leak Detection in a High Pressure Heat Exchanger System at M/s IOCL, Guwahati Refinery, Guwahati Using Radiotracer Technique

Shankhaneel Borah

*Indian Oil Corporation Limited, Process Design Engineering Cell, 9th Floor, Indian Oil
Bhawan ,*

A-1,Udyog Marg, Sector-1, Noida-201301, India

Email : borahs@iocl.co.in

Abstract: Hydro-treater Unit of Guwahati Refinery was commissioned in Dec,2002 to cater to the BS-II specification of Diesel, Kerosene and Aviation Turbine Fuel (ATF) with an installed capacity of 0.6 MMTPA. The Unit is divided in following sections: (a) Feed and Preheat section, (b) Reactor Section, (c) Separator and Stripping Section. Hydro-treatment process involves exothermic reactions resulting in high temperature from reactor effluent. This heat is utilized in special High Pressure brech lock exchanger by heating up cold feed in the feed section. There are seven numbers of these exchangers in series at Guwahati Refinery and any failure in these brech lock exchangers will result in cross flow of feed to the product which will in tern fail product specification. Maintenance of these brech lock involves high skill labour and downtime as these repairing need to be carried out offline during shutdown of Hydro-treater. Thus, defining exact leakage point is very essential before initiating repairing process of the exchangers. It can be established through laboratory analysis and operating parameters of the unit about cross-leakage of these exchangers but, there is no other technique apart from Radio-tracer method to identify cross-leakage of these high pressure exchangers online. M/s Bhabha Atomic Research Centre (BARC) was called for carrying out survey of these heat exchangers using radio-active material to identify the exact leaky exchanger. Detail arrangement was made for handling radio-isotopic element and their handling prior to carrying out the leaky. It was detected during radio-isotopic survey that four exchangers out of seven were having cross leakage leading to failure of product quality specification. These leaky exchangers were attended and product quality was met without any other change in the unit (like change of parameters or catalyst change, etc.)

Paper ID : 20100385

Management and Engineering Challenges in Development of Gulf-A field, JV-CB-OS-1 in Gulf of Khambhat, Gujarat, India

B.K. Gupta, James Varkey
ONGC, Ankleshwar, Gujarat, India
brij.gupta@hotmail.com

Abstract: Joint Venture CB-OS-1 Block was awarded under VIth Exploration bidding round on production sharing contract in 1996 to a consortium. Subsequently, Operators of the block and consortium partners have changed many times. The wells Gulf A-1 & GulfD-1 produced hydrocarbon & were drilled from offshore using jack up Rig. The operator ship of the block has been awarded to ONGC in Dec 2004. Operator has prepared a Commercial Evaluation Report for examining commerciality of the Gulf-A discovery and the onshore option of development is found to be commercially viable and accordingly the Plan of development was prepared which was approved by DGH, Govt of India. The Gulf of Khambhat is interpreted by several inlets of sea and creeks formed by confluence of rivers such as Narmada, Tapi, Mahi, Sabarmati, Dhadhar and many minor rivers. All the major rivers form estuaries and their inflow carries heavy load of suspended sediments in to the Gulf. The Gulf-A development area is one of the highest tidal range zones in the world & environmental condition in the area poses toughest challenge for exploration & development. The on land portion is typically marked by several tidal creeks. The width of the channel and high tide does not give sufficient draft for towing the barges and jackup rigs into the tidal creeks. The recent satellite images depict the changes in the coast line and adjoining river courses and area is highly influenced by the Sabarmati and Mahi rivers and due to confluence of these two rivers, the area currents are very high and sedimentation and erosion pose a major problem of mobile base and scouring. The paper deals with the associated engineering challenges in the remote area to develop this field in the Gulf of Khambhat using land based drilling rig.

Paper ID : 20100389

Effective Medium Modeling Of Gas Hydrate-Filled Fractures Using Sonic Velocity In The Krishna-Godavari Basin, Eastern Indian Offshore

Kalachand Sain, Ranjana Ghosh and Maheswar Ojha

National Geophysical Research Institute (Council of Scientific and Industrial Research), Uppal

Road, Hyderabad-500 606, India,

E-mail: kalachandsain@yahoo.com

Abstract: The Indian National Gas Hydrate Program Expedition-01 has established one of the richest gas hydrate deposits in the clay-rich marine sediment of Krishna-Godavari (KG) basin in the eastern Indian margin. The pressure cores and the resistivity at-bit images exhibit the gas hydrate morphology that varies from complex vein structures (grain-displacing) to invisible pore-filling. The available rock physics models assume isotropic pore-filling gas hydrate and thus mislead the estimation of gas hydrates concentration for fractured fine grained sediments. The anisotropic behavior of sediment in the KG basin provides additional complication. First time, we apply the differential effective medium theory to incorporate grain-displacing morphologies by which gas hydrate is included as vertical ellipsoids with aspect ratios ranging from those of thin veins to nodules in an elastic anisotropic background. The results from sonic velocities at Hole-10D in the KG basin show the saturations of gas hydrates in the depth range of 60-140 meters below sea floor (mbsf) as 35-42, 27-30 and 33-41% of total porosity for three different basic gas hydrate morphologies of (i) pore-filling, (ii) grain-displacing and (iii) combination of grain-displacing and pore-filling, respectively. The saturation is highest at ~67 mbsf for any morphology but the estimations differ between morphologies. For pore-filling morphology, the maximum (56%) gas hydrate saturation is 18-22% higher than that of the grain-displacing morphology and 2-9% higher than that of the combined morphology.

Paper ID : 20100390

Role of Instrumentation & Control system in Static Equipments of Sour Gas Field

Samir K Laskar, HB Singh

Chief Engineer (Instrumentation), ONGC, B&S Asset , Mumbai , India

Email: laskar_sk@ongc.co.in

Abstract: Monitoring of Static equipments through state-of-the-art technology is essential in ageing Oil/Gas field. Based on locations, these Equipments can be broadly categorized as Equipments used in 1) Offshore Installations, 2) Onshore Installations, 3) Major Plants (Hazira, Uran, CPF/CTF-Gandhar). Based on Service, Equipments can also be grouped as those in 1) Sweet applications & 2) Sour application. The present paper gives an outline of development of Instrumentation Systems used in various Static Equipments & also the Control Philosophy adopted for their safe & productive operation - with special reference to Installations of Sour field of Bassein & Satellite (B&S) of Mumbai Offshore. Technical up-gradation & innovations in field instrument systems for measurement & control of process parameters like Level, Pressure and Flow is the main theme of the paper. Enhanced Operation & Maintenance activities involving modern Control systems like DCS & PLC managing Static Equipments will also be discussed. Common problems in important Shutdown Logics initiated by ESD & FSD to actuate Shutdown Valves are also discussed in the said paper. System up-gradation by changing the Material of Construction (MOC) is also suggested for sour fields. It is a real challenge to manage the static equipments in most diversified off-shore Asset like Bassein & Satellite having around 10 unmanned Installations & 2 Process Complexes and EPS Sagar Laxmi. B&S is now a growing field where production basket is enriched with recent additions of C-Series field. The challenging activity also got a thumbs up by exploiting & development of D-Field. Management of static equipments cannot be ignored to get the maximum benefit of the enhanced surface facilities. The knowledge of the use of state-of-the-art technology in managing several vessels, exchangers, pipelines, header, valves etc leveraging the productivity & profit provides a benchmark in similar activity in any sour field of the world.