Quality Management System in German Hard Coal Mining – Lessons From 20 Years of Experience

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ABSTRACT

In 1991, the German coal mining company RAG Aktiengesellschaft (RAG) decided to implement a Quality Management System (QMS) based on the DIN EN ISO 9000 expressing a vision and goals to fulfill the customers’ demands. RAG reduced the customers’ complaints by more than 80% from about four million Euros per year to less than one million Euros. This success results from consequent planning, describing and optimization of all processes along the value chain. 20 years of experience in German coal mining can be transferred to South East Asian mining companies in order to implement an excellent QMS by themselves.

KEY WORDS: Quality management system, quality management philosophy, quality management strategy, implementation, transfer
How Can Southeast Asian Coal mining Industries Apply the German Risk Management System? Experiences from Vietnam

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ABSTRACT

An effective risk management system (RMS) is one of the prerequisites for a sustainable development in emerging mining industries like the ones in Southeast Asian countries. Coal mining industries play an increasing role in the economies of these countries. According to the authors the development of a RMS, including occupational safety and health, becomes crucial in upcoming years. The German hard coal mining industry has developed their RMS during the last fifteen years and has reached outstanding achievements concerning higher productivity, low accidental rate and fatalities, etc. These are persuasive evidence for emerging mining countries in Southeast Asia to adopt this RMS. Recently, the Vietnamese coal mining industry has implemented initiative measures to do so. Initiative results and challenges are figured out. Sharing the experiences with other Southeast Asian coal mining industrie can be useful for a successful effective implementation of a RMS, especially in occupational safety and health.

KEY WORDS: mining, risk management, occupational safety and health, know-how transfer

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Coal Fires Fighting in Wuda, China

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ABSTRACT
Coal fires have been burning in Wuda, China for the last 100 years. Spontaneous combustion of coal is a special kind of natural disaster. The result is reduction of the coal reserve, attribute to atmospheric pollution through the emission of greenhouse related gases, cause land subsidence and negatively impact human health in nearby areas. This paper is carried out the development and the process to find a scientific method of prediction and prevention, and try to take an effective way to control the spread of spontaneous combustion and reduce the loss of coal reserves and environment. Finally the strategic objectives of sustainable development can be archived.

KEY WORDS: Coal Fire / Spontaneous combustion / Natural disaster / Pollution / Sustainable development

REFERENCES


Distribution of Pyrite and Mineral Matter in Coal Seams from Samarinda Area, Lower Kutai Basin, Indonesia

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ABSTRACT

Samples of coal from a stratigraphic section of Balikpapan Formation, near Samarinda, Lower Kutai Basin were studied for their mineralogy and distribution of pyrite using plasma low-temperature ashing plus X-ray diffraction, petrographic examination and SEM analysis. The results show that the inorganic matters of the coal are composed of quartz, clay minerals, calcite, pyrite, chlorite, feldspar and gypsum. Both epigenetic and syngenetic pyrite occurred in this coals and influence of marine conditions is more favored in the lower portion of the studied stratigraphic section. Epigenetic pyrite and minerals might originate from the erosion of Early Tertiary marine sediments of the Central Kalimantan ridge.

KEY WORDS: Lower Kutai Basin / Mineralogy and distribution of pyrite / Samarinda coal

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10

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Study on Occurrence of Acid Mine Drainage
Inner Part of Dumping Site at KPC Coal Mine, Indonesia

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ABSTRACT
Acid Mine Drainage (AMD) is one of the serious problems which are caused in the mining operation and it may impact on the ecosystem due to low pH. Considering the fact that the dumping site is a large stockpile of waste materials and it is always exposed to the local climatic conditions, this area can be deemed as one of the sources of AMD. Therefore, it is important to prevent the occurrence of AMD from dumping site after constructing it. This paper describes the results of field investigation and laboratory experiment about AMD problem, and discuss the relevancy between the inner structure of dumping site and the occurrence of AMD.

KEYWORDS: Acid Mine Drainage (AMD) / Inner structure of dumping site / Percolation water flow

REFERENCES
The Achievement of Environmental Impact Controls and The Study on the IGCC Project in Mae Moh Coal-Fired Power Plant

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ABSTRACT

Mae Moh Power Plant (MMPP) is the largest lignite fired power plant in Thailand with the installation capacity of 2,400 MW from 10 units. MMPP is located close to Mae Moh Mine which is fuel source of the power plant. MMPP is the main power source of Thailand northern region and is also classified as base load power plant which has been operated for more than 20 years.

With the strong intention on by-products management and emission control, there is achievement in the challenge of keeping emission standard to be better than Thailand environmental law as Mae Moh Lignite has its specific properties that are different from other lignite in the world which can be obstacle for power generation process without suitable measures. High efficiency pollution control equipment installations, strict operating procedures for emission control and real time emission monitoring at stacks and surrounding atmosphere lead to MMPP’s success in power generation together with mindset and practice in proper environmental concern.

In addition, cooperation between The Institute of Energy Economics, Japan (IEEJ) and Electricity Generating Authority of Thailand (EGAT) in studying the possibility of Integrated Gasification Combined Cycle (IGCC) Project for MMPP has widen the view point of clean coal fired power plant for EGAT.

KEY WORDS: Clean coal / emission control / lignite fired power plant / IGCC
Recycling Treatment of Cell Phones Including PCBs by Advanced Jigging

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ABSTRACT

Printed Circuit Boards (PCBs) are found in most home appliances (e.g., mobile phones, computers, television). Nowadays, communication technology in Thailand has changed from 2G to 3G mobile phones systems, and mobile phones contain PCBs. These PCBs include precious and base metals and plastics, as well as there are toxins in the PCBs including Bromine and the removal of the toxins from waste PCBs before disposal and deposition in landfill is needed. In this study, RETAC jig separation was applied to separate metals and plastics from mixtures of crushed plastics and PCBs.

KEY WORDS: Printed Circuit Boards (PCBs) / Recycling / Jig separation / RETAC JIG

REFERENCES

Separation of Polyethylene and Cross-Linked Polyethylene Using a Reverse Hybrid Jig

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ABSTRACT
The authors have reported that the RETAC jig, a wet gravity separator, is effective for plastic/plastic separation, and developed two types of modified RETAC jigs: a reverse jig and a hybrid jig. The reverse jig separates plastics floated onto the water surface. The hybrid jig (combination of jig and floatation technologies) separates hydrophobic and hydrophilic plastics having similar specific gravities by attaching air bubbles selectively onto the hydrophobic plastics thus reducing their apparent specific gravity. This paper develops a “reverse hybrid jig”, combining the reverse jig and the hybrid jig, for separating floating plastics with similar specific gravities. Demonstration experiments were carried out using polyethylene (specific gravity, 0.92) and cross-linked polyethylene (specific gravity, 0.93).

The plastics were not separated when the bubbles were introduced to the particle layer in the separation chamber of jig continuously, because almost the same amount of air bubbles are attached on both the polyethylene and cross-linked polyethylene. High-grade product was obtained when air bubbles were introduced intermittently, because of differences in the amount of air bubbles detached from the plastics: the amount of detached air was larger for the polyethylene. This result indicates that the air supply method is important to obtain high separation efficiencies. It was also found that particle size is an important factor affecting the separation efficiency and high grade product was obtained with larger plastics.

KEY WORDS: Recycling/Separation / Jig / Plastic / Wettability

REFERENCES
Application of Reductive Melting Process of CRT Glass for Recovering Valuable Metals from PCB Waste

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ABSTRACT

The amount of electronics waste (E-waste) has been dramatically increasing, and print circuit board (PCB) in the E-waste contains high concentrations of valuable metals. Cathode Ray tube (CRT) glass used as TV component contains a large amount of lead. Reductive melting processes have been reported to be effective to remove lead from CRT glass.

In this study, the reductive melting process of CRT glass was applied for recovering valuable metals from PCB. Reductive melting experiments were carried out with 20g of crushed CRT glass containing 25 wt% lead (particle size less than 1 mm), 10g of Na2CO3, 3 g of activated carbon, and 0.2g of metal compounds (Au, Ag, Cu, Ni, and In2O3) in alumina crucible at maximum temperature of 1200°C. It was found that Au, Ag, Cu and Ni were recovered in metallic Pb obtained by the reduction, while In was remained in glass phase.

KEY WORDS: Cathode Ray Tube (CRT) / Print Circuit Board (PCB)/ Reductive Melting / Lead Recovery/Recycling

REFERENCES


Effect of Phase Transition in Roasting on the Concentration Behavior of Cathode Material of Spent Lithium Ion Battery

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ABSTRACT

Recently large amount of lithium-ion battery (LIB), which is used for hybrid and electric vehicles, has become discharged and the cathod materials, such as Co, Ni, Mn, and Li, should be recovered from them, in order to secure the stable supply. In this study, we applied roasting and physical separation technologies for concentrating the cathode materials and could concentrate them with high recovery. It was found that the concentration behavior was much influenced by the phase transition in the first stage roasting, and the paper describes the mechanism of phase transition and the concentration behavior.

KEYWORDS: Lithium ion battery/ Cathode material/ Roasting/ Physical concentration/ Phase transition

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Synthesis of Iron/Aluminium Substrate for Copper Cementation

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ABSTRACT
The present study was performed on synthesis of iron/aluminium substrate for copper cementation by mixing aluminium powder with FeCl$_2$ or FeCl$_3$ in various concentrations of HCl solution. The adsorbed amount of Fe on aluminium powder were investigated by ICP in order to achieve an optimum condition. Characteristics of iron/aluminium substrate were also investigated by XRD. Cementation of copper using the iron/aluminium substrate was also studied.

KEY WORDS: Iron/Aluminium substrate, bimetallic particles, Copper cementation

REFERENCES


Groundwater Flow and Solute Transport Simulations of the VOCs-Contaminated Area in Map Ta Phut Industrial Estate, Rayong Province

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ABSTRACT
A number of factories in Map Ta Phut Industrial Estate have widely been using Volatile Organic Compounds (VOCs). Once the free-phase VOCs have contaminated groundwater, they can dissolve and migrate downstream away from the source zone and spread or disperse to form a large contaminant plume. In order to design the specific remediation scheme for any site, detailed site characterization must be conducted. Data from the site characterization were used to visualize geologic conditions and to construct groundwater flow and solute transport models. Groundwater flow and solute transport of VOCs in aquifers were simulated using MODFLOW and RT3D, and the models were calibrated using PEST. Groundwater flow simulation showed that the groundwater flow direction of the study area is from northwest to southeast. Results of the solute transport simulation showed that plumes of PCE, TCE and cis-DCE have different sizes and shapes because of effect from the groundwater flow velocity variation due to site’s heterogeneity and the degradation of the chemicals.

KEY WORDS: Groundwater Model / Volatile Organic Compounds / Contaminant Hydrogeology

REFERENCES


Groundwater Flow and Chemistry Around the Tailings Dam of a Closed Mine and Countermeasures for the Leachate

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ABSTRACT
Acid mine drainage (AMD) from tailings dams is a serious problem in many closed mines. In this study, batch leaching experiments of the tailings taken from a closed mine site and numerical simulation of groundwater flow and solute migration around the dam were conducted to characterize the leaching and migration of heavy metals from the tailings dam. The results showed that the high leaching concentrations of heavy metals were observed in the tailings, and that constructing a low-permeable wall downstream of the tailings dam was an efficient method of improving the quality of AMD.

KEY WORDS: Acid mine drainage (AMD)/ Closed mine / Heavy metals /Leaching

REFERENCES
Effectiveness of Adsorption Layer Using Natural Volcanic Ash in Reducing Arsenic Leached from Mudstone

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ABSTRACT

This paper describes the effectiveness of an adsorption layer using natural volcanic ash for reducing arsenic concentration leached from mudstone excavated during tunnel construction. Column experiments consisting of crushed mudstone and volcanic ash layers were conducted both in the laboratory and in situ to evaluate the leaching properties of arsenic from the rock and the adsorption characteristics of arsenic onto the ash. The results showed that the bottom adsorption layer effectively reduced arsenic leached from the rock. This indicates that the adsorption layer is promising for the disposal of waste rocks containing arsenic.

KEY WORDS: Arsenic / Volcanic ash / Adsorption layer / Column experiment / Soil contamination

REFERENCES


Arsenic Adsorption onto Lignite Under Saturated Flow Conditions: Experiment and Reactive Transport Modeling

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ABSTRACT

This paper describes the adsorption of arsenic (As) onto lignite under saturated-steady state flow conditions. The breakthrough curve of As from the unwashed lignite column showed both leaching and adsorption regions. The leaching part of this curve could be attributed to the combined effects of the very acidic pH and high concentrations of dissolved organic carbon (DOC). Washing of lignite before the adsorption experiment removed this initial leaching region but slightly reduced the overall As adsorption capability of the sample. Although As migration was poorly simulated by the one-dimensional advection-dispersion with linear adsorption equation, the estimated ranges of the distribution coefficient (K_D) were potentially useful for practical applications.

KEYWORDS: Lignite/ Arsenic/ Adsorption/ Reactive transport modeling

REFERENCES


Chemical Forms of Arsenic and Selenium Leached from Excavated Mudstones

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ABSTRACT
Batch leaching experiments were conducted to elucidate the leaching behaviors and chemical forms of arsenic (As) and selenium (Se) from excavated mudstones. The results showed that the concentrations of As and Se in the leachate were higher than the environmental standards, and that the major chemical form of As was arsenate (As(V)) whereas that of Se was either selenite (Se(IV)) or selenate (Se(VI)) depending on the sample and number of extraction. These results agreed well with the equilibrium geochemical calculations.

KEY WORDS: Excavated rocks / Mudstone / Arsenic / Selenium / Chemical forms
Interpretation of Gas Well Testing Applied to Well a Field X Cuu Long Basin

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ABSTRACT
Well testing is an experimental process in which the pressure, flow rate and properties of the reservoir recorded simultaneously with high frequency to observe the features of well particular and of the reservoir as a whole. Beside it the well testing also allows to take fluid sample. Results are the physical parameters of the formation, providing the properties of fluids as well as the potention of the formations, thereby support to build detailed models of the reservoir, manage reservoir and make decision suitable for the field investment and development.

In gas well testing analysis, two common methods used are Buildup Test and Drawdown Test. In which, pressure wells were recorded continuously in real-time. The relationship between pressure and time are performed on the Horner graph with the x-axis is time on log scale and the y-axis is pressure on Descartes scale.

The article refers to the well test interpretation of wells A field X Cuu Long basin in the territory of Vietnam by two methods: traditional and modern (supported by computer). The paper focuses on analysis the advantages and disadvantages of each method and proposes the ultimate method in order to improve the reliability of the interpretation.

KEYWORDS: well test interpretation, buildup test, drawdown test, traditional and modern method

REFERENCES
Sensitivity Analysis of the Parameters in the Formula for Assessment of Oil in Place Using Monte Carlo Simulations for Field X

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ABSTRACT

The Monte Carlo algorithm is used very widely in the areas of life, such as currency risk calculations, mathematical probability and statistics, atmospheric research, materials research applications in laser ... In the oil and gas sector, the Monte Carlo algorithm applied to the Business Reserve Assessment. The world have been many research works on the Monte Carlo algorithm application through the use of software on the assessment of reserves as: S Macary, A Hassan, E Ragaee (1999), A Sircar, VK Singh, A Bora (2003), ...

In Vietnam, the Reserve Assessment work with the support of software is nothing new. Monte Carlo algorithms have been applied on the Reserve Assessment work from long review. However, this algorithm is applied only to the extent give predictable results. The analysis of the influence of each input parameter on the calculated results for Reserve Assessment is still very limited.

Therefore the article refers to the sensitivity analysis of each parameter affects how the formula for the oil spot prices using Monte Carlo simulation for X field in the territory of Vietnam in order to improve reliability of the results.

KEYWORDS: Sensitivity, Monte Carlo simulations, oil reserves in place

REFERENCES
Simulation of High Waxy Crude Oil Behavior in Subsea Pipeline after Shutdown

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ABSTRACT:

Nowadays, oil and gas transport by pipelines among different production wells from one or more reservoirs is one part of the development plan for economic efficiency. However, for systems with tens of kilometers of subsea pipelines, the heat loss is significant, specifically during the shutdown and cool down period. Meanwhile, the oil’s temperature will decrease continuously causing heavy organic molecules to crystallize and suspend from the oil. This phenomenon degrades the oil mobility, even forms a network structure or freeze the pipeline. Once the pipeline is frozen during its shutdown, it is likely to trench the pipeline to unblock and restart the pipeline. Hence, it is necessary to focus on the study of high waxy crude oil behavior in the pipeline during the shutdown, cool down, and restart period to provide a safe and effective restart proposal for the shutdown pipeline. In this paper, the model for the numerical simulation of fluid behaviors in pipelines at different flow rates during shutdown, cool down, and restart period is built based on the theory of thermodynamics. The resulting model is used for the subsea tie-in system between fields X and Y in Cuu Long Basin, Southern Vietnam in order to determine the proper pressure that should be used to launch the pipeline system after shutdown period.

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Injection Water Quality Enhancement in Sandstone Formation: An Experimental Approach

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ABSTRACT

Mixing of incompatible brines (injection and formation) leads to precipitation of various types of mineral. The most effective way to avoid this scaling problem is by using scale inhibitor that generally fall into one of the four main classes, polyphosphates, phosphate esters, phosphonates and polymers.

The objective of this paper is to investigate the suitability of the injection of fresh water compared with the reinjection of formation water for a selected carbonate oil reservoir. Displacement experiments using actual core and fluid samples collected from sandstone formation from Abutafel oil field in Sirte Basin, Libya were conducted. Formation water, fresh water, and a combination of the two waters were employed as injection fluids. Different types of scale inhibitors were used in all studied cases. The effect of scale inhibitor on the on the relative permeability curves of different systems were studied at ambient and reservoir conditions. Chemical equilibrium scale prediction methods were used to predict the scaling tendency of the studied cases.

KEY WORDS: Water Quality / Scale / Relative Permeability / Carbonate / Sandstone / Petroleum

REFERENCES


‘In-Situ Gas Lift’ and ‘In-Situ Gas Injection’ Successfully Improve Oil Recovery in Arthit North Field

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ABSTRACT
Recently, number of attempts using practical depletion techniques such as lowering wellhead pressure removing bottleneck at surface and perforating minor gas sand allowing restrictedly low gas rate influx inside tubing sufficing lifting capacity of the well or gas lift installation are made aiming for increasing oil production from North Arthit field. In this paper, the strategy of depletion techniques was delineated and their significance was rated based on maximum oil recovery achievable for the candidate oil wells. However, as the goal of an oil development is to accelerate production and maximize the recovery at a lowest cost, whichever technique to be selected it must retain minimum operational downtime during bad weather condition and in no way create obstruction to any well intervention operations. The lifting performance optimization effort showed a potential breaking the oil recovery limit for ineffectual wells in North Arthit field improving the oil reserves by two fold. In addition, this paper demonstrates that deployment of pressure reducer unit is suitable for not only oil wells but also weak gas wells that have upside potential.

KEY WORDS: Gas lift / Gas injection / IOR / Petroleum
Development Strategy for Thin Oil Column in Reservoirs with Strong Water Drive

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ABSTRACT

In a typical Gulf of Thailand oil reservoir, primary recovery efficiency tends to be in the 5-10% range. In the presence of strong water drive, the expected recovery factor can be 18% up to 40%. However, in reservoirs that have thin oil column on water, presence of strong water drive leads to early coning of water compromising the recovery efficiency. These thin oil sands on water are encountered in the western trend of Benchamas field. The conventional strategy to maximize recovery in reservoirs with thin oil column on water is to limit the production rate to impose small drawn down and control water coning. This approach trades-off initial rate and economic value for improved recovery.

The use of horizontal wells with inflow control device (ICD) completions to develop these thin oil sands allows production at higher rates and equalizes flow rate along the horizontal section to prevent pre-mature water breakthrough, thereby offering a solution that maximizes recovery without compromising on production rate or economic value. However, developing these thin oil columns with horizontal well requires the ability to accurately place the well at the top of the sand or at the gas-oil contact if gas cap is present. The thinner the oil column and the stronger the water drive, the more accuracy is required.

Recently, Chevron has successfully developed two marginal oil reservoirs with OOIP around 1 MMSTB and oil column thickness between 16 and 18 feet. These are the thinnest oil columns produced by horizontal wells in the Gulf of Thailand. These 2 wells are producing around 1500 bopd average for over 6 months with very little water and low GOR, and to-date have cumulative production of 220 MMBOE. Well placement and ICD completions were the keys to the success of these horizontal wells, which have opened up new opportunities to further develop thinner oil accumulations.
The Effect of Foam Stability in CO\textsubscript{2}-Foam Flooding

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ABSTRACT

CO\textsubscript{2}-foam flooding is implemented to minimize drawbacks of CO\textsubscript{2}-flooding by reducing high mobility of CO\textsubscript{2}. Performance of CO\textsubscript{2}-foam flooding depends on several factors including foam stability. In this study, results shows that varying foam stability slightly affects flooding performance. CO\textsubscript{2}-foam application is favorable when reservoir wettability is water-wet condition. For oil-wet reservoir, CO\textsubscript{2} flooding shows similar or slightly better result compared to CO\textsubscript{2}-foam flooding. Oil composition also affects CO\textsubscript{2}-foam. Benefit from CO\textsubscript{2}-foam over CO\textsubscript{2} flooding is greater when hydrocarbon contains low intermediate component. The best strategy for CO\textsubscript{2}-foam flooding is injecting one slug of CO\textsubscript{2}-foam followed by chasing water.

KEY WORDS: CO\textsubscript{2}-Foam flooding /Foam stability

REFERENCES

Evaluation of Low Salinity Brine Injection in Sandstone Reservoir

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ABSTRACT
Water injection is generally implemented when production from natural-stored force is not adequate. Currently, injection of Low Salinity Brine (LSB) is considered as a potential improved oil recovery process by means of wettability alteration toward a more water wetness condition. The effectiveness of LSB injection is significantly affected by several parameters. Presence of low formation water salinity, mobile connate water, high viscous oil, and wettability to oil condition, could diminish oil recovery from LSB injection. Optimal slug size of LSB and suitable injection rate would remarkably improve benefit of LSB injection.

KEY WORDS: Low salinity /LSB injection /Wettability alteration

REFERENCES


Evaluation of Oil Recovery by Alkali/Surfactant Flooding in Multi-Layered Carbonate Reservoirs with Different Pore Sizes

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ABSTRACT
Carbonate reservoirs can severely yield oil recovery. Major part of residual oil remains in small pores due to high capillary pressure. Waterflooding therefore can recover oil only from large pore. Carbonate reservoir can be found as layers with different pore sizes. This structure is naturally formed by different sediments in different environments. Surface active agents such as alkaline substances and surfactants, can be injected to overcome high capillary pressure force between residual oil and rock surface. This study involves with reservoir simulation to study effects of several parameters on effectiveness of alkali/surfactant flooding in layered carbonate reservoirs with different pore sizes. Optimized alkali/surfactant flooding base case is first to be identified and followed by sensitivity analysis of interest parameters.

KEYWORDS: Alkali /Surfactant / Multi-Layered/ Carbonate Reservoirs / Different Pore Sizes

REFERENCES


Evaluation of Polymer Flooding in Multi-Layered Heterogeneous Reservoir: The Study of Viscosity and Injection Rate of Polymer Solution

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ABSTRACT

By means of polymer flooding, mobility ratio is substantially reduced, leading to improvement of areal sweep efficiency as well as wellbore profile. Breakthrough time is obviously extended. This technique seems to be suitable for heterogeneous reservoir. This study emphasizes on effects of viscosity and injection rate of polymer solution on effectiveness of polymer flooding in reservoir containing certain range of heterogeneity. Optimization is performed first to verify injection scheme. After that, viscosity (related to polymer concentration), polymer injection rate, and double-slug injection mode are studied. Different heterogeneity is prepared by Lorenz coefficient to have value ranging from 0.25 to 0.46. Too high polymer concentration results in low injectivity, whereas too low concentration of polymer yields low oil recovery due to improper mobility control. High polymer injection rate provides benefit on low heterogeneous reservoir, while injection rate does not show different on heterogeneity higher than 0.4.

KEY WORDS: Polymer flooding / Heterogeneous reservoir / Polymer viscosity / Polymer injection rate

REFERENCES
