

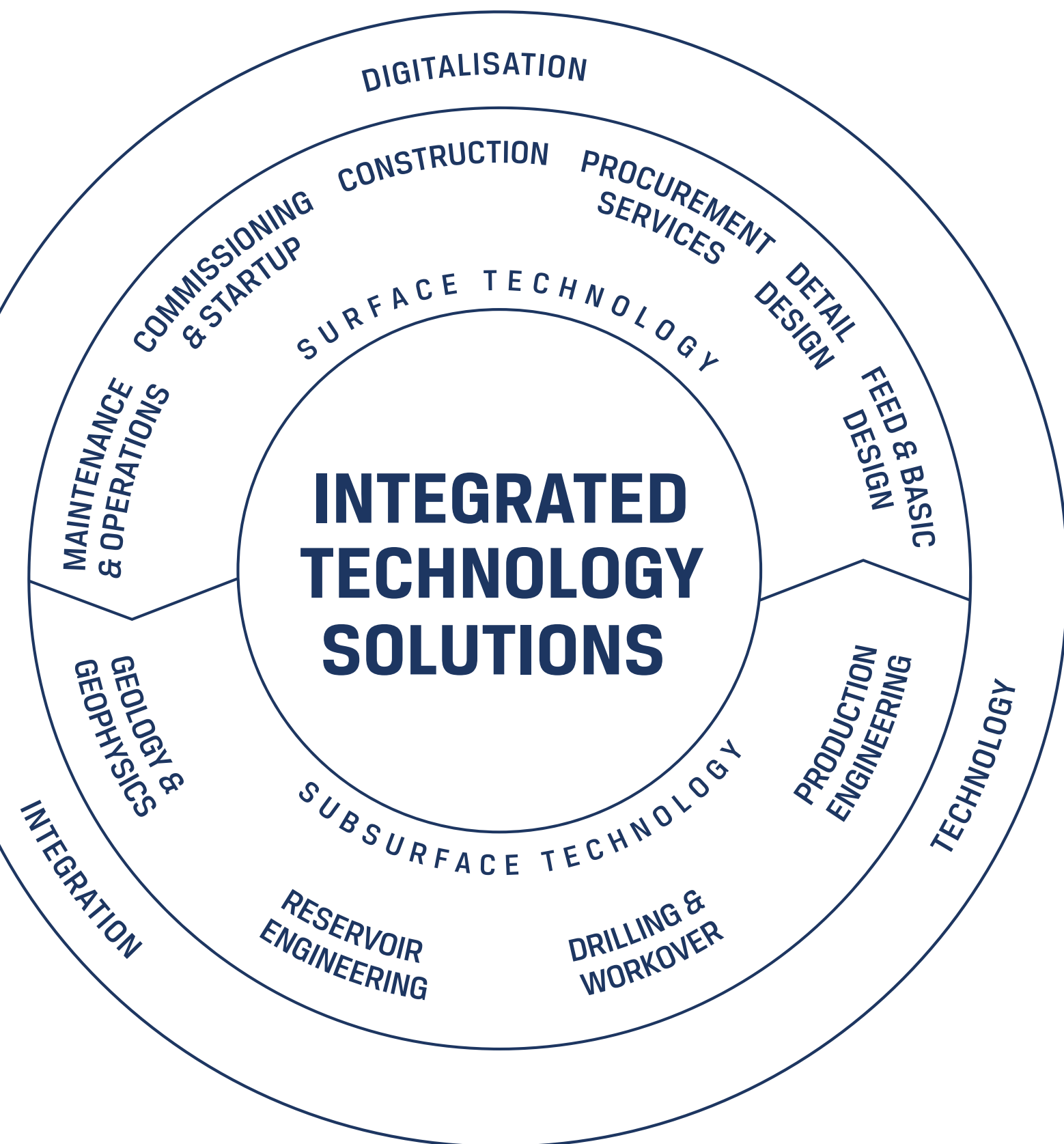
SUBSURFACE TECHNOLOGY **REFERENCE LIST**

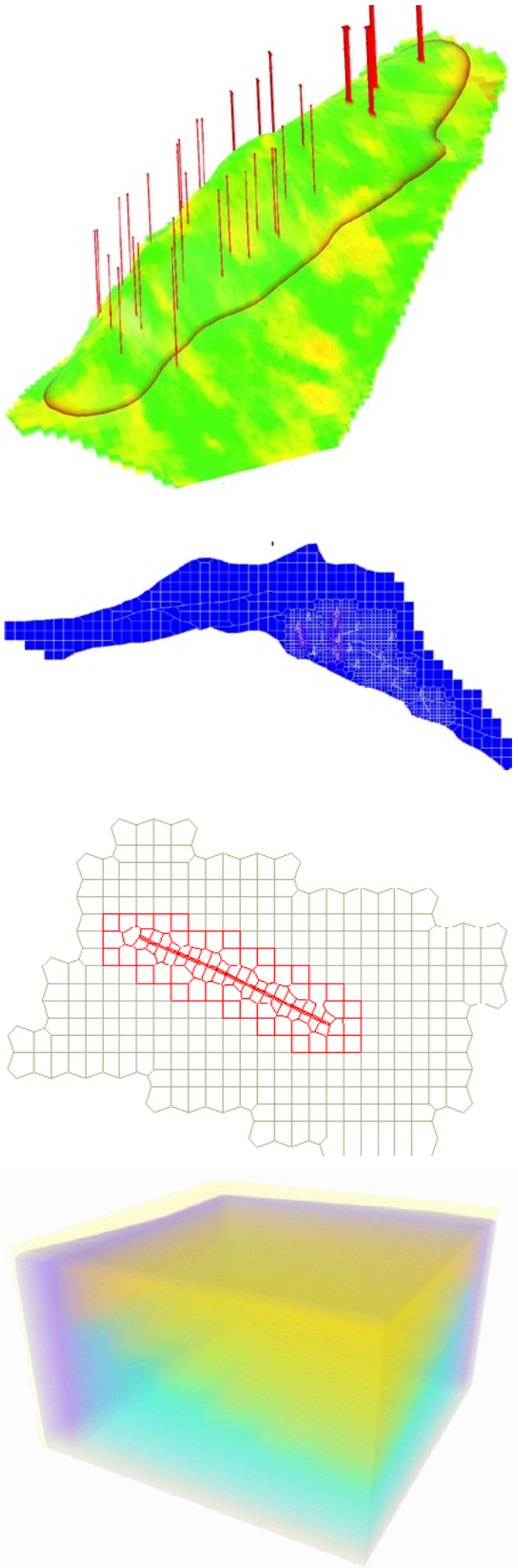
APRIL 2021



ISO 9001: 2015 Quality Management System
ISO 14001 : 2015 Environmental Management System
ISO 45001 : 2018 Occupational Health and Safety Management System
ISO 50001 : 2011 Energy Management System

Certified by TÜV NORD





PROJECT:

IN-HOUSE RESERVOIR SIMULATOR DEVELOPMENT

CLIENT: **PM Lucas Corporate**

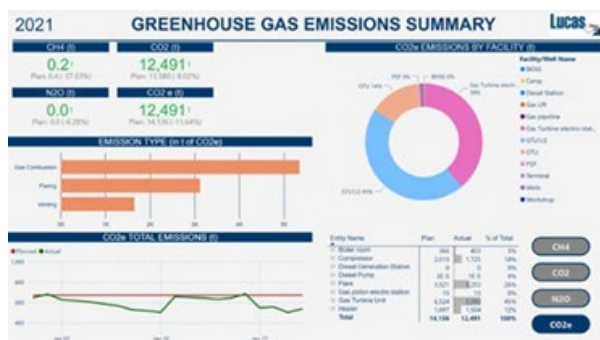
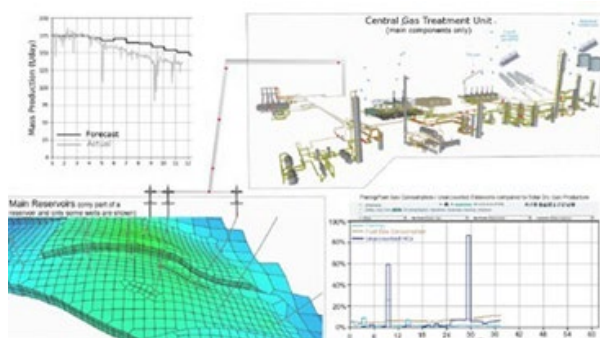
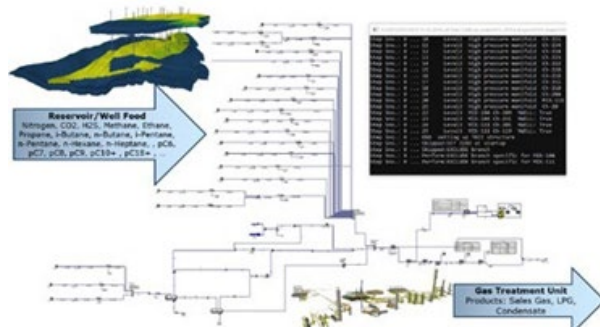
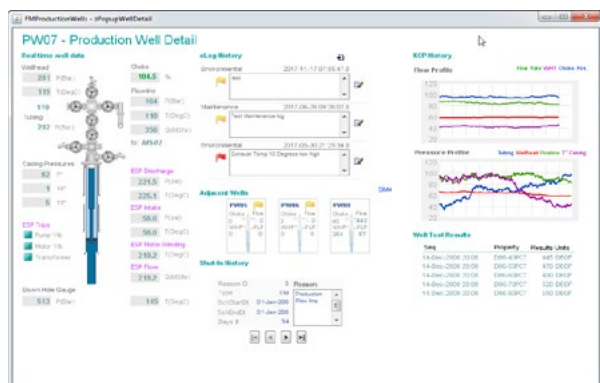
SERVICES: **Development and Maintenance of Multi-Purpose Reservoir Simulator**

COMMENCEMENT: **January 2017**

COMPLETION: **ongoing**

SERVICES INCLUDED:

- 1) 3D all purpose, multiphase numerical modelling
- 2) Black oil and compositional model formulation
- 3) Multi scale modelling
 - Multiple reservoirs
 - Full field
 - Sector
 - Single well
 - Column
 - Single matrix block
 - Lab scale / slim tube
- 4) Unstructured PEBI grids
 - Fault modelling
 - Local grid refinement
 - Local grid coarsening
- 5) Windowing Technique
 - Changing the grid over time
 - Radial and horizontal well models
 - Transient well testing
- 6) Fracture Modelling
 - Single Matrix Block (SMB) analysis
 - Recovery Curve Method (RCM)
 - Dual porosity / dual permeability
- 7) Model verification / assisted history matching
 - Target Pressure Method (TPM)
 - Target Pressure and Phase Method (TPPM)
 - Drainage Phase Method (DPM)
- 8) Well integrity detection module
 - Automated identification of abnormal production behavior
 - Recognition of abnormal pressure developments
 - Estimation of local fugitive emission rates
- 9) CO₂e Module
 - Reporting of hydrocarbons in place and well production in CO₂e
 - Integration with leading process simulation software
 - Tracking of molecules through all simulation domains (from pore space to point of release)
 - Subsurface module of holistic material balance
 - Bottom-up Scope 1, 2 & 3 GHG emission assessment & classification
- 10) Underground Hydrogen Storage (UHS) Module
 - Modelling of dispersion and diffusion of H₂ in the reservoir
 - Assessing long term impact of injected H₂ on cap rock integrity
 - Modelling of geochemical & biochemical reactions
 - Modelling of subsurface in-situ bio-methanation / "Green Methane"
 - Integration with leading process simulation software packages
- 11) Carbon Capture Sequestration (CCS) Module
 - Modelling of dispersion and diffusion of CO₂ in the reservoir
 - Assessing long term HSE impact of CO₂ sequestration
 - Assessment of long term impact on reservoir rock and cap rock integrity
 - Modelling of geochemical & biochemical reactions
 - Integration with leading process simulation software packages
- 12) Geothermal Energy Recovery Module
 - Modelling of geothermal assets (low- and high enthalpy reservoirs)
 - Modelling of thermal conduction of heat in the rock and convection of heat with the injected/produced working fluid (reservoir brine)
 - Integration with leading process simulation software packages
- 13) Smart Well Module
 - Well site installed dedicated reservoir simulator
 - Fully integrated into overall digital oil field solution
 - Fully automated, on-site history matching and near to midterm forecasting
 - Real time well performance monitoring & model validation tool
 - Integration with leading ERP (enterprise resource planning) systems



PROJECT:

FULL ASSET DIGITALIZATION & ESYS SIMULATION

CLIENT: ZhaikMunai LLP, Kazakhstan

SERVICES: Development, Pilot Installation, Field Roll Out and Long-Term Maintenance

COMMENCEMENT: March 2018

COMPLETION: ongoing

SERVICES SUMMARY:

The full Integrated Digitalization enables achievement of Environmental Social Corporate Governance (ESG) targets as well as future RoK Regulatory requirements for GHG Emissions reporting and compliance. Integrated asset-wide numerical model from the reservoir to the backend of the processing facility. Full Document Management System (DMS) Integration, Project Quality Management Integration, Facility Maintenance Integration. Forecasting of plant product specifications based on reservoir development scenarios. Assessment of Scope 1 and Scope 2 emissions resulting from plant operations

SERVICES INCLUDED:

1) Data Collection & Storage

- Data collection from field instruments
- Data collection from manual inputs, reports
- Automatic reviewing and approval process
- One single data source

2) Data Analysis

- Data cleansing and filtering (pre-processing)
- Data aggregation and calculations

3) Integrated Subsurface-Surface ESYS Simulation

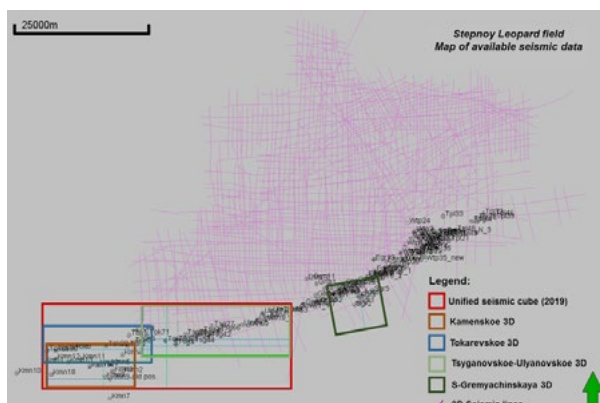
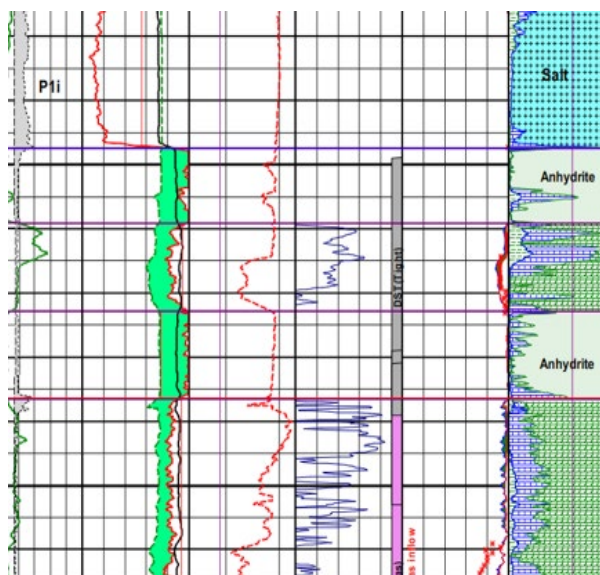
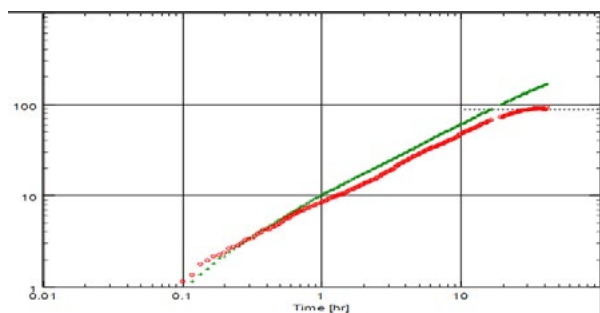
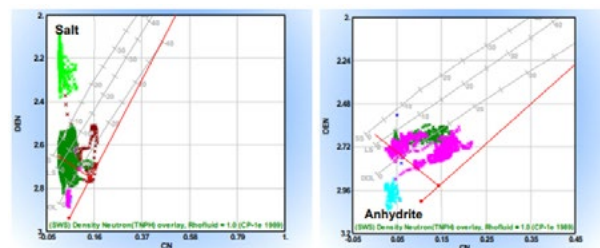
- Connection of reservoir and facility simulation into one numerical tool
- Link the reservoir simulation models of Ardatovski, Biyski, Frasnian & Tournaisian reservoirs to the process simulation models of the gas treatment units GTU 1-2, GTU 3 and the oil treatment complex UPN
- Revision of sour conditions gas condensate and oil fluid description to conform to reservoir and surface simulation needs
- Full compositional, equation-of-state numerical modeling from the reservoir to the backend of the processing facility
- High-resolution compositional simulation of the well drainage area
- Integrated subsurface-surface modeling of complex physical and chemical processes, and their impact on operational and investment decisions
- Forecasting of plant products and product quality and assessment the impact of reservoir development strategies

4) GHG Emissions calculations & forecasts

- Assessment of Scope 1 and Scope 2 emissions resulting from plant operations
- Evaluation of reservoir development strategies and plant operations to develop emission mitigation strategies
- Bottom-up accounting of unaccounted hydrocarbons (e.g. fugitive emissions)

5) Automated Reporting System

- Interactive & intuitive dashboards
- PDF Reports (government)
- Data availability (SharePoint, PC, tablet, phone, watch)
- Role-based approach
- Real-time monitoring



PROJECT:

STEPNOY LEOPARD DEVELOPMENT PROJECT II

CLIENT: **Nostrum Oil & Gas Coöperatief U.A**

SERVICES: **Full Field Appraisal Development Project**

COMMENCEMENT: **January 2019**

COMPLETION: **December 2019**

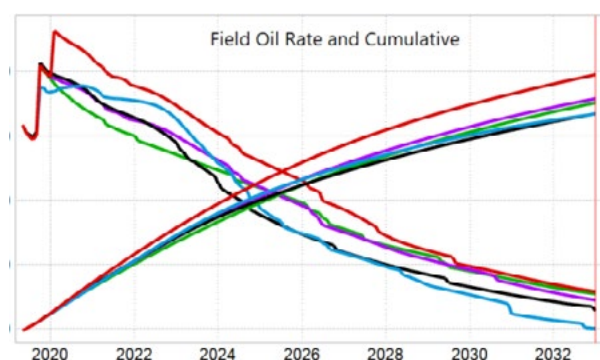
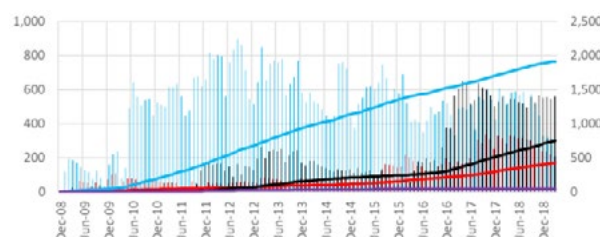
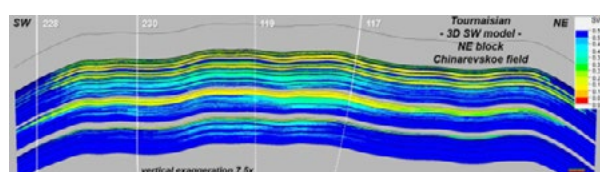
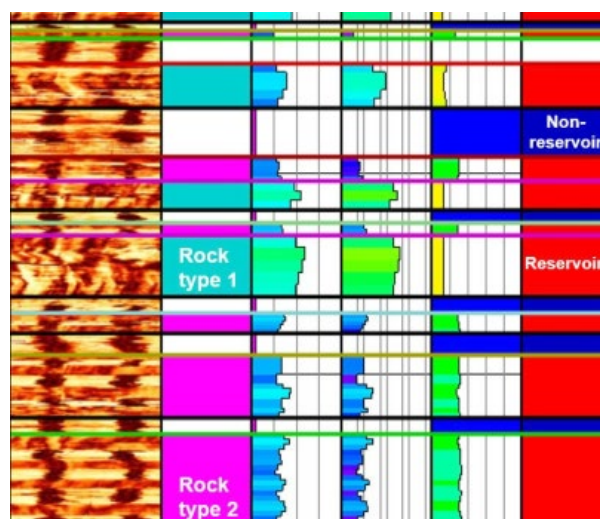
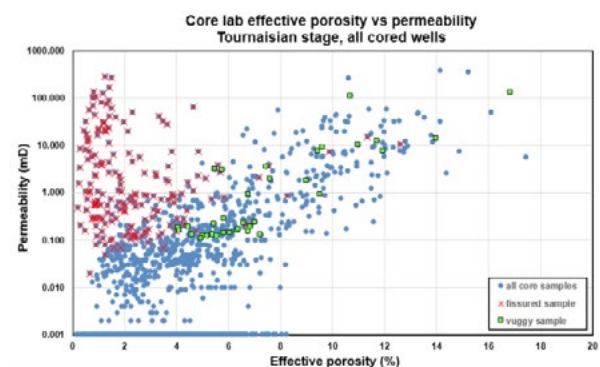
SERVICES SUMMARY:

Stepnoy Leopard Project incorporates an 80km long chain of hydrocarbon fields in the NW part of the Republic of Kazakhstan, which belongs to hydrocarbon prolific Pre-Caspian sedimentary basin. The chain of eight gas-condensate and gas-condensate-oil fields is controlled by a long stretch of Permian carbonate barrier reefs. The challenges for geological modeling were:

- structural morphology of shelf-edge reefs, rising above shelf plateau up to several hundred of meters
- complex internal architecture as a consequence of specific depositional conditions & diagenetic alterations
- highly variable reservoir properties

SERVICES INCLUDED:

- 1) Complex data base established
- 2) Geological data QC and analyses
- 3) Seismic data QC
- 4) Well log data QC and interpretation
- 5) Reservoir engineering data QC and analyses
- 6) Guides to 3D seismic data re-processing
- 7) 3D geological modeling of reservoirs
- 8) Simulation modeling of reservoirs
- 9) Hydrocarbon in place volumes and HC reserves estimation
- 10) Assets evaluation
- 11) Field development plan
- 12) Well integrity assessment of existing 150 wells
- 13) Well designs
- 14) General drilling programs
- 15) Production & Operations Simulations



PROJECT:

GEOLOGICAL & SIMULATION MODELLING AND DEVELOPMENT STRATEGY FOR TOURNAÏSIENS AND BIYSKI + AFONINSKI RESERVOIRS (THE CHINAREVSKOE FIELD)

CLIENT: ZhaikMunai LLP, Kazakhstan

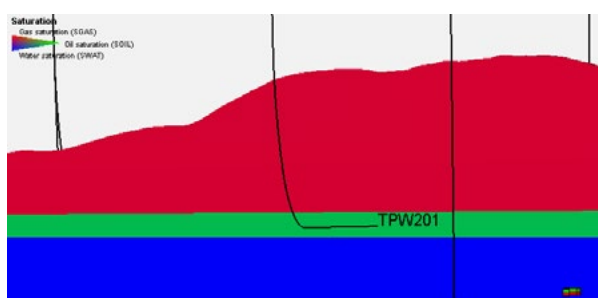
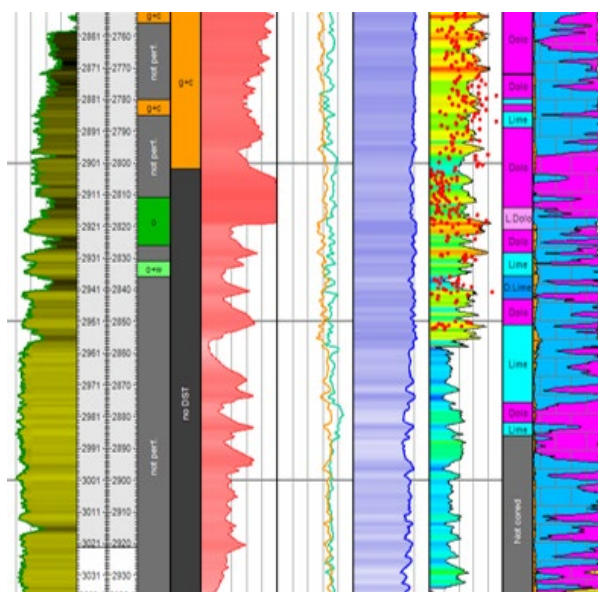
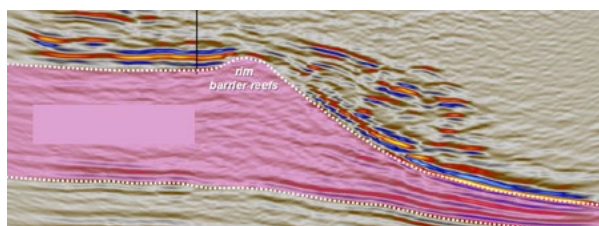
SERVICES: 3D Geological Modeling, HC in Place Volumes Estimation, 3D Simulation Modeling, HC Reserves Estimation, Development Strategy

COMMENCEMENT: November 2018

COMPLETION: December 2019

SERVICES INCLUDED:

- 1) Data base updating
- 2) Geological and geophysical data QC and analyses
- 3) Well log data interpretation
- 4) 3D seismic data interpretation
- 5) Seismic attribute analyses
- 6) 3D structural modeling
- 7) 3D facies modeling
- 8) 3D reservoir properties modeling
- 9) 3D fracture modeling
- 10) HC in place volumes estimation
- 11) Reservoir engineering data QC and analyses
- 12) Production analyses and production re-allocation
- 13) PLT data interpretation
- 14) Well test data interpretation
- 15) PVT data modeling
- 16) History matching
- 17) Forecasting
- 18) Development strategy



PROJECT:

STEPNOY LEOPARD DEVELOPMENT PROJECT ICLIENT: **Nostrum Oil & Gas Coöperatief U.A**SERVICES: **Full Field Appraisal Development Project**COMMENCEMENT: **March 2018**COMPLETION: **November 2018**

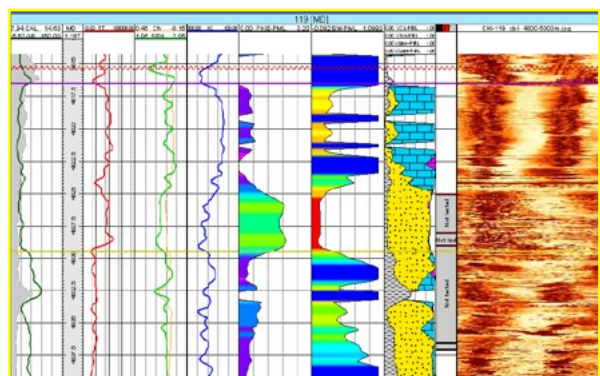
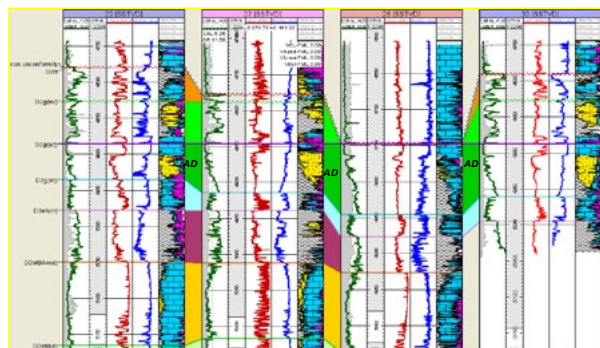
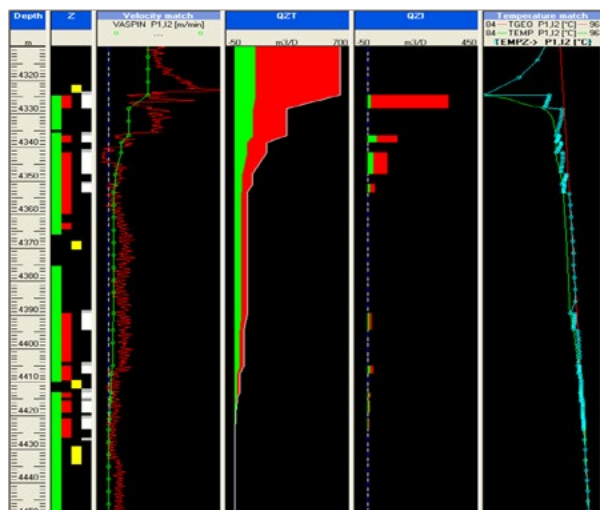
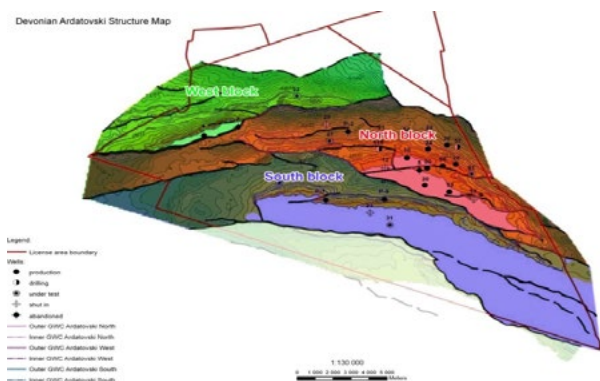
SERVICES INCLUDED:

Stepnoy Leopard Project incorporates an 80km long chain of hydrocarbon fields in the NW part of the Republic of Kazakhstan, which belongs to hydrocarbon prolific Pre-Caspian sedimentary basin. The chain of eight gas-condensate and gas-condensate-oil fields is controlled by a long stretch of Permian carbonate barrier reefs. The challenges for geological modeling were:

- structural morphology of shelf-edge reefs, rising above shelf plateau up to several hundred of meters,
- complex internal architecture as a consequence of specific depositional conditions & diagenetic alterations
- highly variable reservoir properties

SERVICES INCLUDED:

- 1) Data base design and implementation
- 2) Geological data QC and analyses
- 3) Well log data QC and interpretation
- 4) 3D seismic data QC and interpretation
- 5) 3D geological modeling and HC in place volumes estimation
- 6) Reservoir engineering data QC and analyses
- 7) Simulation modeling and HC reserves estimation
- 8) Assets Evaluation
- 9) Development plan
- 10) Well integrity assessment of existing 150 wells
- 11) General drilling program
- 12) Production & Operations Simulations
- 13) Technical solutions for surface facilities



PROJECT:

PRODUCTION OPERATIONS AND PETROLEUM ENGINEERING SUPPORT (CHINAREVSKOE GAS-OIL FIELD)

CLIENT: ZhaikMunai LLP, Kazakhstan

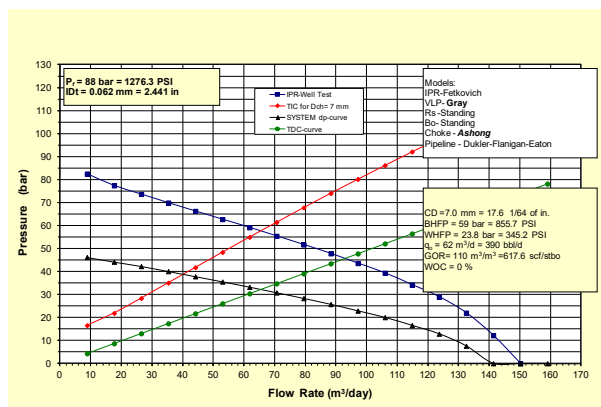
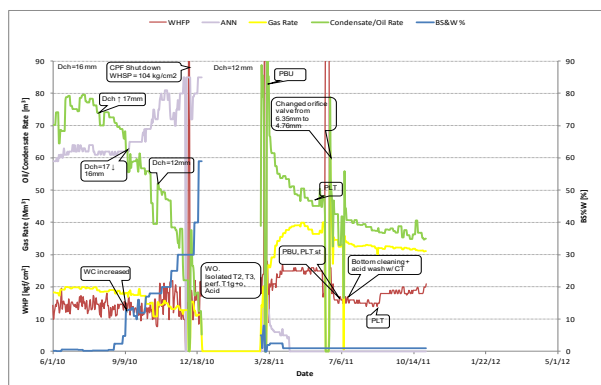
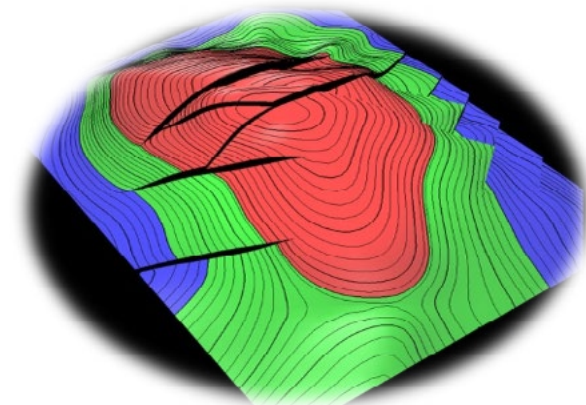
SERVICES: Gas-Condensate and Oil Wells Production Performance Monitoring, Water Wells Production and Water Injection Wells Performance Monitoring, Production Data Validation, Well Production Allocation, Well Evaluations and Well Problem Analysis, 3D Reservoir Modelling, Operations Management System Development and Implementation

COMMENCEMENT: May 2010

COMPLETION: Ongoing (2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020)

SERVICES INCLUDED:

- 1) Gas-Condensate and Oil Production Wells Performance Monitoring and Analysis
- 2) Water Production Wells and Water Injection Wells Performance Monitoring and Analysis
- 3) WO and Well Services Monitoring and well testing planning
- 4) Well Production Validation, Production Allocation and Production Reporting
- 5) Well Evaluations (Well Log Interpretation, Well Test Design and Interpretation, Production Log Interpretation)
- 6) Well Flow Analysis (Inflow and Outflow Analysis)
- 7) Well Problem Analysis (Reservoir, Near Wellbore and Bottom Hole Assembly Problems and Surface Facility Problem Definition) and Recommendations for Problem Solution
- 8) G & G Considerations (Well Locations, Well Trajectory Definition)
- 9) 3D Static Reservoir Modelling (3D Structural and 3D Property Modelling)
- 10) Reservoir Engineering Considerations (Material Balance Calculations, Flow Efficiency Estimations)
- 11) 3D Dynamic Modelling
- 12) Operations and Management System Development and Implementation
- 13) Well Integrity Assessments & Solutions



PROJECT:

PRODUCTION OPERATION SUPPORT, KONYS OIL FIELDS

CLIENT: KuatAmlonMunai LLP

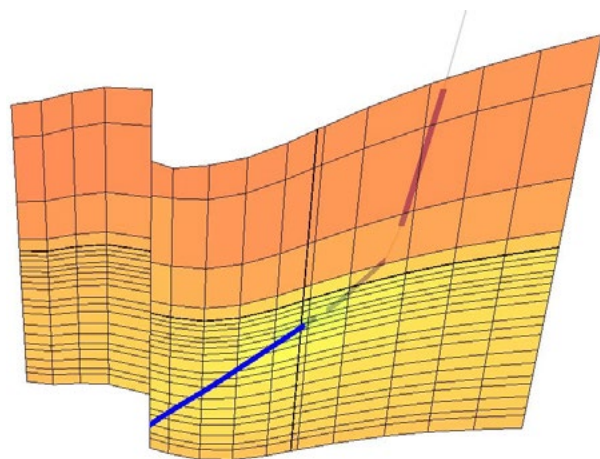
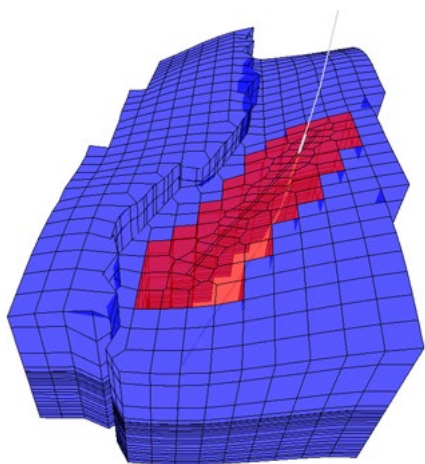
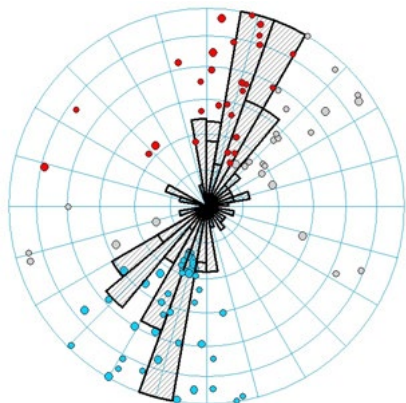
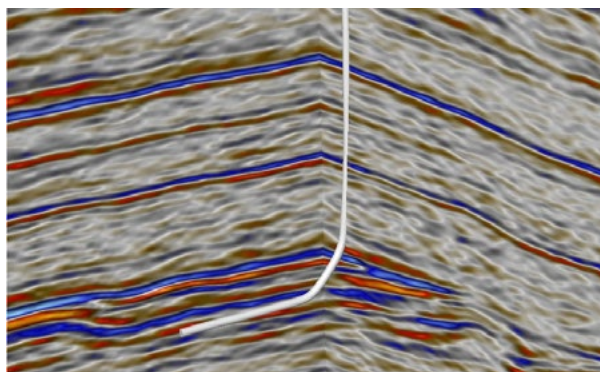
SERVICES: Oil Wells Production Performance Monitoring, Water Wells Production and Water Injection Wells Performance Monitoring, Production Data Validation, Well Production Allocation, Well Evaluations and Well Problem Analysis, Workover Design and Workover Final Reports, Artificial Lift Selection and Design, Artificial Lift System Optimization, Well Testing and Production Log Planning and Supervision, Well Servicing Planning and Supervision, Overall Field Production Optimization

COMMENCEMENT: November 2002

COMPLETION: Ongoing (2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020)

SERVICES INCLUDED:

- 1) Reservoir and Well Evaluations
- 2) Daily Production Wells Performance Analysis
- 3) Daily Water and Gas Injection Wells Performance Analysis
- 4) Well Integrity Assessments & Solutions
- 5) Well Service Planning
- 6) Well Test Planning and Supervision
- 7) Production Logging Planning and Supervision
- 8) Daily, Monthly and Yearly Production Reporting
- 9) Well Problem Analysis and Diagnosis
- 10) Artificial Lift System Design, Monitoring, Analysis and Optimization
- 11) WO Planning
- 12) WO Design
- 13) WO Well End Report
- 14) Well Stimulation Reports
- 15) Surface Facility Operation Supervision
- 16) Optimization of the Gathering and Treatment System
- 17) Production Data Base (OFM) Creation and Maintenance



PROJECT:

IMPACT OF NATURAL FRACTURES AND PROXIMITY TO FAULT ON WELL INTEGRITY IN RESERVOIRS SUBJECT TO MASSIVE WATER INJECTION

CLIENT: Public oil and gas company in former Soviet Union

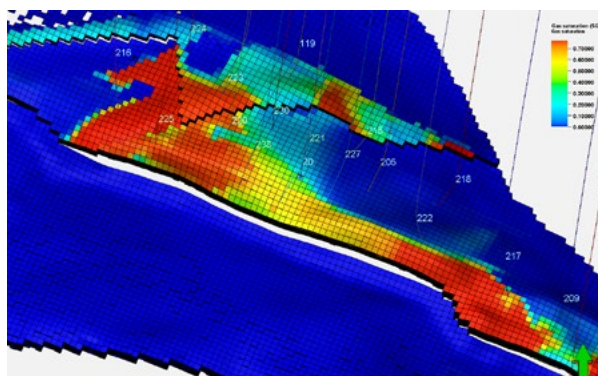
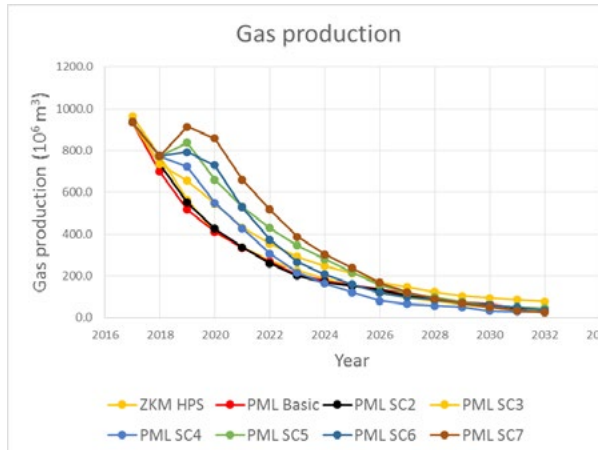
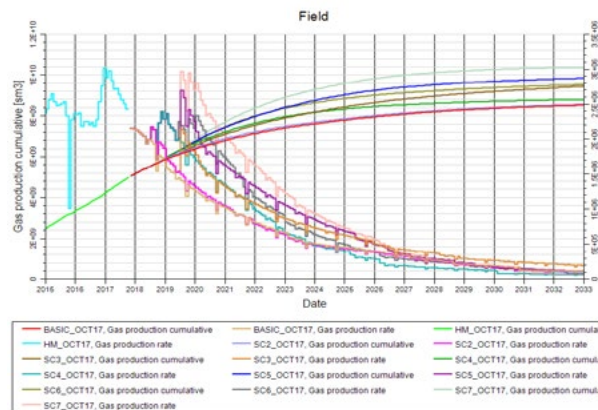
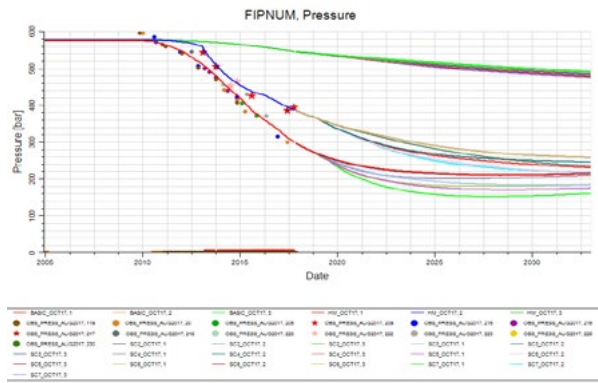
SERVICES: Geological and Geo-Mechanical Study

COMMENCEMENT: December 2017

COMPLETION: June 2019

SERVICES INCLUDED:

- 1) Geophysical and petrophysical evaluation
- 2) Static and dynamic model building
- 3) Discrete fracture network modelling
- 4) Dynamic and geo-mechanical assessment of cement bond
 - Impact of stress regime and natural fractures on initial cement job
 - Fault re-activation (dynamic altered stress regime) due to depletion of neighboring compartments
- 5) Elaboration of reservoir management strategy to minimize alterations in stress regimes
- 6) Design of workover program to isolate flow behind casing



PROJECT:

3D SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, AFONINSKI+BIYSKI FORMATIONS, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP , Kazakhstan

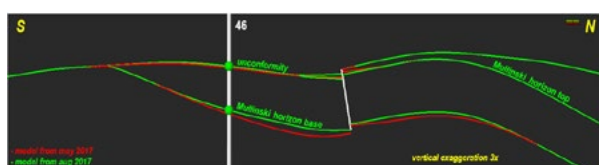
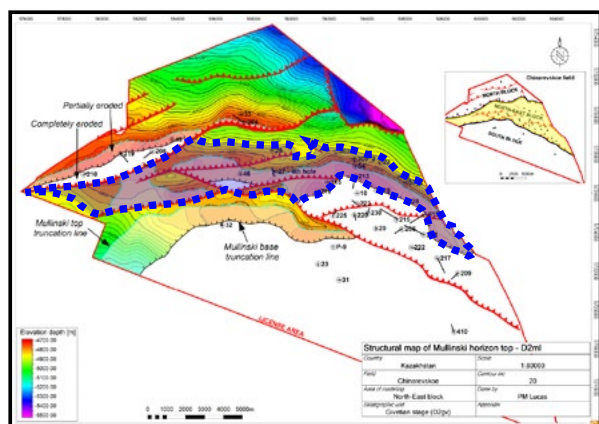
SERVICES: 3D Simulation Model Up-dating, History Matching and Dynamic Modelling for Afoninski and Biyski Formations, North-East Block

COMMENCEMENT: September 2017

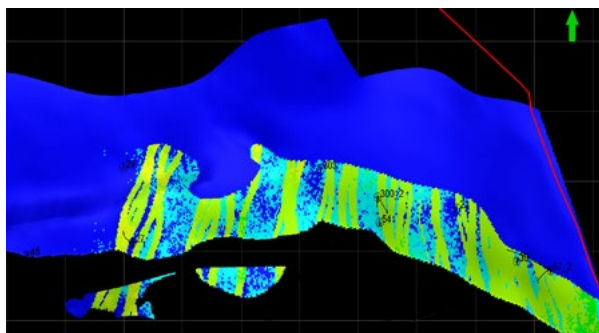
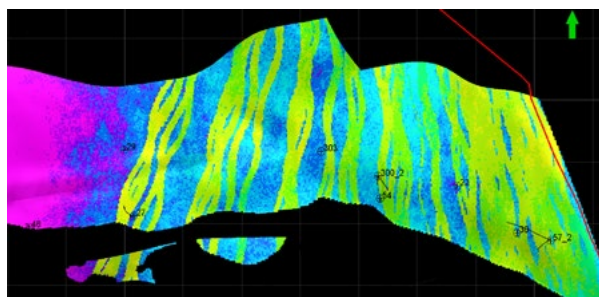
COMPLETION: November 2017

RESERVOIR STUDY INCLUDED:

- 1) Change of PI over production time
- 2) Reduction of CGR due to condensate banking (consideration of critical condensate saturation)
- 3) Complete HM for 2017
- 4) Review the forecast decline behavior after reaching the inlet pressure
- 5) 3D model building:
 - Model dimensions
 - Reservoir porosity distribution
 - Rock type-permeability distribution
 - Relative permeability curves
 - Regionalization
 - Aquifer modeling
 - Fluid modeling
 - Initial conditions / Initial fluid in place
- 6) History match approach (calibration of the model by satisfactory matching between calculated and observation data (production and pressure data))
- 7) Establishing a basic scenario which served for comparison of all the other field development cases
- 8) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 9) One of the main goals was to investigate production deliverability of unconventional Afoninski reservoir using multistage fracturing
- 10) Well integrity evaluations (in simulation was used ECLIPSE 300)



well did not drill the lowermost part of Mullinski horizon



PROJECT:

3D GEOLOGICAL STUDY UPDATE (CHINAREVSKOE GAS-OIL FIELD, MULLINSKI FORMATION, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP, Kazakhstan

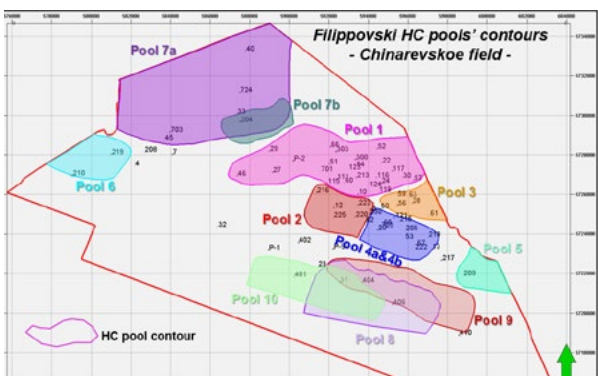
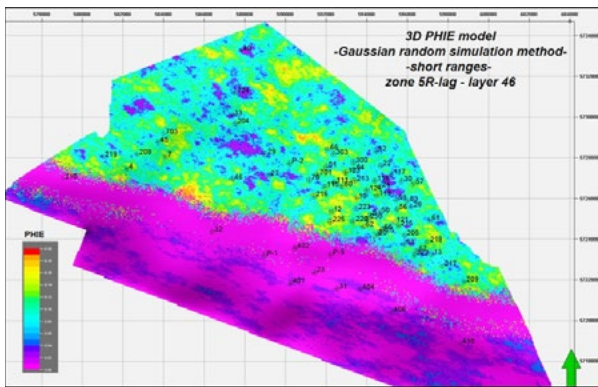
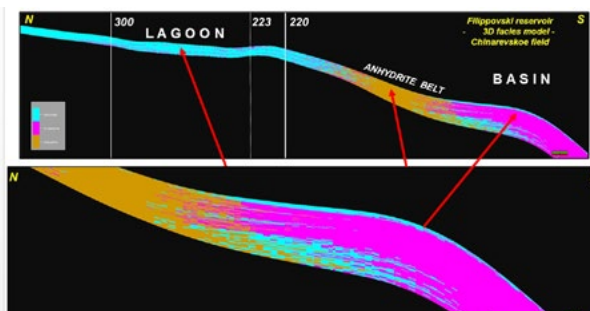
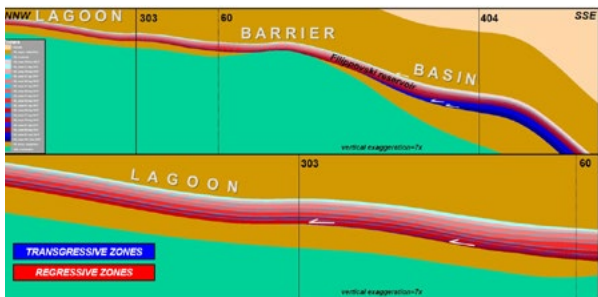
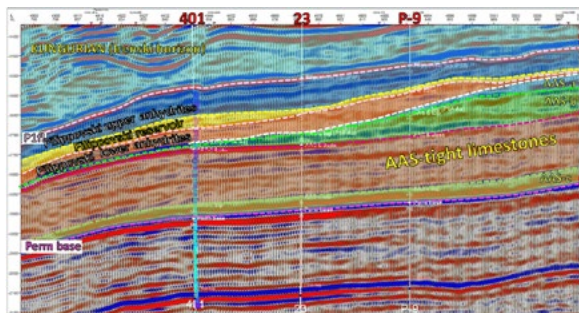
SERVICES: 3D Geological Model Update: 3D Structural Modelling, 3D Facies Modelling, 3D Petrophysical Modelling

COMMENCEMENT: September 2017

COMPLETION: October 2017

RESERVOIR STUDY INCLUDED:

- 1) New well data analysis and interpretation
- 2) Modified 3D geo-modeling parameters
- 3) 3D structural model update
- 4) 3D facies model update
- 5) 3D petrophysical model update
- 6) Volumetric calculations
- 7) Well integrity evaluations



PROJECT:

3D GEOLOGICAL STUDY UPDATE (CHINAREVSKOE GAS-OIL FIELD, FILIPPOVSKI FORMATION, CHINAREVSKOE FIELD)

CLIENT: ZhaikMunai LLP , Kazakhstan

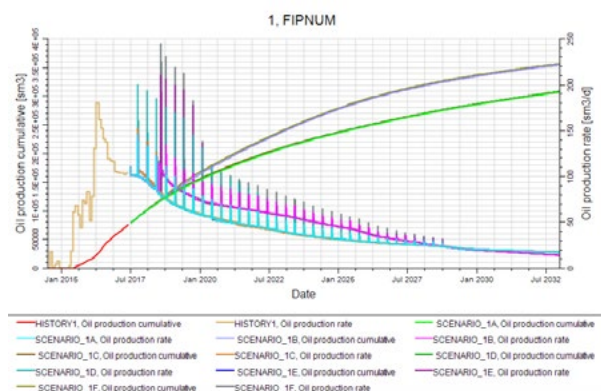
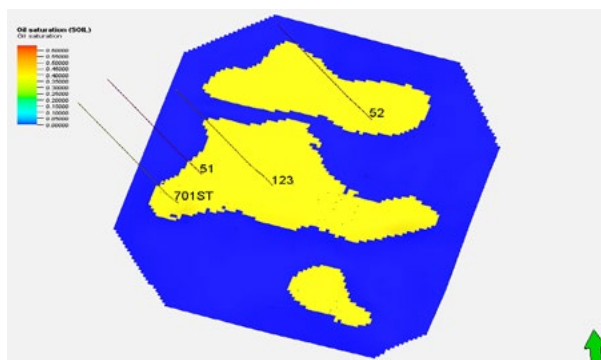
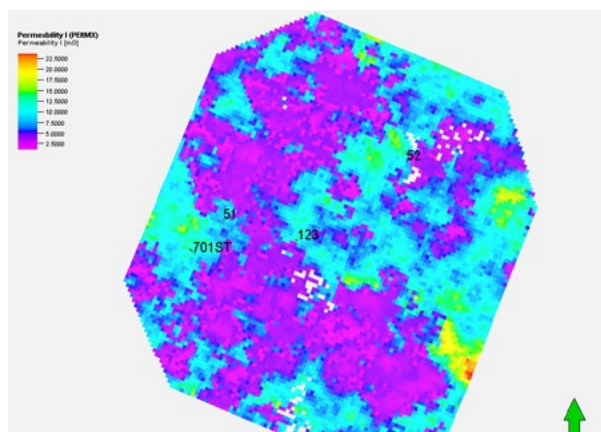
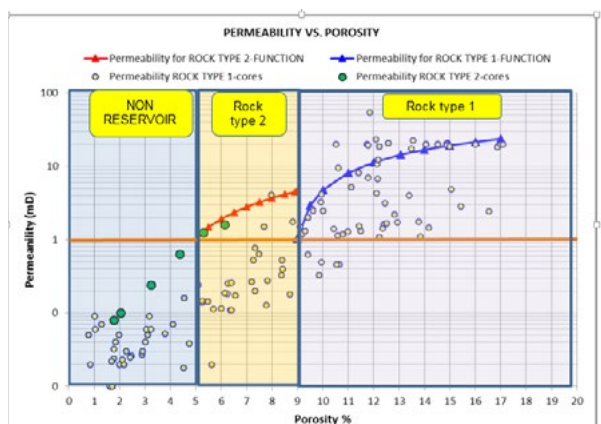
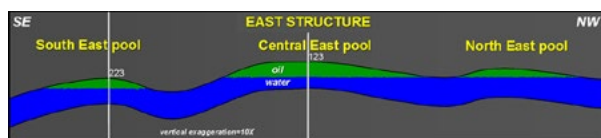
SERVICES: 3D Geological Model Building: 3D Structural Modelling, 3D Facies Modelling, 3D Petrophysical Modelling, Volumetric Calculations

COMMENCEMENT: June 2017

COMPLETION: October 2017

RESERVOIR STUDY INCLUDED:

- 1) Regional stratigraphy
- 2) Lithology and architecture
- 3) Reservoir and non-reservoir rocks
- 4) Reservoir properties
- 5) Depositional environment
- 6) 3D structural model
- 7) 3D facies model
- 8) Trapping mechanisms
- 9) 3D effective porosity model
- 10) 3D connected volumes model
- 11) 3D net to gross thickness model
- 12) 3D property model
- 13) 3D water saturation model
- 14) Hydrocarbon properties
- 15) Hydrocarbon pools
- 16) Volumetric calculations
- 17) Uncertainties



PROJECT:

3D SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, BASHKIRIAN FORMATION, EAST POOL)

CLIENT: ZhaikMunai LLP , Kazakhstan

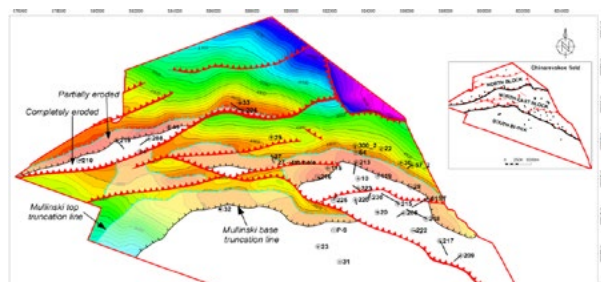
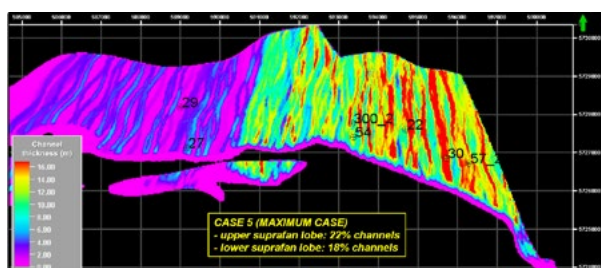
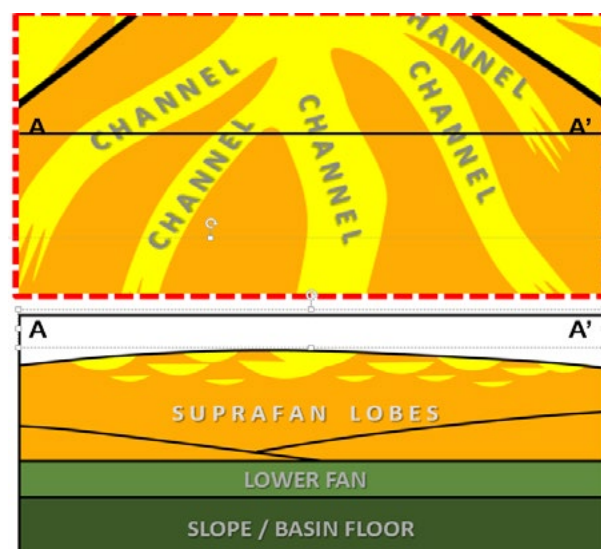
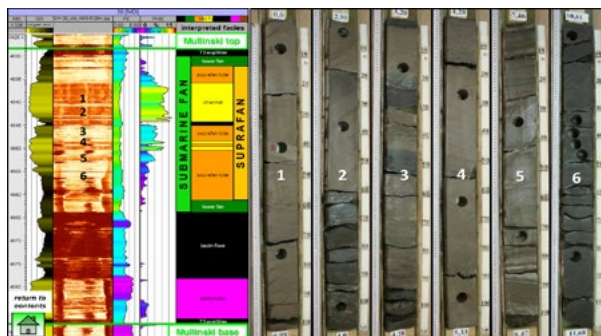
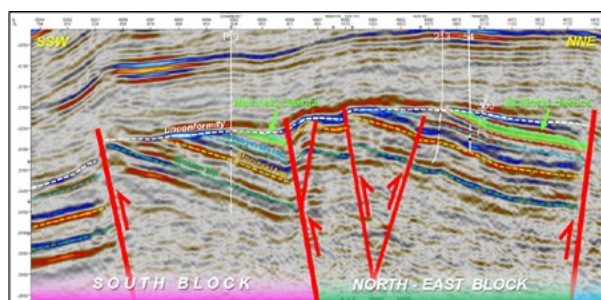
SERVICES: 3D Simulation Model Building, History Matching and Dynamic Modelling for Bashkirian Formation, East Pool

COMMENCEMENT: June 2017

COMPLETION: August 2017

RESERVOIR STUDY INCLUDED:

- 1) 3D model building:
 - Model dimensions
 - Reservoir porosity distribution
 - Rock type-permeability distribution
 - Relative permeability curves
 - Regionalization
 - Aquifer modeling
 - Fluid modeling
 - Initial conditions / Initial fluid in place
- 2) History match approach (calibration of the model by satisfactory matching between calculated and observation data (production and pressure data))
- 3) Establishing a basic scenario which served for comparison of all the other field development cases
- 4) Working out prediction scenarios that reflected different development options in the field
- 5) One of the main goals was to investigate production deliverability of three pools (North East, Central East and South East pool)
- 6) Well integrity evaluations (simulation - ECLIPSE 300)



PROJECT:

3D GEOLOGICAL STUDY UPDATE (CHINAREVSKOE GAS-OIL FIELD, MULLINSKI FORMATION, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP , Kazakhstan

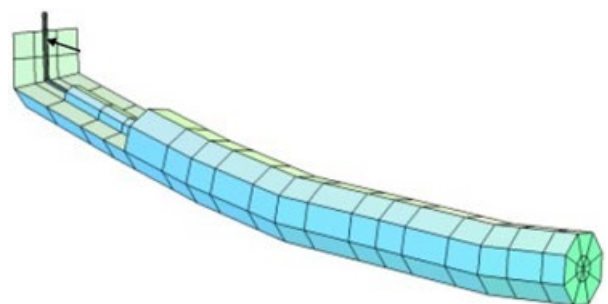
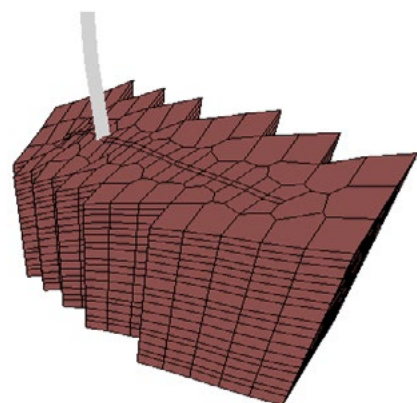
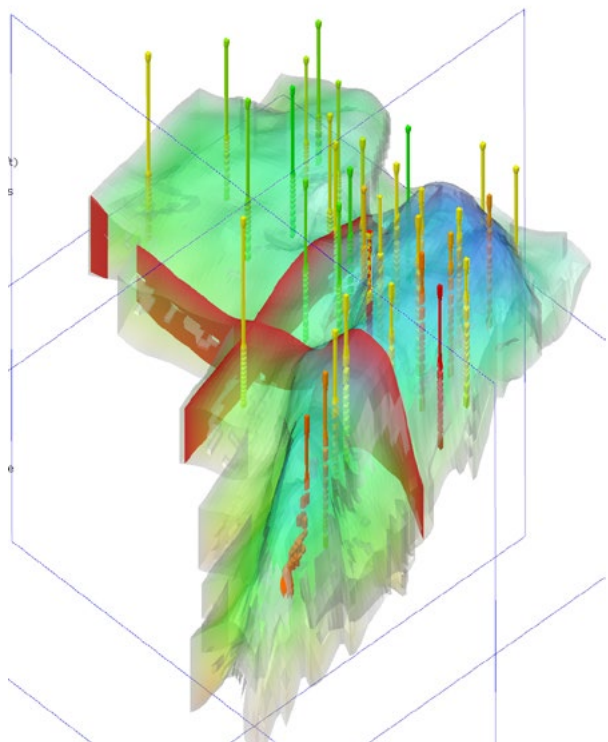
SERVICES: 3D Geological Model Building: 3D Structural Modelling, 3D Facies Modelling, 3D Petrophysical Modelling

COMMENCEMENT: February 2017

COMPLETION: June 2017

RESERVOIR STUDY INCLUDED:

- 1) Tectonic style
- 2) Lithology and architecture
- 3) Depositional environment
- 4) Reservoir rock properties
- 5) Trapping mechanisms
- 6) 3D structural modelling
- 7) 3D facies modelling
- 8) 3D petrophysical modelling
- 9) Volumetric calculations
- 10) Main uncertainties highlights



PROJECT:

**WELL AND CAP ROCK INTEGRITY STUDY FOR A RESERVOIR
IN COMPLEX GEOLOGICAL SETTING SUBJECT TO MASSIVE
WATER INJECTION**

CLIENT: NOC Subsidiary - North Africa

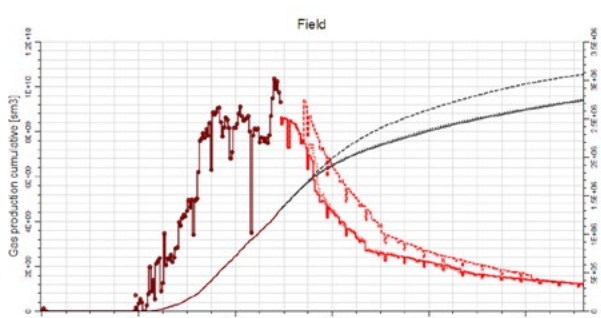
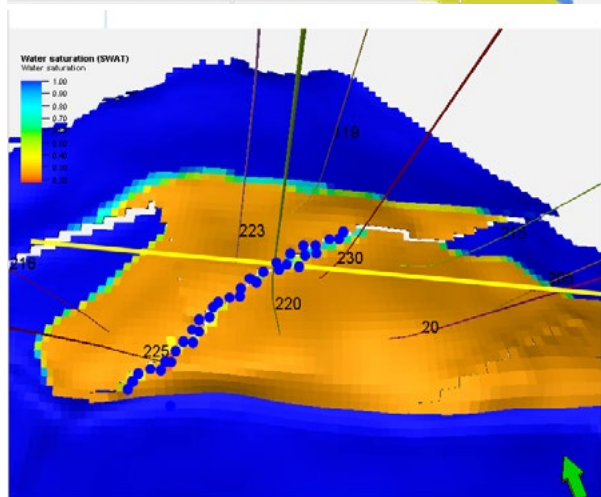
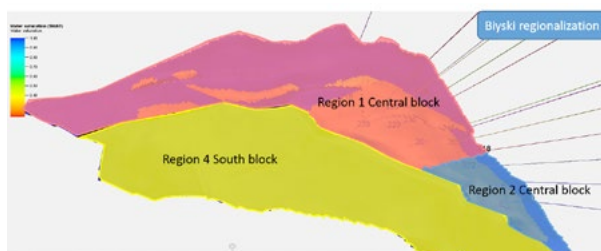
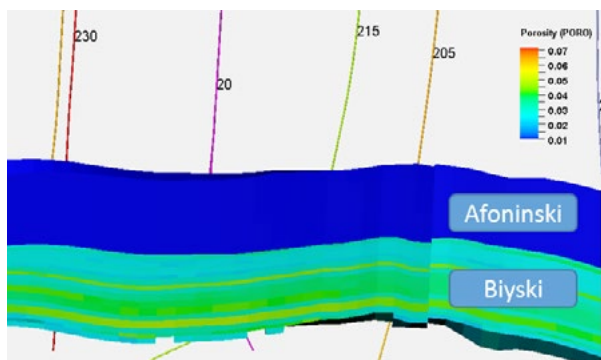
SERVICES: Geological and Dynamic Reservoir Modelling,
Assisted History Matching Focusing on Assessment of
Cap-Rock Integrity and Workover Program Development

COMMENCEMENT: March 2016

COMPLETION: May 2017

SERVICES INCLUDED:

- 1) Geophysical and petrophysical audit
- 2) Material balance and water influx evaluation
- 3) Dynamic model building
- 4) Assisted history matching
- 5) Identification of areas with potential cap rock fracturing
- 6) Ranking of wells potentially suffering from well integrity issues
- 7) Work over program design
- 8) Reservoir management strategy to initiate fracture closure and mitigate risk of further cap rock fracturing



PROJECT:

3D SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, AFONINSKI+BIYSKI FORMATIONS, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP , Kazakhstan

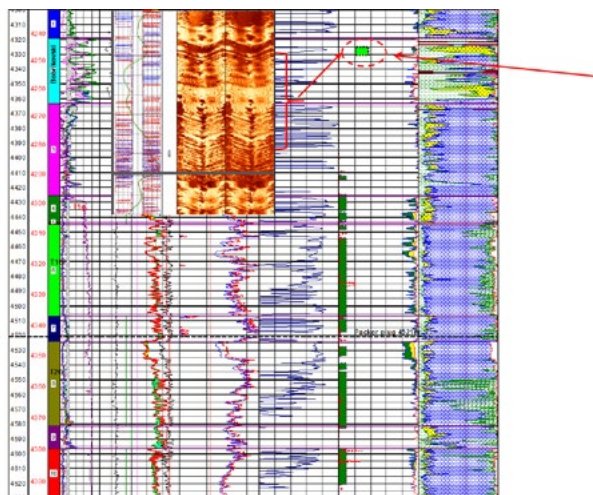
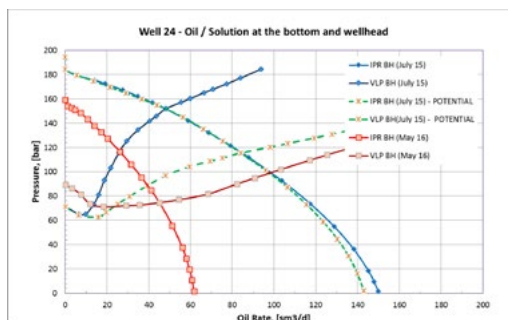
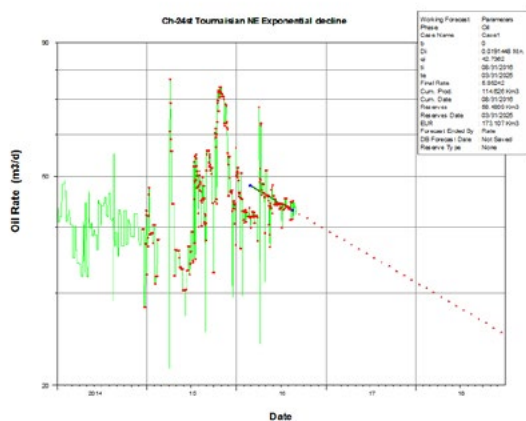
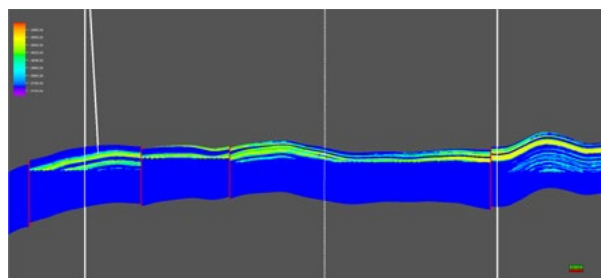
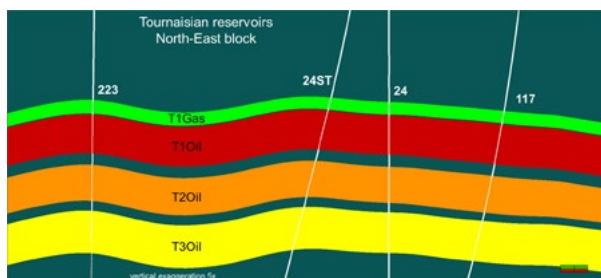
SERVICES: 3D Simulation Model Up-dating, History Matching and Dynamic Modelling for Afoninski and Biyski Formations, North-East Block

COMMENCEMENT: February 2017

COMPLETION: May 2017

RESERVOIR STUDY INCLUDED:

- 1) Key points-Afoninski activity, water production and gas-condensate ratio
- 2) 3D model building:
 - Model dimensions
 - Reservoir porosity distribution
 - Rock type-permeability distribution
 - Relative permeability curves
 - Regionalization
 - Aquifer modeling
 - Fluid modeling
 - Initial conditions / Initial fluid in place
- 3) History match approach (calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 4) Establishing a basic scenario which served for comparison of all the other field development cases
- 5) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 6) One of the main goals was to investigate production deliverability of unconventional Afoninski reservoir using multistage fracturing
- 7) Well integrity evaluations simulation - ECLIPSE 300



PROJECT:

WA-WPA STUDY (CHINAREVSKOE GAS-OIL FIELD, ALL DRILLED WELLS ON LICENSE AREA)

CLIENT: ZhaikMunai LLP , Kazakhstan

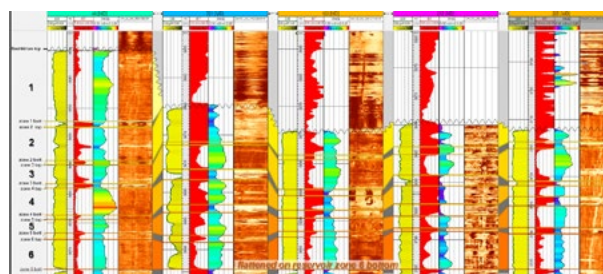
SERVICES: Well Analysis-Well Problem Analysis, Estimation of New Well Opportunities for Each Well on the License Area

COMMENCEMENT: September 2016

COMPLETION: April 2017

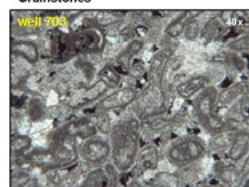
RESERVOIR STUDY INCLUDED:

- 1) The main geological features
- 2) Well log re-interpretations
- 3) Work over history
- 4) Production history and production forecast (3D simulation results, decline analysis); PLT and WT history
- 5) Well integrity evaluations & solutions
- 6) Nodal analysis and ALS analysis
- 7) Production optimization, production increment estimations
- 8) Well problem(s) identification/ Definition and solution proposal
- 9) New opportunities, selection feasible opportunities, and schedule definition
- 10) Operations duration and cost estimate



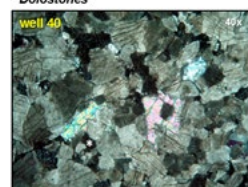
- intergranular porosity

Grainstones



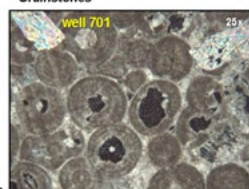
- intercrystalline porosity

Dolostones



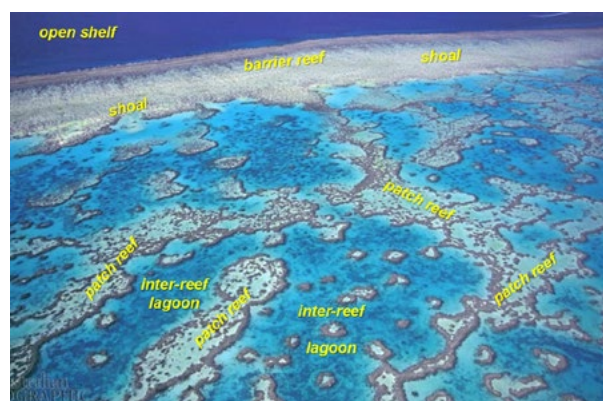
- intragranular porosity

Grainstones



- intragranular porosity

Bafflestones



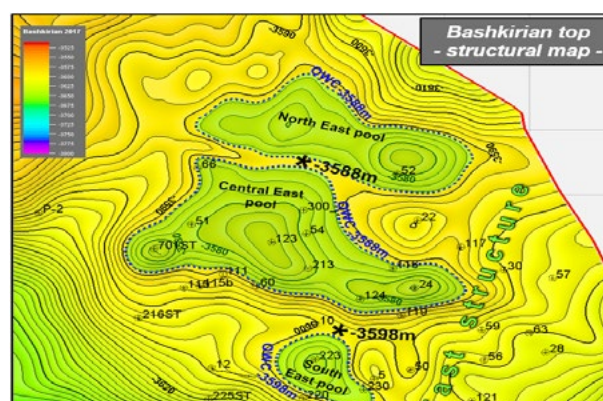
Depositional environments of Lower Bashkirian limestones (sketch)



patch reefs:
grainstones
rudstones
grainstones

shoals:
grainstones
rudstones

lagoons:
grainstones
rudstones
wackestones



PROJECT:

3D GEOLOGICAL MODEL (CHINAREVSKOE GAS-OIL FIELD, BASHKIRIAN FORMATION, EAST POOL)

CLIENT: ZhaikMunai LLP , Kazakhstan

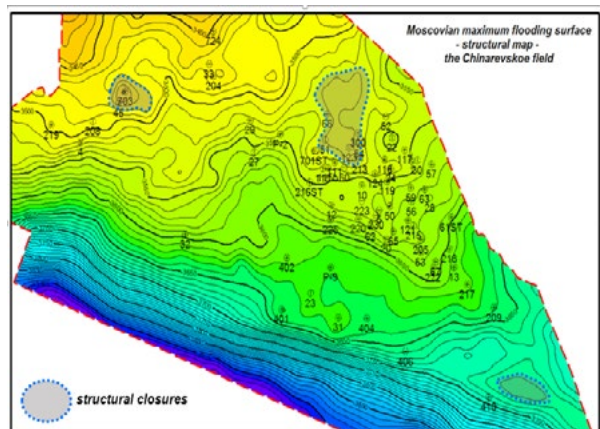
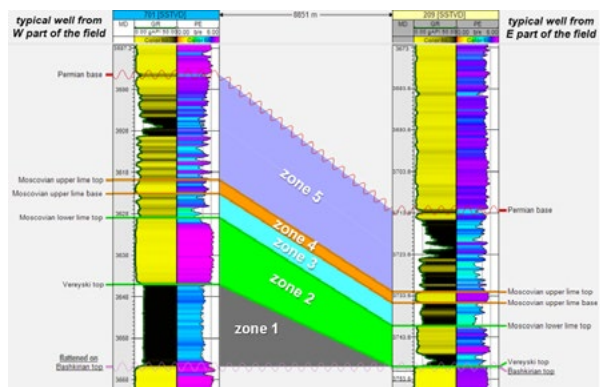
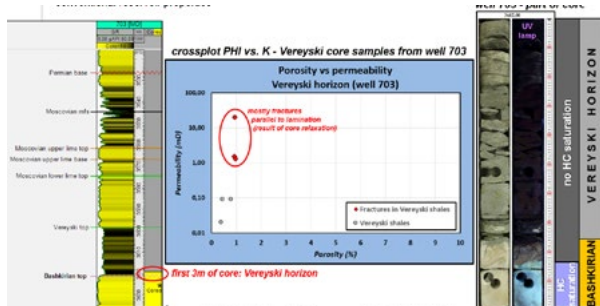
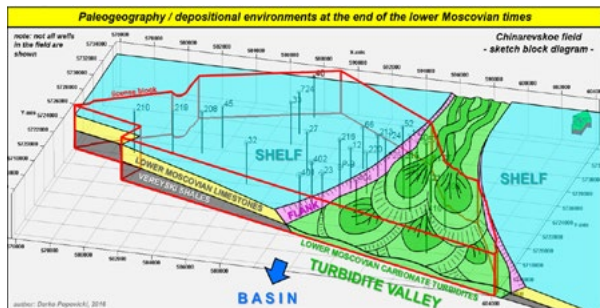
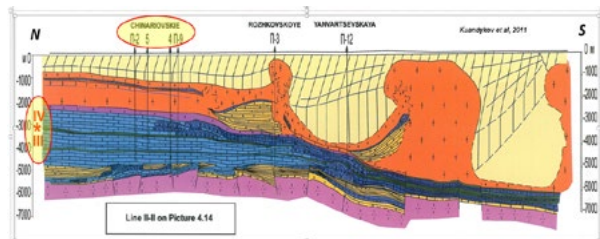
SERVICES: 3D Geological Model Up-dating

COMMENCEMENT: December 2016

COMPLETION: February 2017

RESERVOIR STUDY INCLUDED:

- 1) Stratigraphic analysis and interpretation
- 2) Analysis of lithology
- 3) Reservoir properties analysis
- 4) Depositional style
- 5) Tectonic style
- 6) Well correlation
- 7) 3D structural modelling
- 8) 3D facies modelling
- 9) 3D petrophysical modelling
- 10) HC in place calculation



PROJECT:

MOSCOVIAN HORIZON: A DEEPER INSIGHT INTO THE GEOLOGY AND HYDROCARBON POTENTIAL OF THE MOSCOVIAN STAGE IN THE CHINAREVSKOE FIELD BLOCK)

CLIENT: ZhaikMunai LLP , Kazakhstan

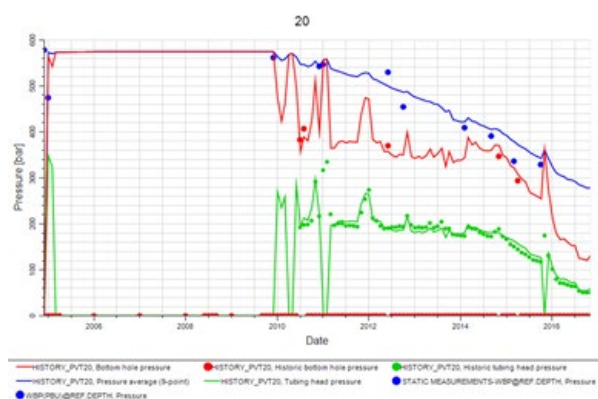
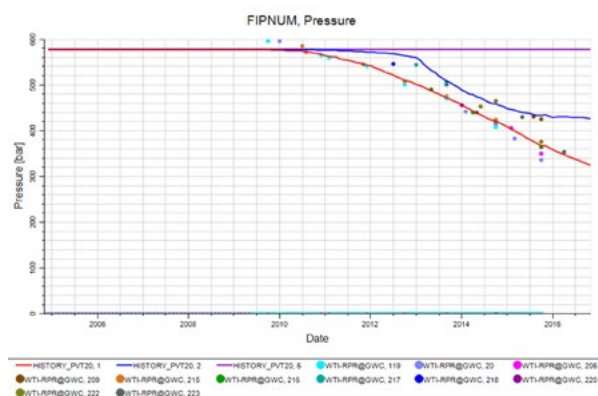
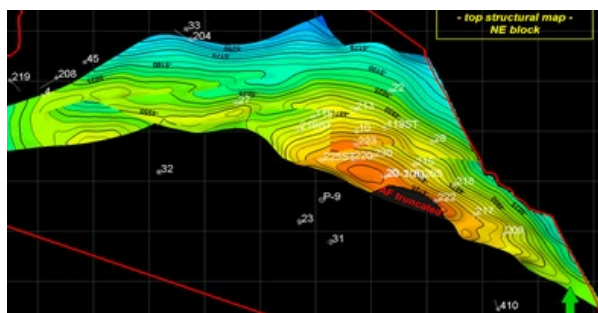
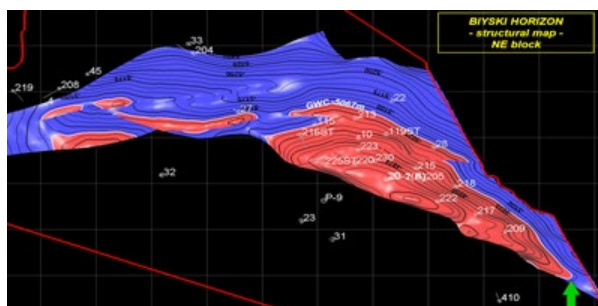
SERVICES: Analysis of all available data to describe main geological features and to estimate hydrocarbon potential of Moscovian Formation

COMMENCEMENT: December 2016

COMPLETION: January 2017

RESERVOIR STUDY INCLUDED:

- 1) Analysis of stratigraphy
- 2) Sedimentology
- 3) Analysis of lithology
- 4) Sequence stratigraphy analysis
- 5) Structural morphology
- 6) Reservoir properties
- 7) Trapping mechanisms
- 8) Source rock properties
- 9) Well proposed for testing



PROJECT:

3D SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, AFONINSKI+BIYSKI FORMATIONS, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP , Kazakhstan

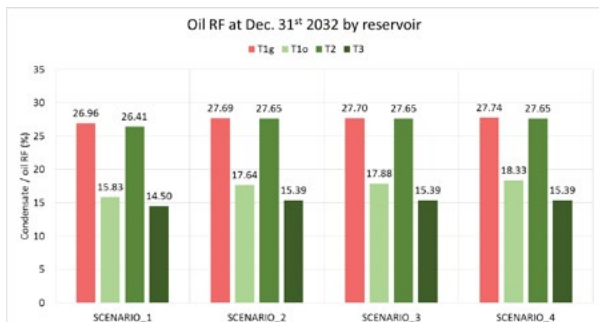
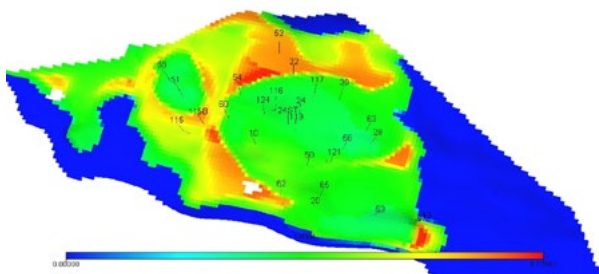
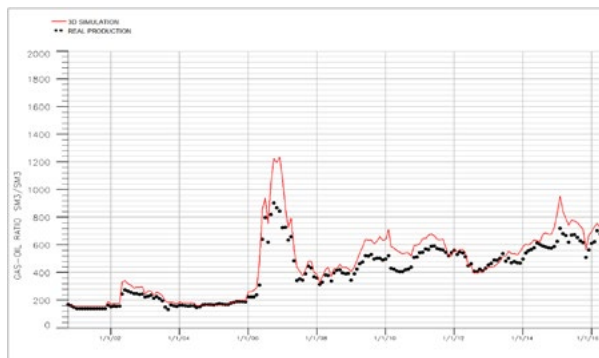
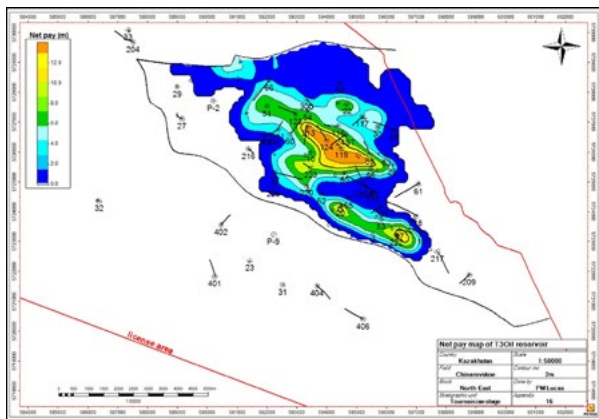
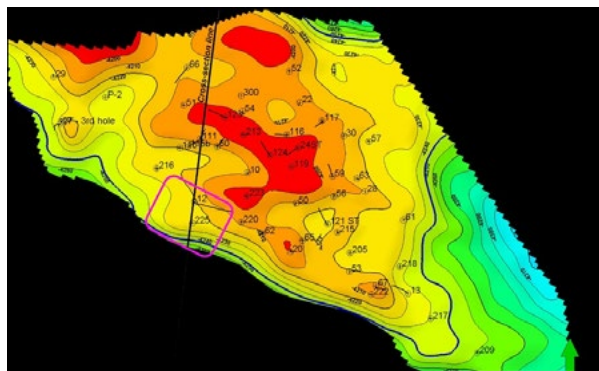
SERVICES: 3D Geological Model Up-dating, History Matching and Dynamic Modelling for Afoninski and Biyski Formations, North-East Block

COMMENCEMENT: November 2016

COMPLETION: November 2016

RESERVOIR STUDY INCLUDED:

- 1) The 3D geological model up-dating (structural and petrophysical) based on new information (new well production data, pressure transient data, PLT interpretation data); in the model is included Afoninski reservoir
- 2) OOIP calculation
- 3) 3D simulation model building based on updated 3D geological model
- 4) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 5) In simulation was used ECLIPSE 300
- 6) Establishing a basic scenario which served for comparison of all the other field development cases
- 7) Working out prediction scenarios that reflected different development options and operating conditions in the field; one of the main goals was to investigate production deliverability of unconventional Afoninski reservoir using multistage fracturing
- 8) Well integrity evaluations
- 9) Providing a range of forecast results that will be used further to update the best development plan



PROJECT:

3D SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, TOURNAISIAN FORMATION, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP , Kazakhstan

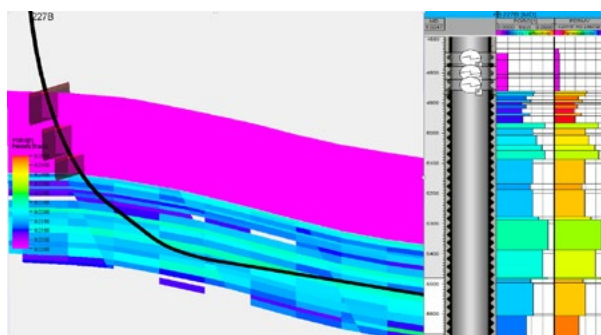
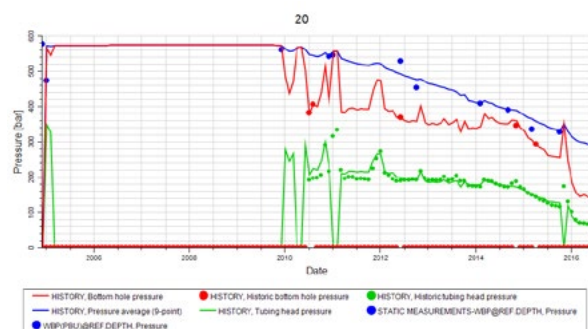
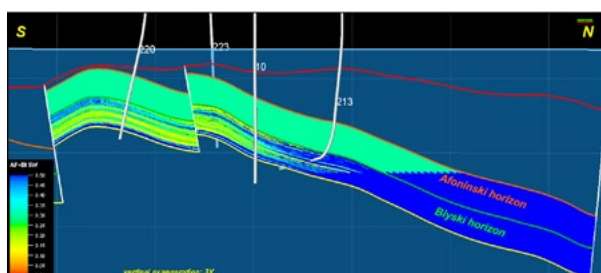
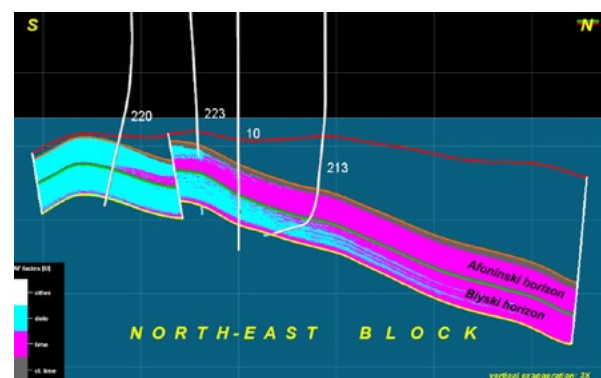
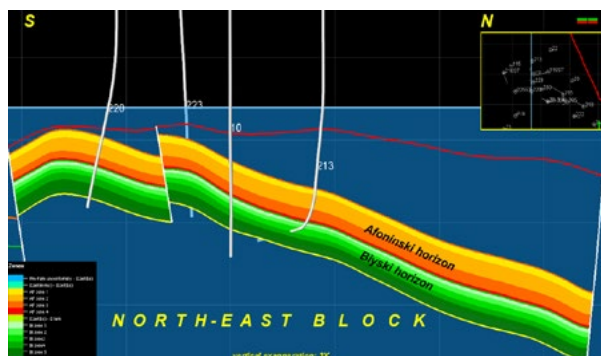
SERVICES: 3D Geological Model Up-dating, History Matching and Dynamic Modelling for Tournaisian Formation, North-East Block

COMMENCEMENT: June 2016

COMPLETION: June 2016

RESERVOIR STUDY INCLUDED:

- 1) The 3D geological model updating (structural and petrophysical) based on new information (new well production data, pressure transient data, PLT interpretation data)
- 2) OOIP calculation
- 3) 3D simulation model building based on updated 3D geological model
- 4) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 5) In simulation was used ECLIPSE 300
- 6) Establishing a basic scenario, which served for comparison of all the other field development cases
- 7) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 9) Providing a range of forecast results that will be used further to update the best development plan



PROJECT:

3D SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, AFONINSKI+BIYSKI FORMATIONS, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP , Kazakhstan

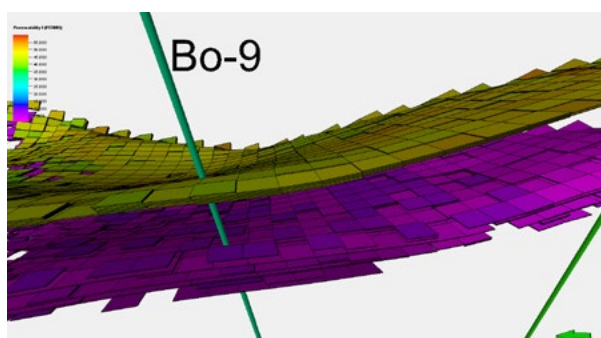
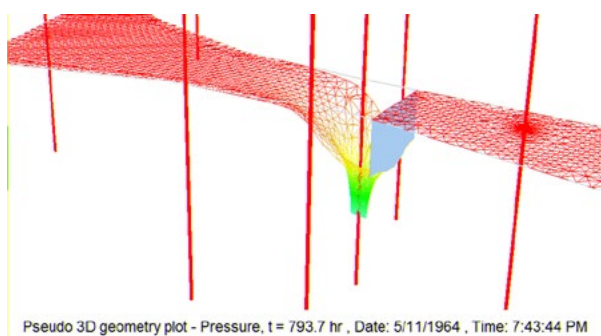
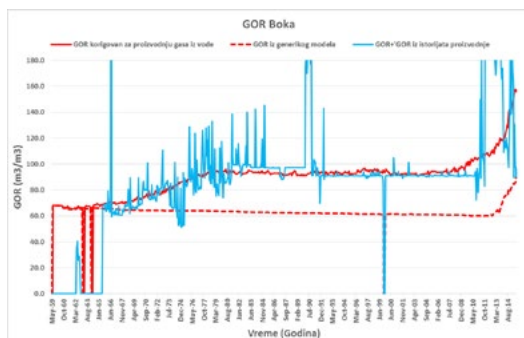
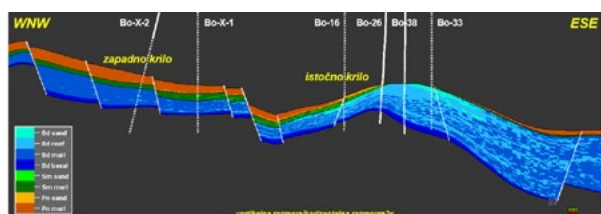
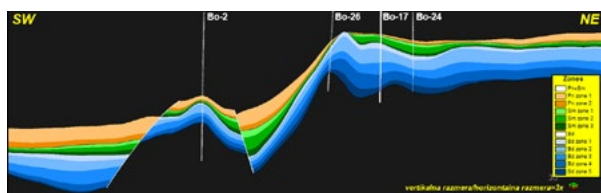
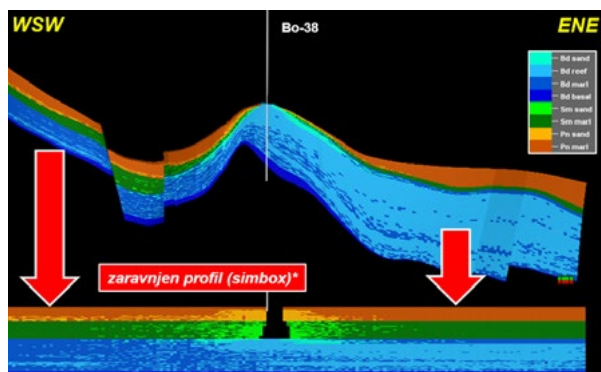
SERVICES: 3D Geological Model Up-dating, History Matching and Dynamic Modelling for Afoninski and Biyski Formations, North-East Block

COMMENCEMENT: May 2016

COMPLETION: June 2016

RESERVOIR STUDY INCLUDED:

- 1) The 3D geological model updating (structural and petrophysical) based on new information (neW well production data, pressure transient data, PLT interpretation data); in the model is included Afoninski reservoir
- 2) OOIP calculation
- 3) 3D simulation model building based on updated 3D geological model
- 4) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 5) In simulation was used ECLIPSE 300
- 6) Establishing a basic scenario, which served for comparison of all the other field development cases
- 7) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 8) One of the main goals was to investigate production deliverability of unconventional Afoninski reservoir using multistage fracturing
- 9) Providing a range of forecast results that will be used further to update the best development plan



PROJECT:

RESERVOIR STUDY OF THE OIL FIELD BOKA

CLIENT: NIS a.d. Novi Sad, Serbia

SERVICES: 3D Geological Model Building, OOIP Calculation, RF and Recoverable Reserves Calculation, Production Profile Estimation, Techno-economical Calculation and Verification of the HC Reserves with Republic of Serbia State Authorities

COMMENCEMENT: September 2015

COMPLETION: June 2016

RESERVOIR STUDY INCLUDED:

1) The 3D geological model building

- Structural model building
- Facial modeling
- Petrophysical model building
- In 3D modeling were used all available information (3D seismic data, well data, production data, pressure transient data, laboratory core and fluid data, PVT data)

2) OOIP calculation

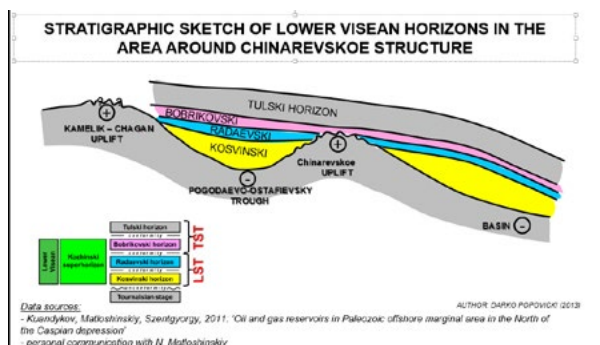
3) Estimation of RF for all reservoirs within area of interest

4) Recoverable reserves and future production profile calculation by:

- Statistical method
- Material balance
- 3D simulation

5) Techno-economical estimation of the reserves

6) Verification of remained recoverable reserves of oil and gas with Republic of Serbia state authorities



PROJECT:

3D GEOLOGICAL MODEL UPDATE (CHINAREVSKOE GAS-OIL FIELD, BOBRIKOVSKI FORMATION-LOWER VISEAN STAGE (C₁²) OF EARLY CARBONIFEROUS)

CLIENT: ZhaikMunai LLP , Kazakhstan

SERVICES: Data QC, 3D Geological Model updating, HC Volume Calculations

COMMENCEMENT: January 2016

COMPLETION: April 2016

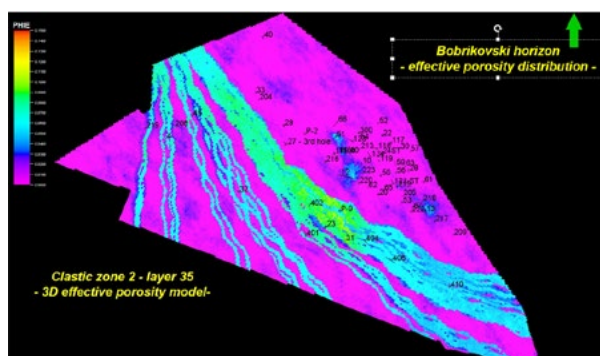
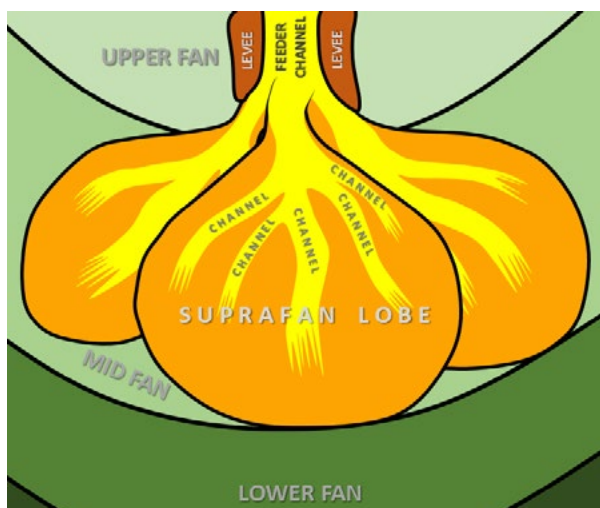
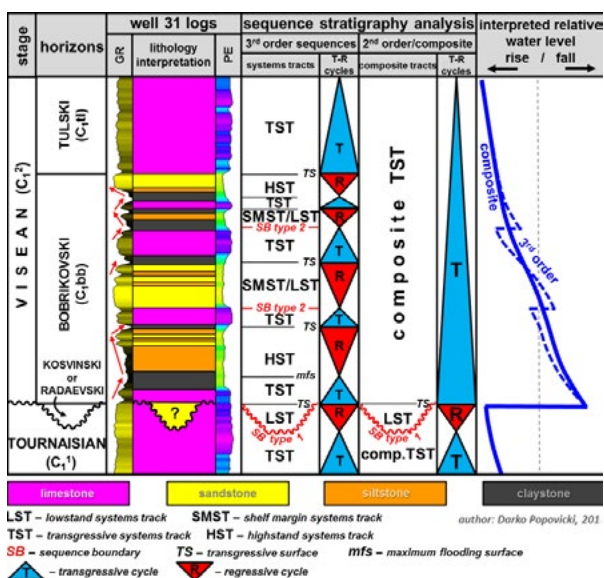
RESERVOIR STUDY INCLUDED:

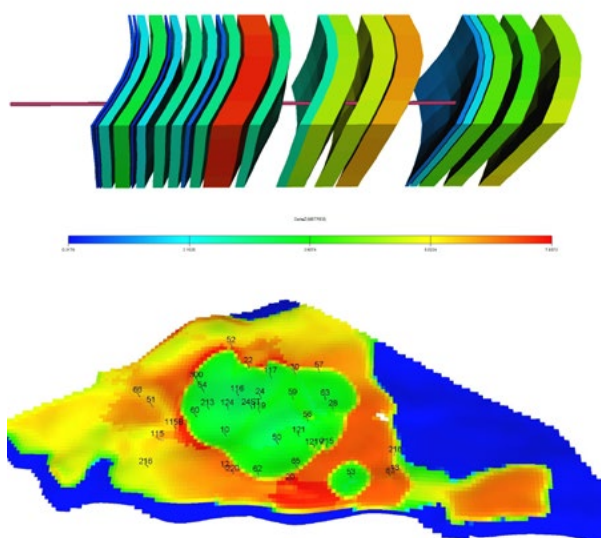
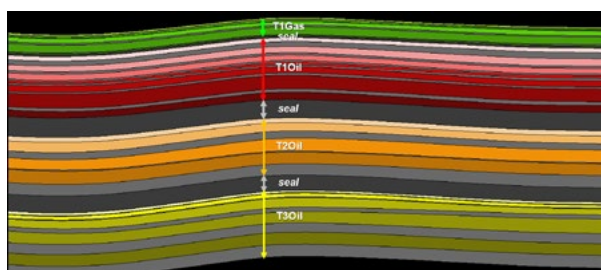
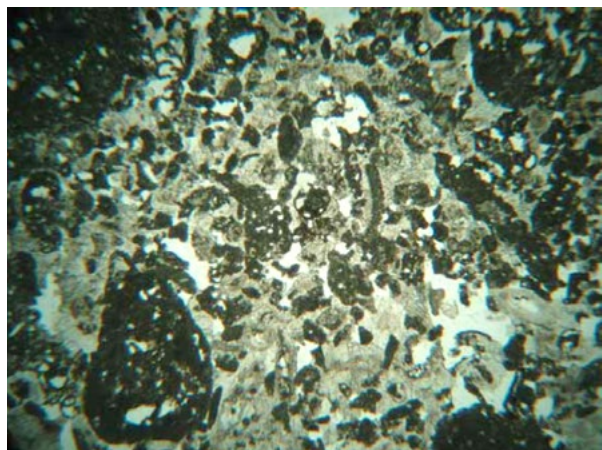
1) 3D GEOLOGICAL MODEL UPDATE

- 3D structural modeling
- 3D facies modeling
- 3D petrophysical modeling

2) HC VOLUMES

- Deterministic approach (volumetric calculation)
- Probabilistic approach (Monte Carlo simulation)





PROJECT:

3D SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, TOURNAISIAN FORMATION, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP , Kazakhstan

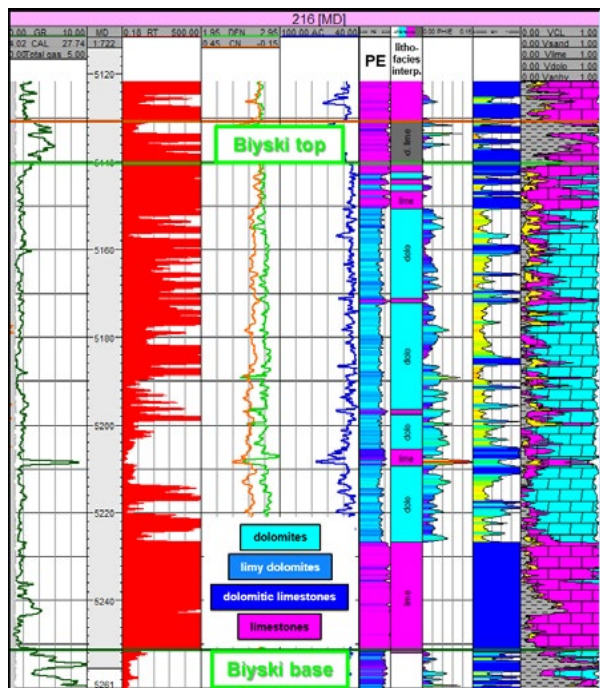
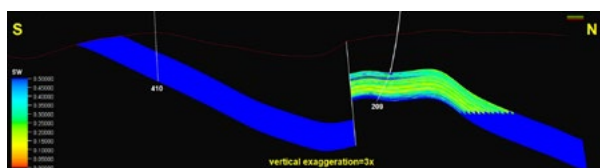
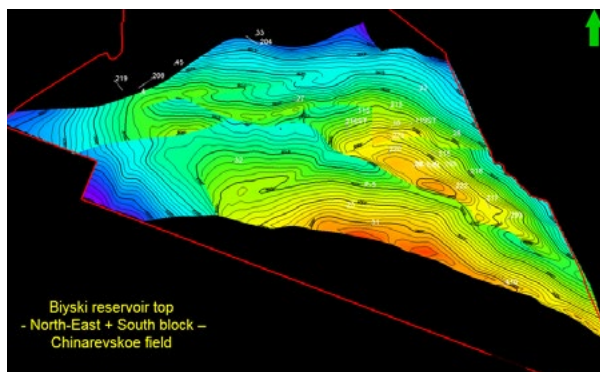
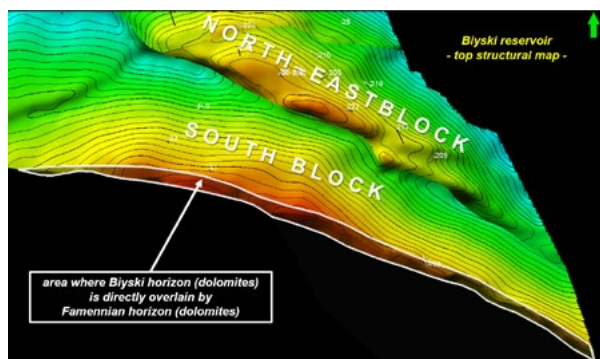
SERVICES: 3D Geological Model Up-dating, History Matching and Dynamic Modelling for Tournaisian Formation, North-East Block

COMMENCEMENT: August 2015

COMPLETION: December 2015

RESERVOIR STUDY INCLUDED:

- 1) The 3D geological model updating (structural and petrophysical) based on new information (production data, pressure transient data, PLT interpretation data)
- 2) OOIP calculation
- 3) 3D simulation model building based on updated 3D geological model
- 4) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 5) In simulation was used ECLIPSE 300
- 6) Flooding system-pressure maintenance control and improvement were considered
- 7) GL system as artificial method was applied
- 8) Establishing a basic scenario, which served for comparison of all the other field development cases
- 9) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 10) Providing a range of forecast results that will be used further to update the best development plan



PROJECT:

3D SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, BIYSKI FORMATION, NORTH-EAST + SOUTH BLOCK)

CLIENT: ZhaikMunai LLP, Kazakhstan

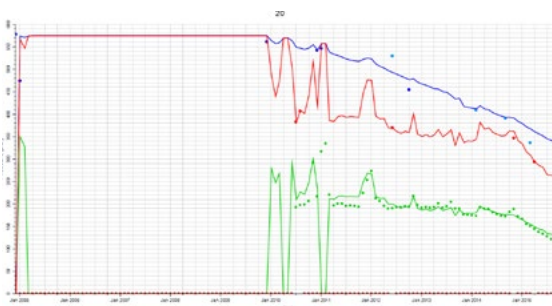
SERVICES: 3D Geological Model Building, History Matching and Dynamic Modelling for Biyski Formation, North-East + South Block

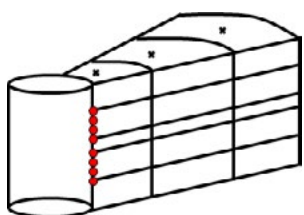
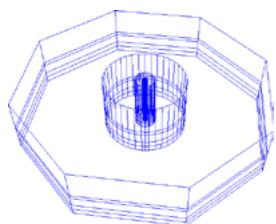
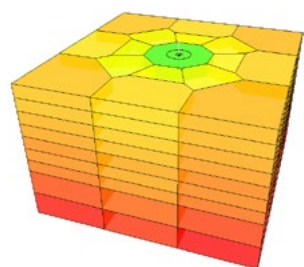
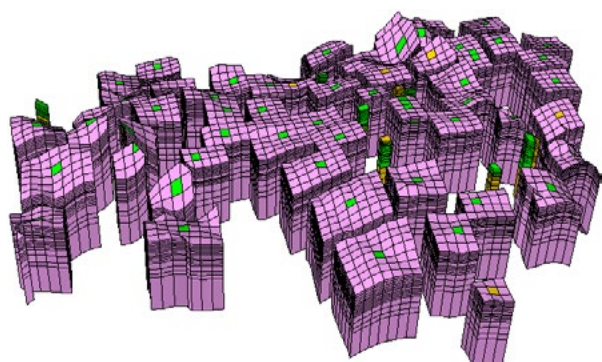
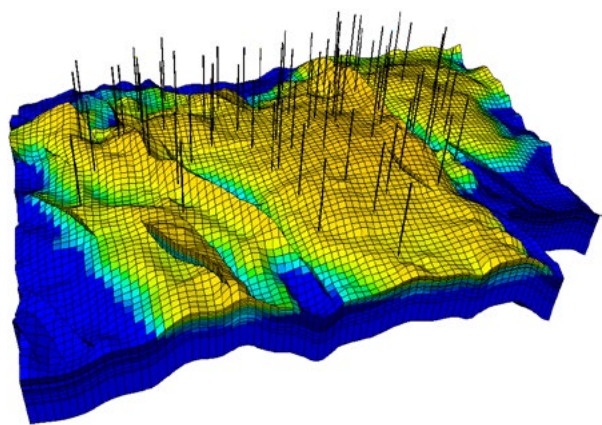
COMMENCEMENT: August 2015

COMPLETION: December 2015

RESERVOIR STUDY INCLUDED:

- 1) The 3D geological model building (structural and petrophysical) based on new information (production data, pressure transient data, PLT interpretation data)
- 2) OOIP calculation
- 3) 3D simulation model building based on 3D geological model
- 4) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 5) In simulation was used ECLIPSE 300
- 6) VLP tables were prepared and applied in 3D simulation
- 7) Based on pressure data, communication between N-E and S block was simulated
- 8) Establishing a basic scenario, which served for comparison of all the other field development cases
- 9) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 10) Providing a range of forecast results that will be used further to update the best development plan





PROJECT:

ASSESSMENT OF FLOW BEHIND CASING – WELL INTEGRITY STUDY FOR A NATURALLY FRACTURED RESERVOIR

CLIENT: NOC Subsidiary - North Africa

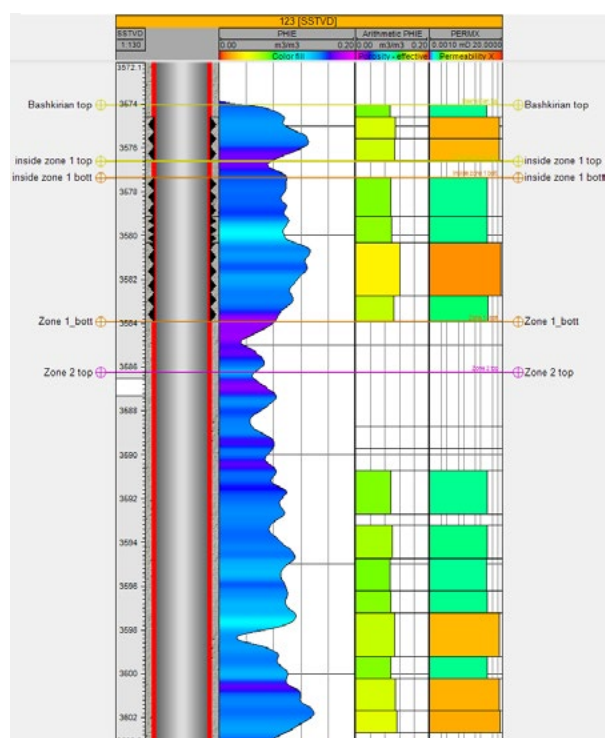
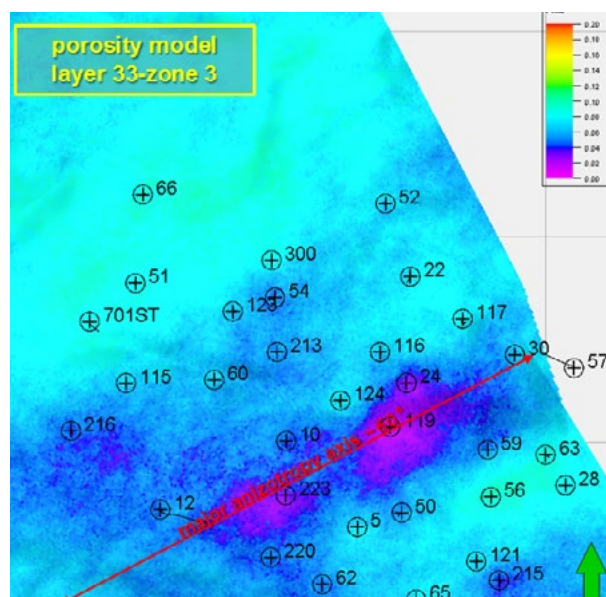
SERVICES: Numerical Modelling to Identify Wells Potentially Suffering from Flow Behind Casing - Charging from Overlying Aquifer

COMMENCEMENT: February 2015

COMPLETION: November 2015

SERVICES INCLUDED:

- 1) Dynamic model audit and re-evaluation
- 2) Assisted history matching update
- 3) Identification of wells suffering from external water charging
- 4) In-depths analysis of problem wells
 - Casing corrosion
 - Distorted cement bond
 - Leaking packers
- 6) Elaboration of workover program



PROJECT:

3D SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, BASHKIRIAN FORMATION-EAST POOL, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP , Kazakhstan

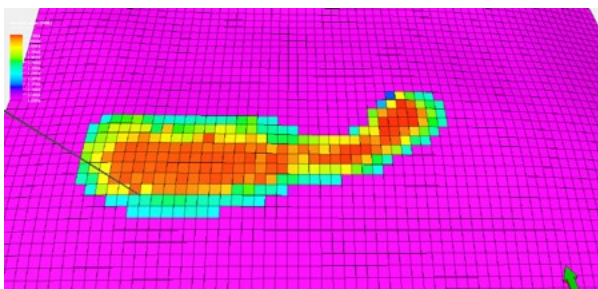
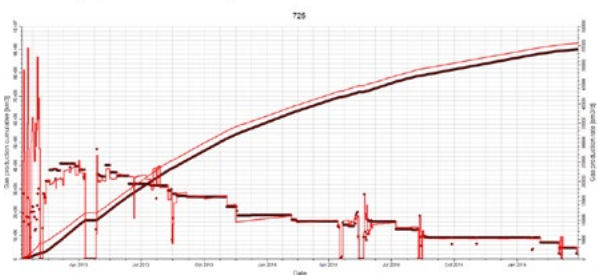
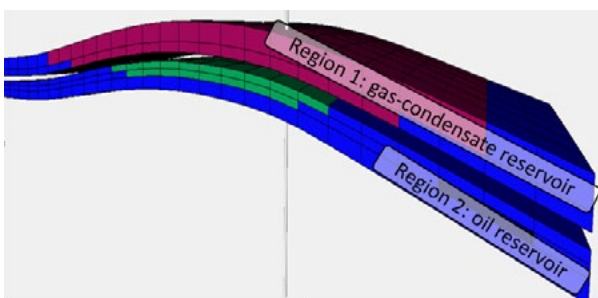
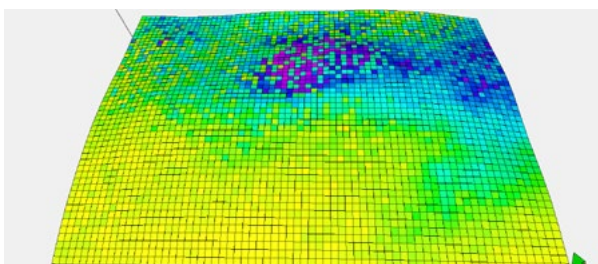
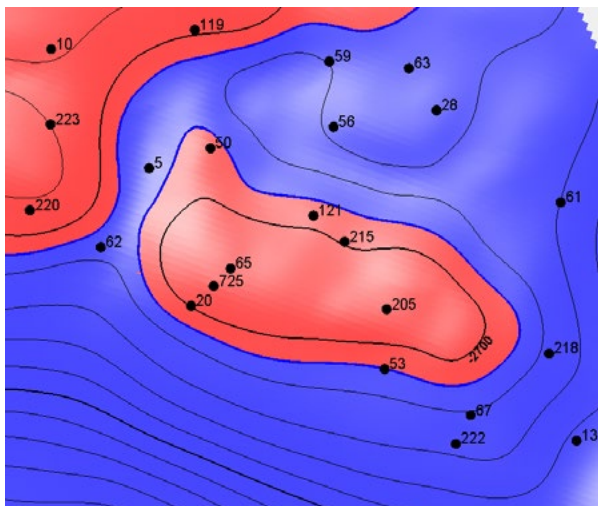
SERVICES: 3D Geological Model Building, History Matching and Dynamic Modelling for Bashkirian Formation-East Pool, North-East Block

COMMENCEMENT: May 2015

COMPLETION: September 2015

RESERVOIR STUDY INCLUDED:

- 1) 3D geological model building (structural and petrophysical) based on new information (production data, pressure transient data, PLT interpretation data)
- 2) OOIP calculation
- 3) 3D simulation model building based on updated 3D geological model
- 4) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 5) In simulation was used ECLIPSE 100
- 6) Establishing a basic scenario, which served for comparison of all the other field development cases
- 7) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 9) Providing a range of forecast results that will be used further to update the best development plan



PROJECT:

SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, FILIPPOVSKI FORMATION-SECTOR MODEL, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP , Kazakhstan

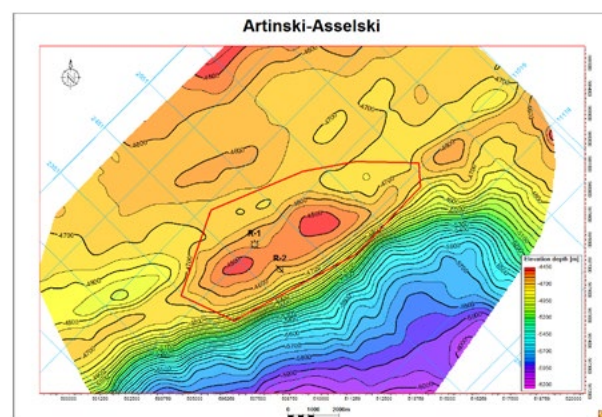
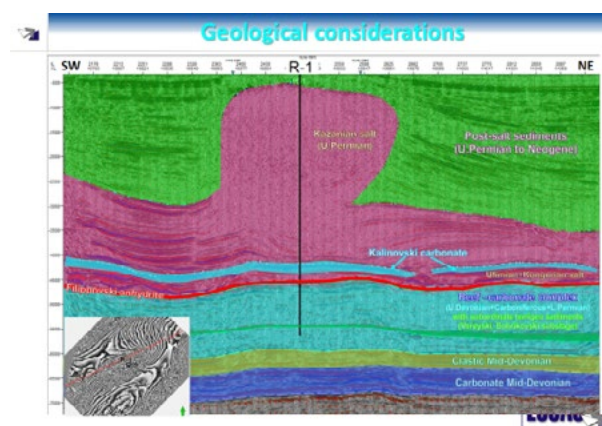
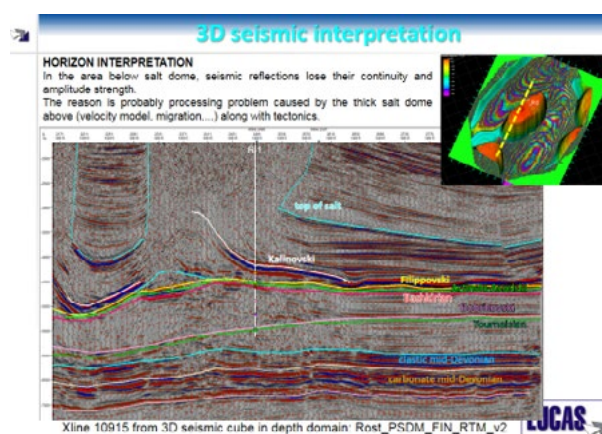
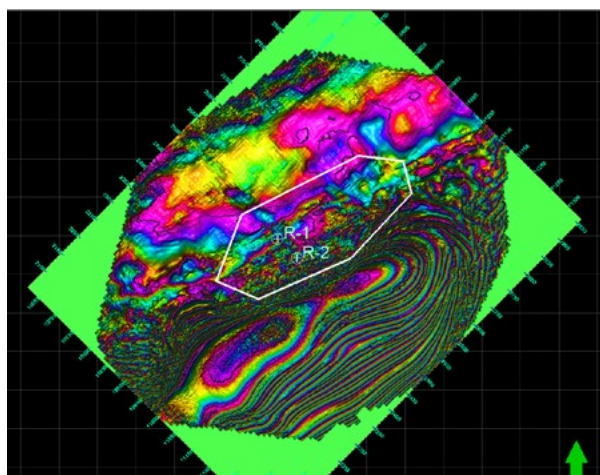
SERVICES: 3D Geological Model Updating, History Matching and Dynamic Modelling for Filippovski Formation-Sector model, North-East Block

COMMENCEMENT: April 2015

COMPLETION: May 2015

RESERVOIR STUDY INCLUDED:

- 1) The geological model updating (structural and petrophysical) based on new information (production data, pressure transient data, PLT interpretation data)
- 2) OOIP calculation
- 3) 3D simulation model building based on updated 3D geological model
- 4) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 5) In simulation was used ECLIPSE 300 for oil reservoir and for gas condensate reservoir
- 6) Well was considered as unique systems (commingled production from oil and gas-condensate reservoir). Well Integrity Evaluations performed
- 7) Establishing a basic scenario, which served for comparison of all the other field development cases
- 8) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 9) Providing a range of forecast results that will be used further to update the best development plan



PROJECT:

2D GEOLOGICAL STUDY OF: KALINOVSKI CARBONATES (P₂kz, - UPPER PERMIAN), ARTINSKI-ASSELSKI CARBONATES (P₁a-ass - LOWER PERMIAN) AND BASHKIRIAN CARBONATES (C₂b - MIDDLE CARBONIFEROUS)

CLIENT: **Nostrum Oil & Gas PLC, Netherlands**

SERVICES: Geological Considerations, 3D Seismic Interpretation, Structural Mapping, HC Volumes In Place Estimation, Proposal for Further Drilling

COMMENCEMENT: **March 2015**

COMPLETION: June 2015

SERVICES INCLUDED:

1) AVAILABLE DATA REVIEW

- Basic well data
- Well log data
- 3D Seismic data

2) GEOLOGICAL CONSIDERATIONS

- Regional geological setting
- Well log correlation
- Reservoir rocks
- Cap rocks

3) 3D SEISMIC INTERPRETATION

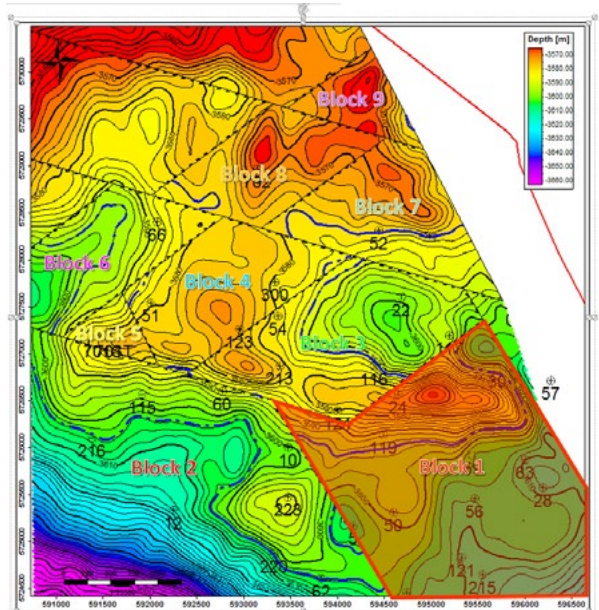
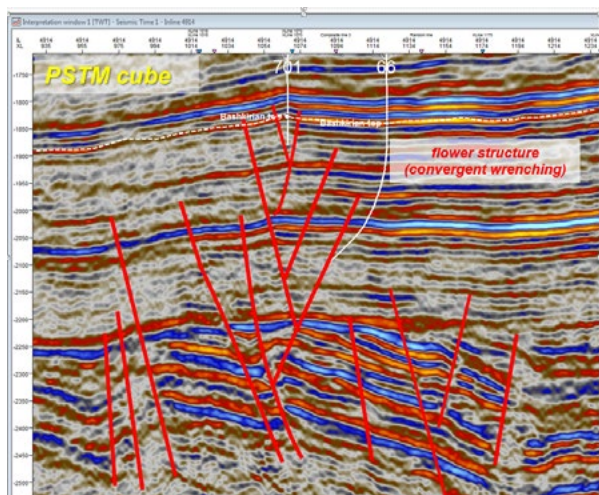
- Well to seismic tie
- Horizon interpretation

4) STRUCTURAL MAPPING

5) HC VOLUMES IN PLACE ESTIMATION

- OOIIP estimation by MC simulation

6) PROPOSAL FOR FURTHER DRILLING



PROJECT:

RESERVOIR STUDY- BASHKIRIAN OIL RESERVOIR (EAST POOL)

CLIENT: ZhaikMunai LLP, Kazakhstan

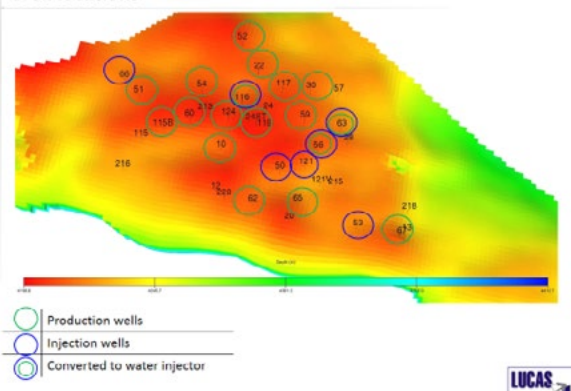
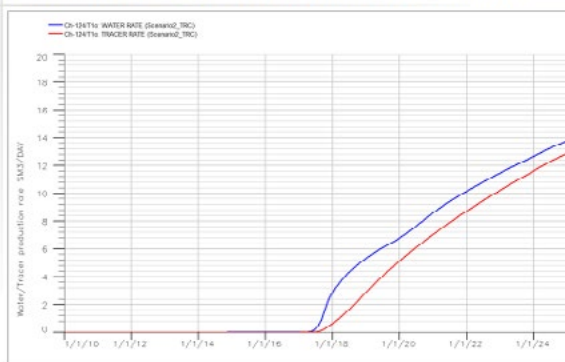
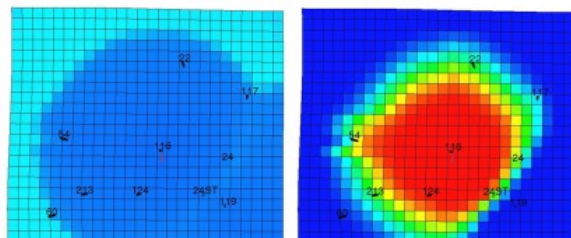
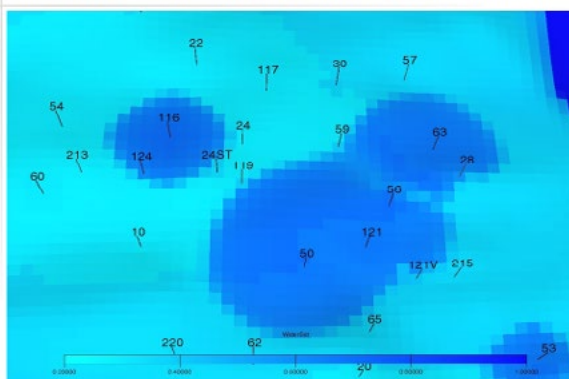
SERVICES: 3D Geological Model Building, Mapping Oil Pool(s), OOIP Calculations, Locations for Appraisal Well(s)

COMMENCEMENT: March 2015

COMPLETION: April 2015

RESERVOIR STUDY INCLUDED:

- 1) RESERVOIR LITHOLOGY
- 2) HORIZON PETROPHYSICS
- 3) PRODUCTION RESULTS
- 4) 3D GEOLOGICAL MODELING
 - area of 3D geological modeling
 - 3D structural modeling
 - oil-water contact(s)
 - 3D petrophysical modeling
- 5) VOLUMETRIC CALCULATION
- 6) PROPOSAL FOR THE LOCATION OF APPRAISAL WELL(S)

Well locations**Ch-124/T1o: Water and tracer production rate (Scenario2_TRC)****Scenario2B_TRC: Water and tracer saturation around Ch-116****Scenario2_TRC: Water saturation, T1o reservoir, January 1st 2018**

PROJECT:

RESERVOIR STUDY-TOURNAISIAN N-E

CLIENT: ZhaikMunai LLP, Kazakhstan

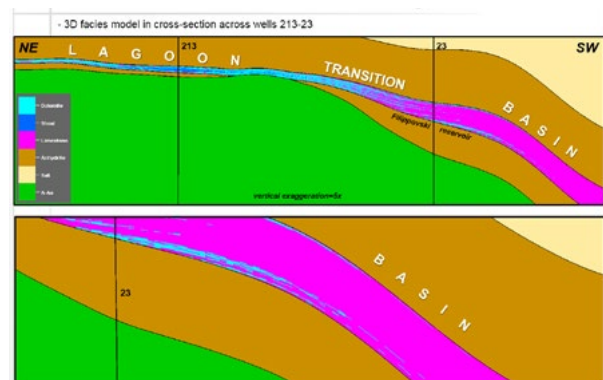
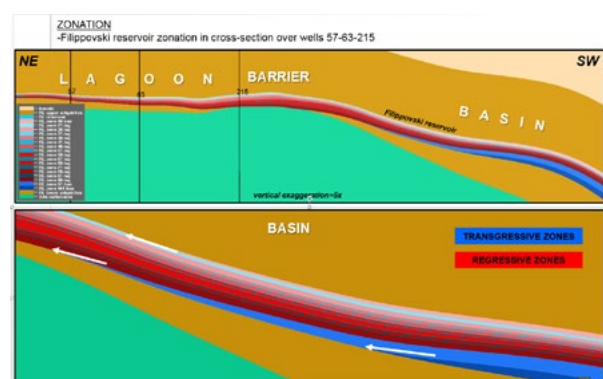
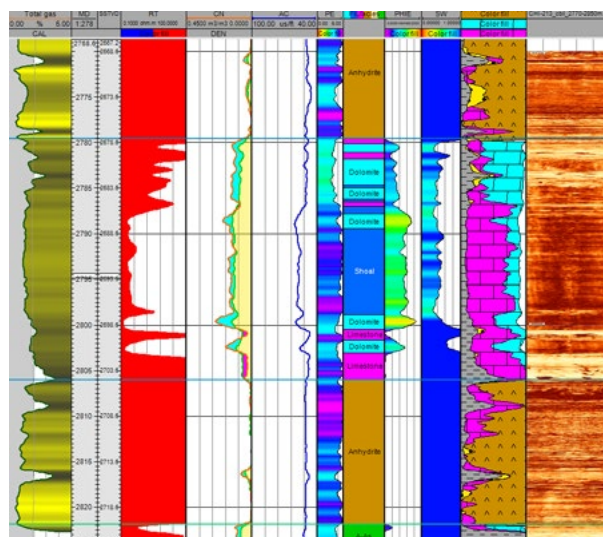
SERVICES: Application of Tracers-3D Dynamic Simulation to Track Tracer Movement Throughout the Reservoir

COMMENCEMENT: March 2015

COMPLETION: April 2015

RESERVOIR STUDY INCLUDED:

- 1) Sector selection for tracer tracking
- 2) Selection of the well(s) for tracer injection
- 3) 3D model building
- 4) Water rate injection and tracer concentration definition
- 5) 3D simulation scenarios:
 - Water breakthrough in production wells
 - Tracer concentration changes
- 6) Proposal of the tracker tracking strategy
- 7) Tracker tracking optimization



PROJECT:

3D GEOLOGICAL STUDY (CHINAREVSKOE GAS-OIL FIELD, FILIPPOVSKI HORIZON ('P₁⁴ OR P₁fl) OF THE KUNGURIAN STAGE (P₁⁴ OR P₁k))

CLIENT: ZhaikMunai LLP, Kazakhstan

SERVICES: Data QC, General Considerations and Key Geological Features, 3D Geological Model Building, HC Pools and HC Volume Calculations, The Main Uncertainties

COMMENCEMENT: September 2014

COMPLETION: December 2014

SERVICES INCLUDED:

1) GENERAL CONSIDERATIONS

2) KEY GEOLOGICAL FEATURES:

- Structural features
- Lithology
- Depositional environments
- Reservoir rocks
- PVT analyses

3) 3D GEOLOGICAL MODELING:

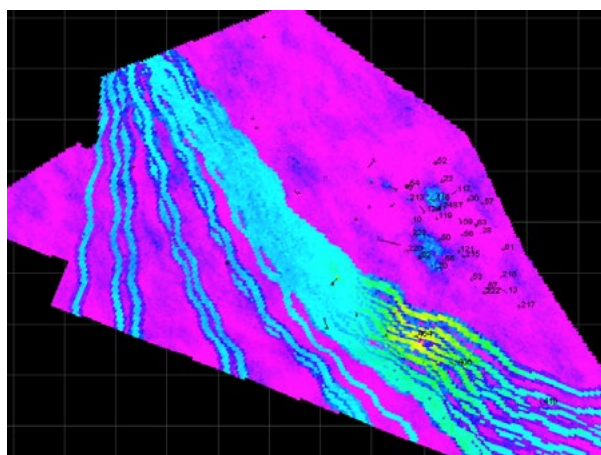
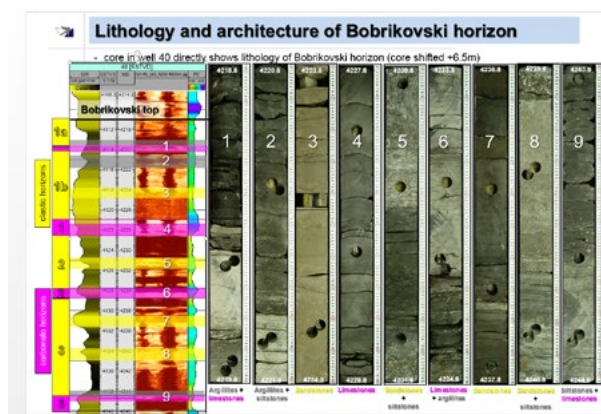
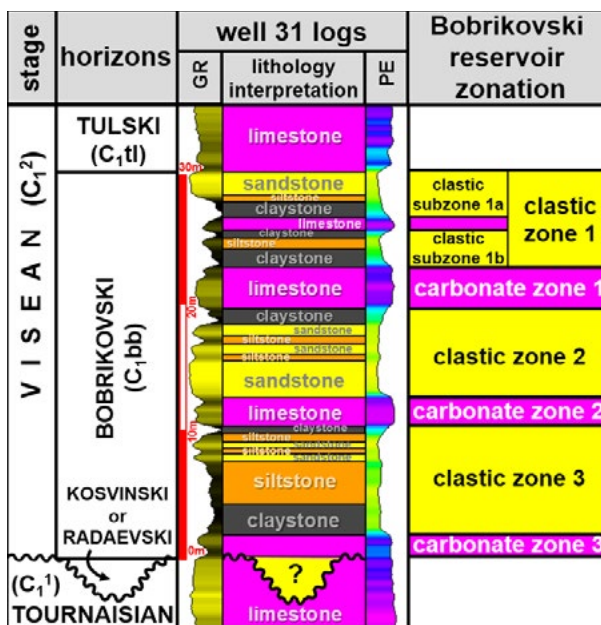
- 3D structural modeling
- 3D facies modeling
- 3D petrophysical modeling

4) HC POOLS

5) HC VOLUMES IN PLACE

6) UNCERTAINTIES

7) Providing a range of volumetric calculations that will be used in economic calculations



PROJECT:

3D GEOLOGICAL STUDY (CHINAREVSKOE GAS-OIL FIELD, BOBRIKOVSKI FORMATION-LOWER VISEAN STAGE (C₁²) OF EARLY CARBONIFEROUS)

CLIENT: ZhaikMunai LLP, Kazakhstan

SERVICES: Data QC, Basic Geological Features, 3D Geological Model Building, HC Volume Calculations

COMMENCEMENT: July 2014

COMPLETION: October 2014

SERVICES INCLUDED:

1) KEY GEOLOGICAL FEATURES:

- Regional stratigraphy
- Lithology and architecture
- Sequence stratigraphy
- Depositional environments
- Reservoir rocks
- Trapping mechanism
- Fluid characteristics and PVT analysis
- Production data

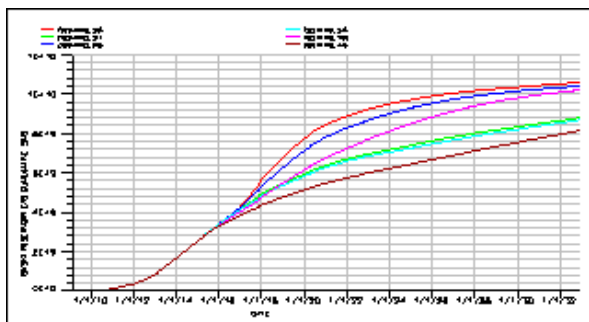
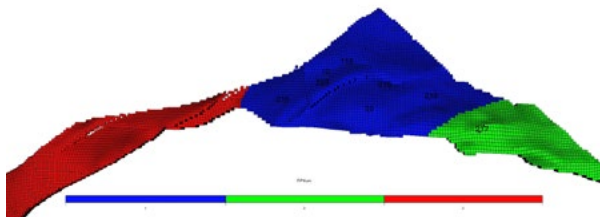
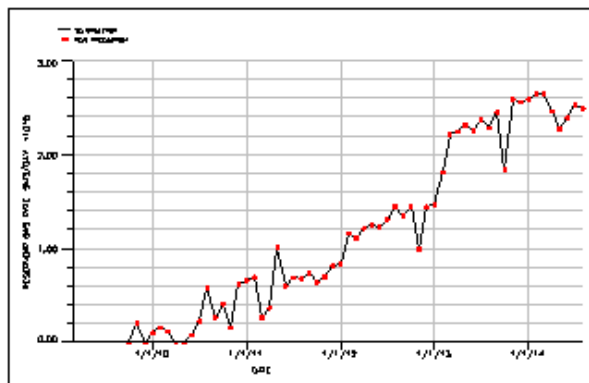
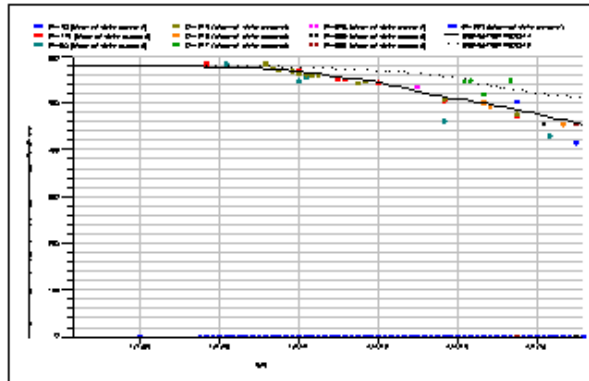
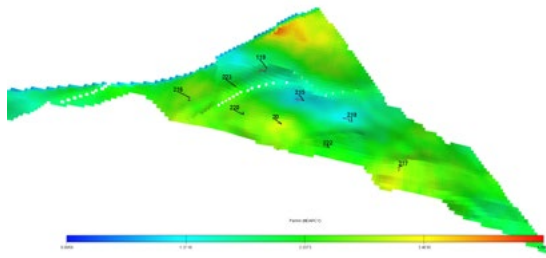
2) 3D GEOLOGICAL MODELING:

- Input data QC
- 3D structural modeling
- Oil-water contact
- 3D facies modeling
- 3D petrophysical modeling

3) HC VOLUMES:

- Deterministic approach (volumetric calculation)
- Probabilistic approach (Monte Carlo simulation)

4) Providing a range of volumetric calculations that will be used in economic calculations to define further development plan



PROJECT:

3D SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, BIYSKI FORMATION, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP , Kazakhstan

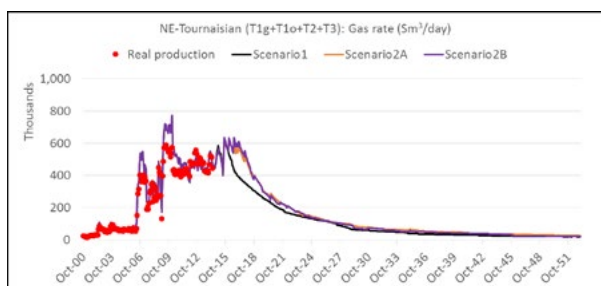
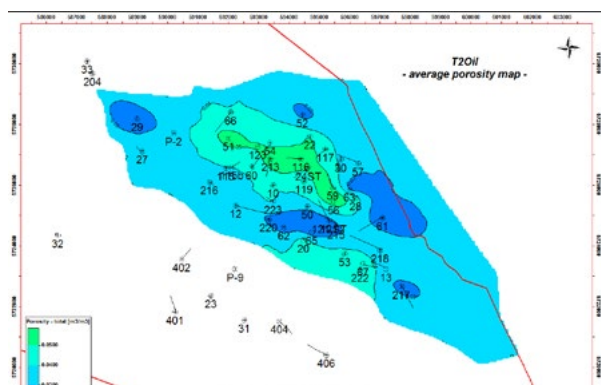
SERVICES: 3D Geological Model Updating, History Matching and Dynamic Modelling for Biyski Formation, New Development Scenarios Analysis, North-East Block

COMMENCEMENT: August 2014

COMPLETION: September 2014

RESERVOIR STUDY INCLUDED:

- 1) 3D simulation model updating
- 2) Model initialization and OHIP calculations
- 3) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 4) In simulation was used ECLIPSE 300
- 5) Establishing a basic scenario, which served for comparison of all the other reservoir development cases
- 6) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 7) The main uncertainty analysis
- 7) Providing a range of forecast results that will be used in economic calculations to define the best development plan



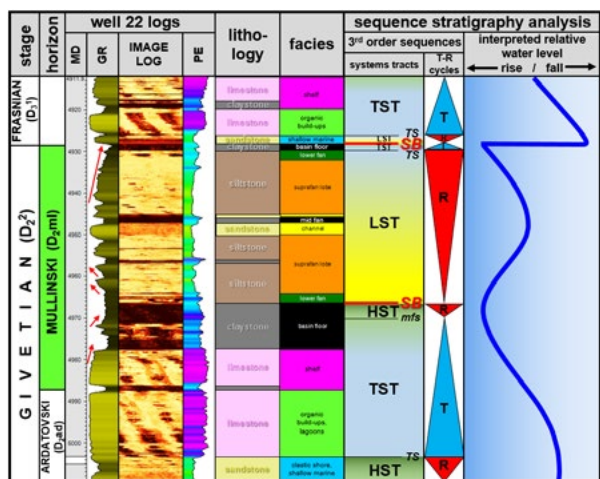
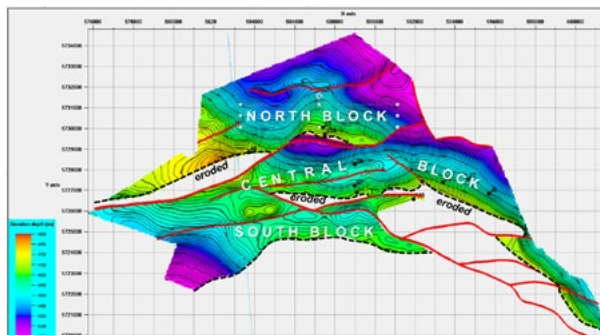
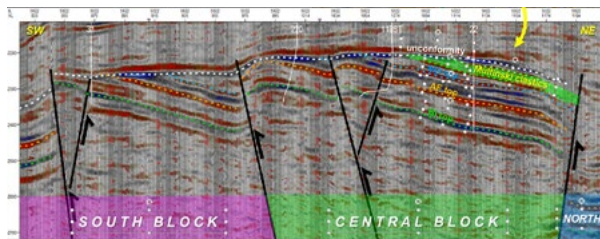
3D SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, TOURNAISIAN FORMATION, NORTH-EAST BLOCK)

SERVICES: 3D Geological Model Up-grading, History Matching and Dynamic Modelling for Tournaisian Formation, North-East Block

COMPLETION: August 2014

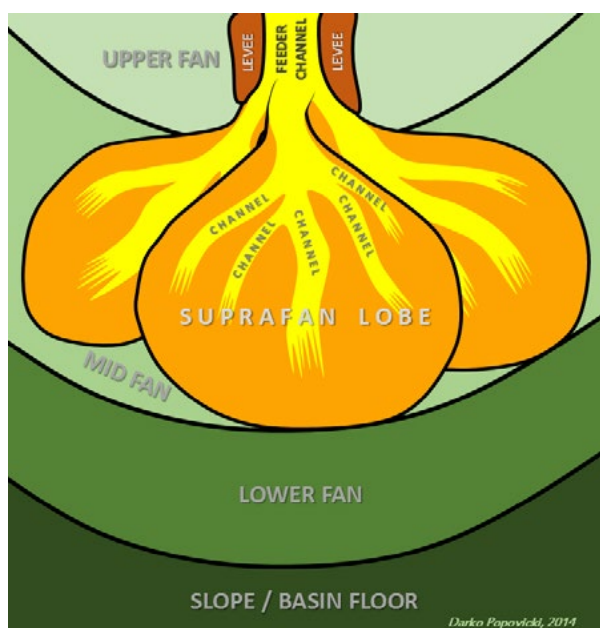
1) The geological model updating (structural and petrophysical) based on new information (new wells, production data, pressure transient data, PLT interpretation data)

- 2) OOIP calculation based on new 3D model
- 3) 3D simulation model building based on new 3D geological model
- 4) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 5) In simulation was used ECLIPSE 300 for oil reservoirs and for gas condensate reservoir
- 6) Wells were considered as unique systems (commingled production from three oil and one gas-condensate reservoir)
- 7) Establishing a basic scenario, which served for comparison of all the other field development cases
- 8) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 9) Providing a range of forecast results that will be used in further economic calculations to define the best development plan



LST – lowstand systems track TST – transgressive systems track HST – highstand systems track
 SB – sequence boundary TS – transgressive surface mfs – maximum flooding surface
 T – transgressive cycle R – regressive cycle

author: Darko Popovicki, 2014



Darko Popovicki, 2014

PROJECT:

3D SIMULATION STUDY (CHINAREVSKOE GAS-OIL FIELD, MULLINSKI FORMATION, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP , Kazakhstan

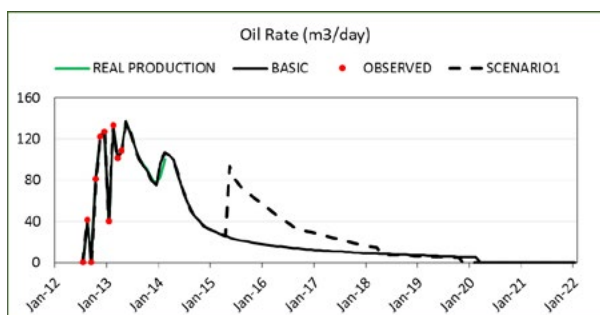
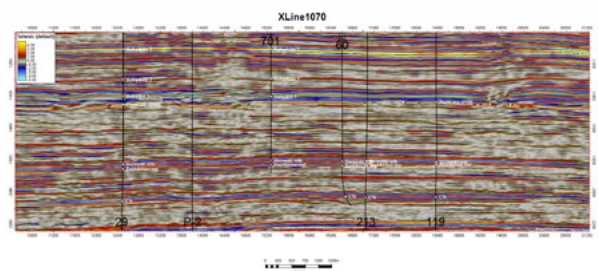
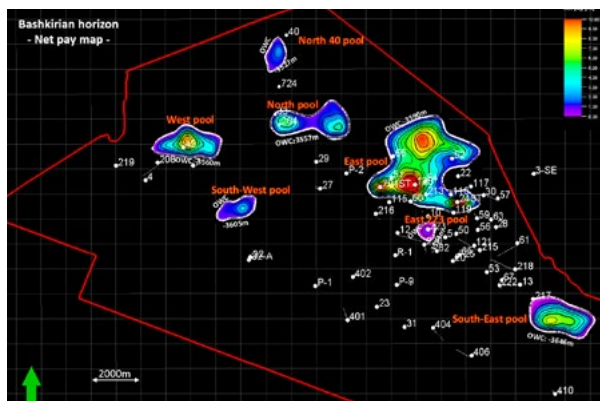
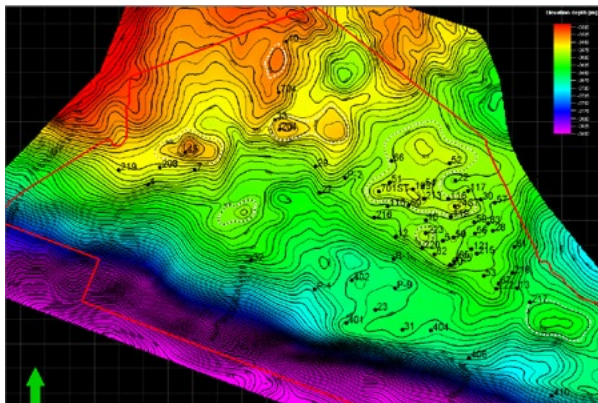
SERVICES: 3D Geological Model Building; 3D Structural Modelling, 3D Facies Modelling, 3D Petrophysical Modelling

COMMENCEMENT: May 2014

COMPLETION: October 2014

RESERVOIR STUDY INCLUDED:

- 1) 3D seismic data interpretation
- 2) 3D geological model building (structural and property modeling) based on available information (drilled wells, pilot production data, pressure transient data, PLT interpretation data)
- 3) Facies modeling
- 4) Probability and uncertainty analysis
- 5) OOIP calculation based on 3D model and probability approach
- 6) Appraisal well location and trajectory definition
- 7) 3D simulation model building based on 3D geological model
- 8) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 9) In simulation was used ECLIPSE 300 for oil reservoirs and for gas condensate reservoir
- 10) Establishing a basic scenario, which served for comparison of all the other field development cases
- 11) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 12) Providing a range of forecast results that will be used in further economic calculations to define the best development plan



PROJECT:

RESERVOIR STUDY- BASHKIRIAN OIL RESERVOIR

CLIENT: ZhaikMunai LLP, Kazakhstan

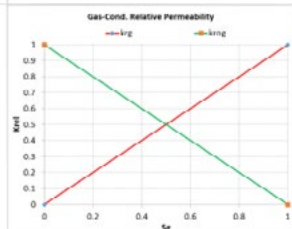
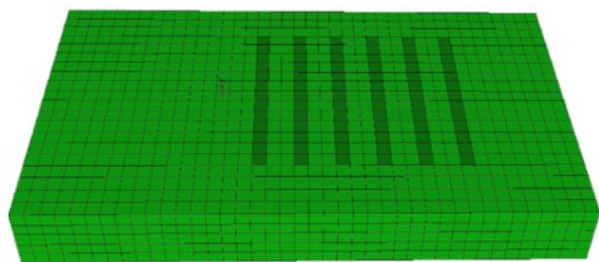
SERVICES: Geological Model Building-Mapping New Oil Pools for Exploration Drilling, History Matching, 3D Dynamic Modelling and Recovery Factor and Production Profile Re-Estimation for Different Scenarios for Bashkirian Reservoir, Chinarevskoe Oil Field, West Pool

COMMENCEMENT: February 2014

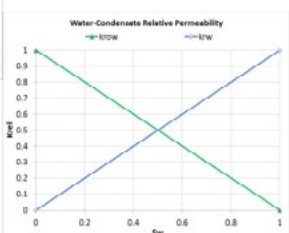
COMPLETION: March 2014

RESERVOIR STUDY INCLUDED:

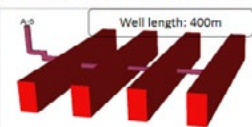
- 1) 3D seismic data re-interpretation
- 2) The geological model construction (structural and petrophysical modeling) based on available information (well data, well testing, pilot production data, pressure transient data)
- 3) Preparation of structural maps (new pools for drilling)
- 4) OOIP calculation based on geological model for all defined pools
- 5) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data) for West pool (around well Ch-45)
- 6) In simulation was used ECLIPSE 100
- 7) Establishing a basic scenario, which served for comparison of all the other field development cases
- 8) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 9) Natural water inflow and natural pressure support were considered as the main development approach



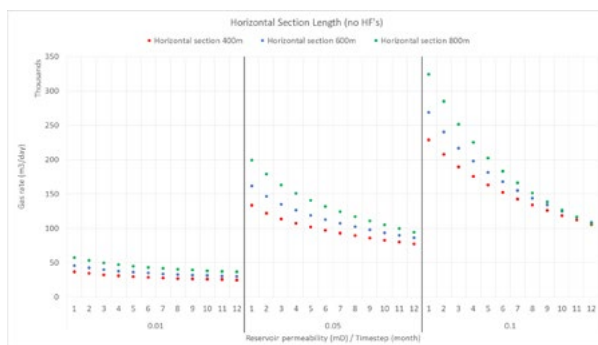
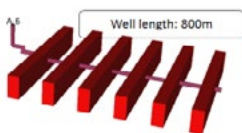
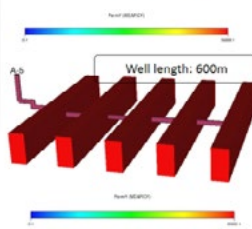
Hydraulic fracture relative permeability curves



3D Simulation model – fracture modeling



Horizontal well well:
Fracture half length: 300m
Fracture height: 100m
Proppant pack permeability: 250,000mD
Reservoir permeability: 0.1mD



PROJECT:

RESERVOIR STUDY OF GAS-CONDENSATE RESERVOIR AFONINSKI, NORTH-EAST BLOCK OF CHINAREVSKOE GAS-OIL FIELD (3D SIMULATION HYDRAULIC FRACTURING - SENSITIVITY ANALYSIS)

CLIENT: ZhaikMunai LLP, Kazakhstan

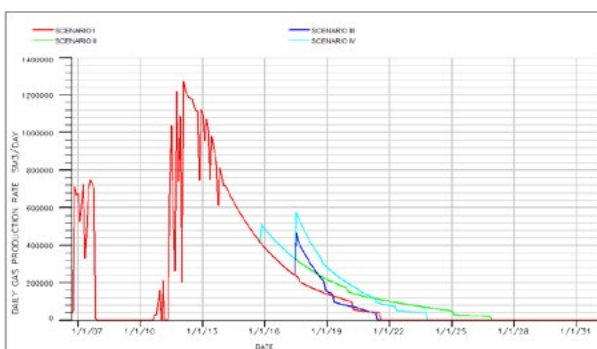
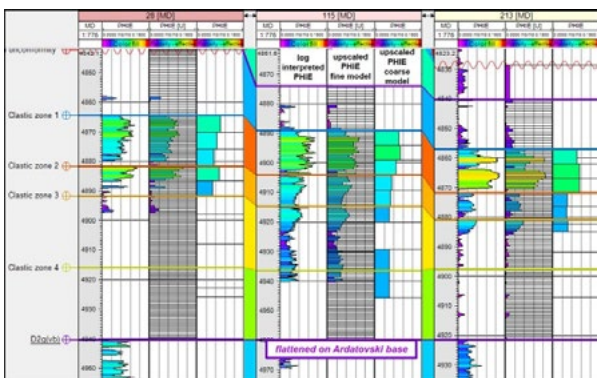
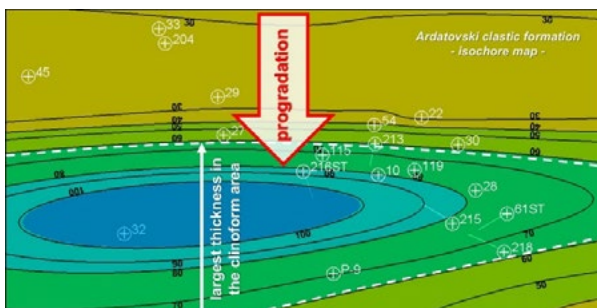
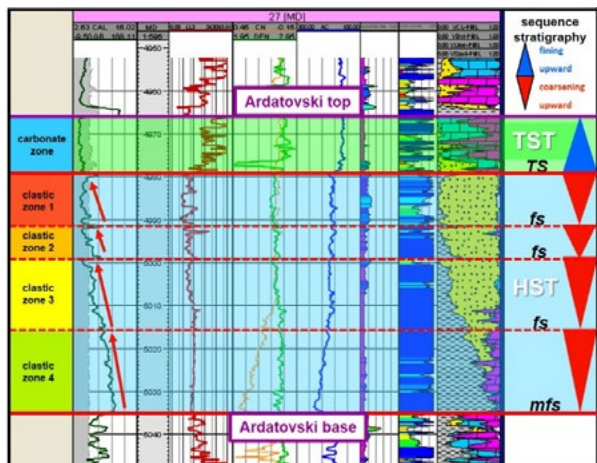
SERVICES: 3D Generic Model Building, (Structural and Property Modelling), 3D Dynamic Model Building, Estimation of The Initial Gas and Condensate Production Rates for Different Scenarios

COMMENCEMENT: February 2014

COMPLETION: March 2014

SERVICES INCLUDED:

- 1) 3D structural modeling
- 2) 3D petrophysical modeling
- 3) 3D dynamic model building
- 4) Providing a range of forecast results that will be used in further economic sensitivity analysis and risk analysis and assessments. The next parameters are modelled:
 - Rock permeability
 - Fracture proppant permeability
 - Length of horizontal section
 - Number of hydraulic fractures
 - Hydraulic fracture height
 - Hydraulic fracture half length



PROJECT:

RESERVOIR STUDY OF GAS-CONDENSATE RESERVOIR ARDATOVSKI, (NORTH-EAST BLOCK OF CHINAREVSKOE GAS-OIL FIELD)

CLIENT: ZhaikMunai LLP, Kazakhstan

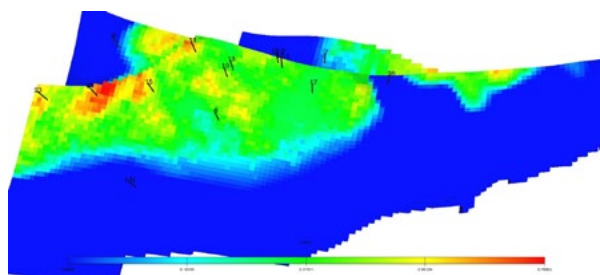
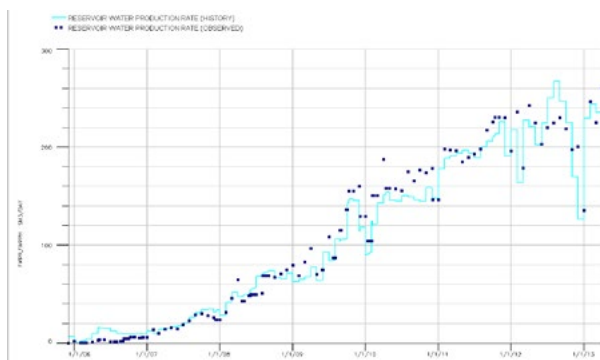
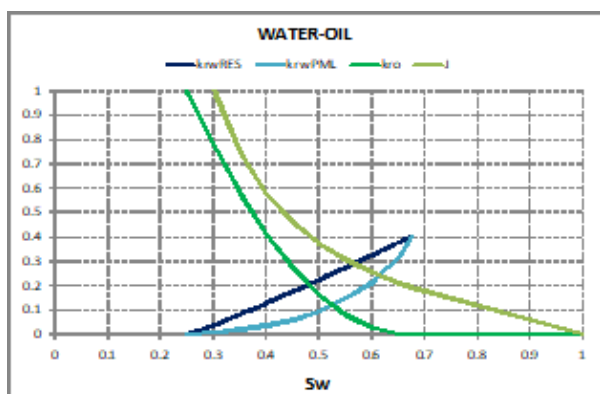
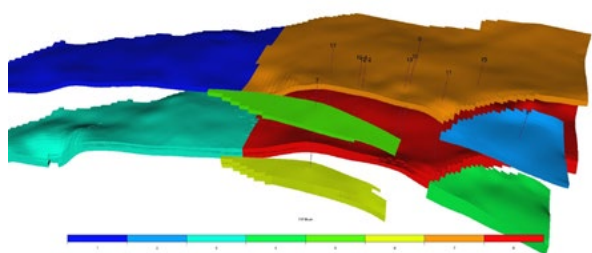
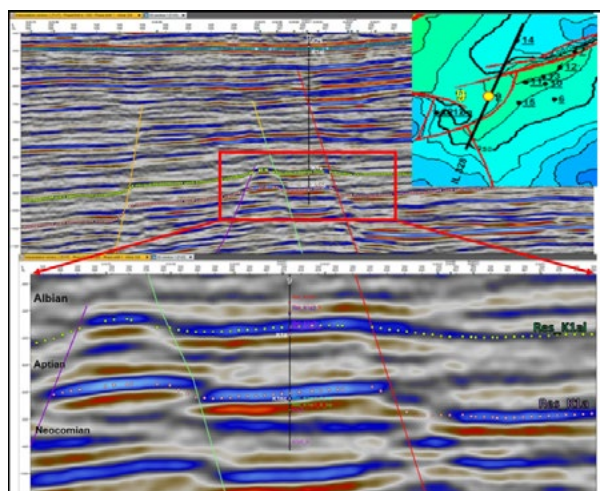
SERVICES: 3D Geological Modelling (Structural and Property Modelling), OGIP/OCIP Estimation and Recovery Factor (Recoverable Reserves Calculation for Different Scenarios)

COMMENCEMENT: January 2014

COMPLETION: February 2014

RESERVOIR STUDY INCLUDED:

- 1) 3D structural modeling
- 2) 3D petrophysical modeling
- 3) 3D static model up-scaling
- 4) OGIP/OCIP by volumetrics
- 5) 3D dynamic model building
- 6) The model calibration to reflect good matching between calculated and available observation data (production and pressure data)
- 7) The base scenario prediction which served for comparison of all the other field development cases
- 8) Working out a prediction scenarios that reflected different operating conditions in the field
- 9) Providing a range of forecast results that will be used in further economic calculations to determine the best field development plan



PROJECT:
RESERVOIR STUDY- MORSKOE EAST OIL FIELD

CLIENT: Probel Capital Management, Brussels

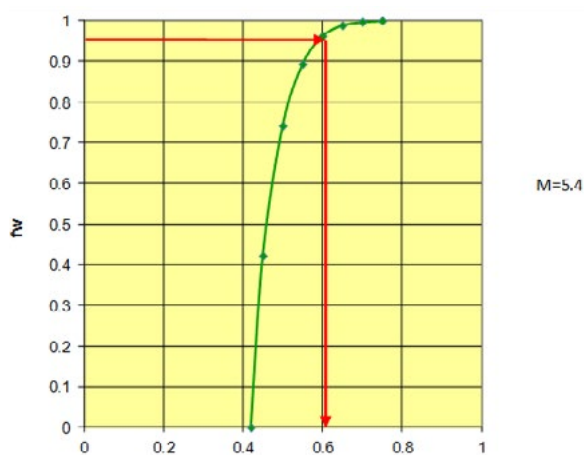
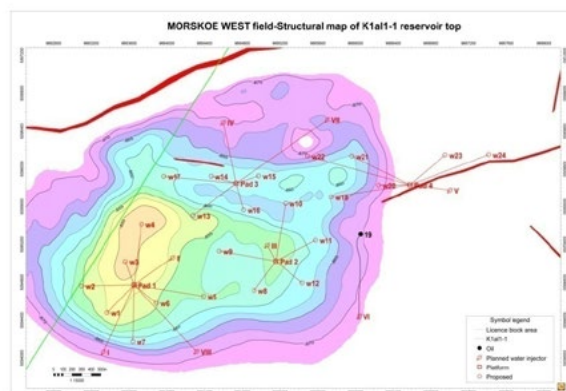
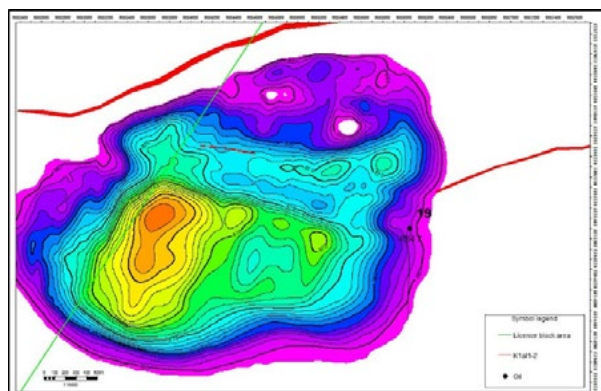
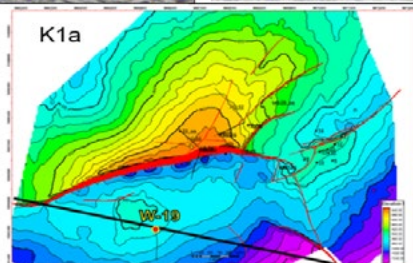
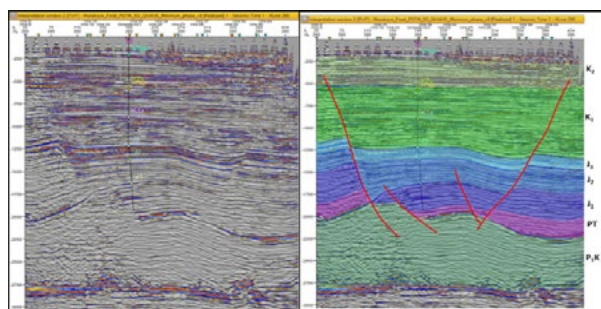
SERVICES: OOIP Evaluations, Recovery Factor and Oil Production Forecast Evaluation

COMMENCEMENT: September 2013

COMPLETION: October 2013

RESERVOIR STUDY INCLUDED:

- 1) Data collection, Analysis and Validation
- 2) Structural Model Checking
- 3) Petrophysical Model Checking
- 4) OOIP Calculations Checking
- 5) Production Data Base Creation
- 6) Production History Analysis
- 7) WFP Analysis for Key Wells
- 8) 3D Dynamic Model Checking and 3D Dynamic Model Upgrading
- 9) Production Forecast-New Development Scenarios
- 10) Capital Costs Estimation
- 11) Operation Cost Estimation
- 12) The Main Uncertainties and Risks



PROJECT:

RESERVOIR STUDY- MORSKOE WEST OIL FIELD

CLIENT: Probel Capital Management, Brussels

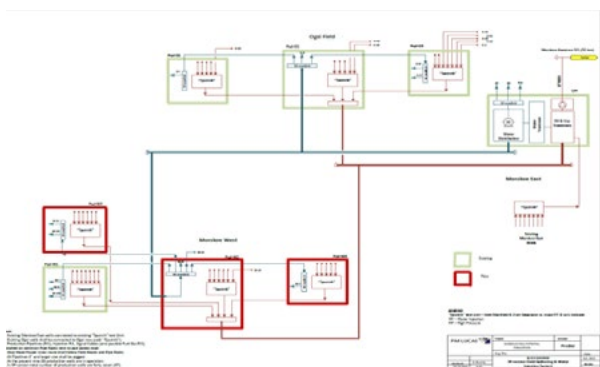
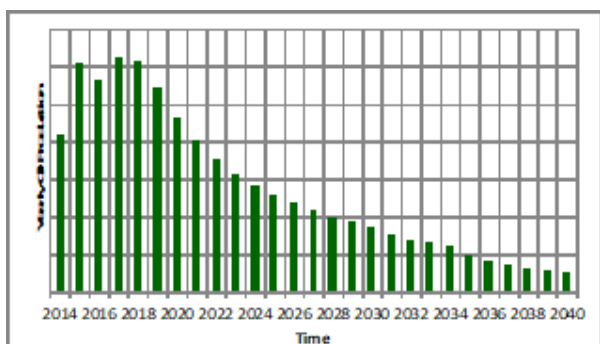
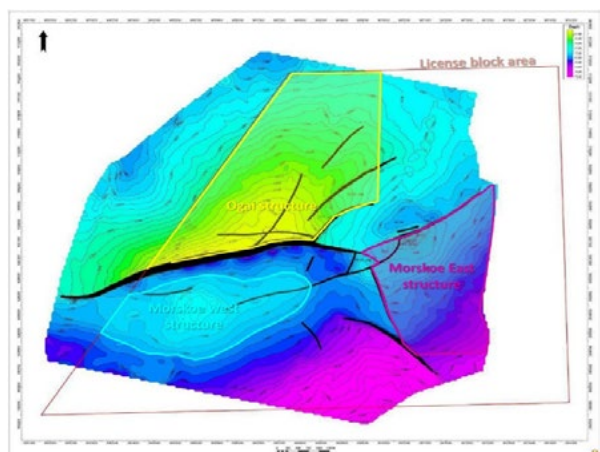
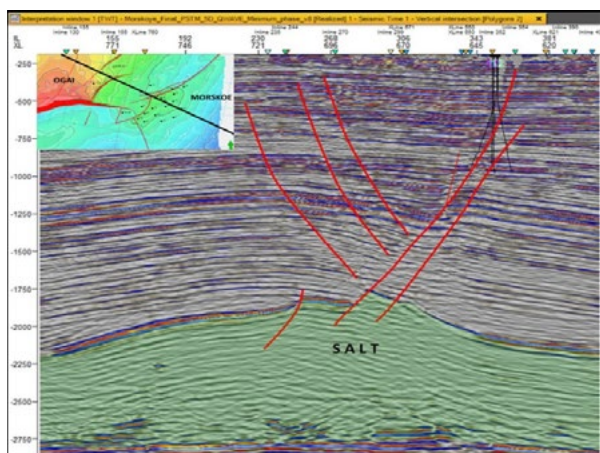
SERVICES: OOIP Evaluations, Recovery Factor and Oil Production Forecast Evaluation

COMMENCEMENT: September 2013

COMPLETION: October 2013

RESERVOIR STUDY INCLUDED:

- 1) Data collection, Analysis and Validation
- 2) Structural Model Checking
- 3) Petrophysical Model Checking
- 4) OOIP Calculations Checking
- 5) WFP Analysis for Exploration Well
- 6) Recovery Factor Calculation
- 7) Definition and Estimation P1, P2 and P3 Reserves
- 8) Field Development Scenarios Definition
- 9) Production Forecast Estimations
- 10) Capital Costs Estimations
- 11) Operation Cost Estimations
- 12) The Main Uncertainties and Risks



PROJECT:

RESERVOIR STUDY- OGAI OIL FIELD

CLIENT: Probel Capital Management, Brussels

SERVICES: OOIP Evaluations, Recovery Factor and Oil Production Forecast Evaluation

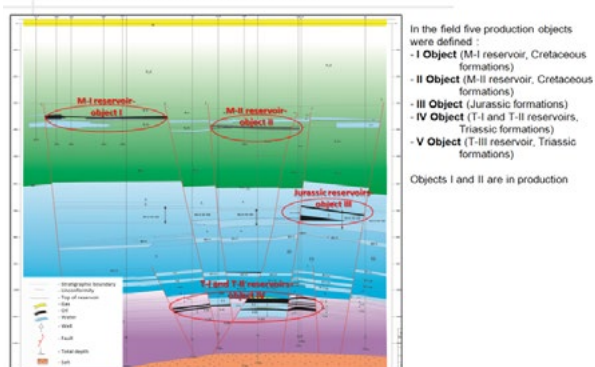
COMMENCEMENT: September 2013

COMPLETION: October 2013

RESERVOIR STUDY INCLUDED:

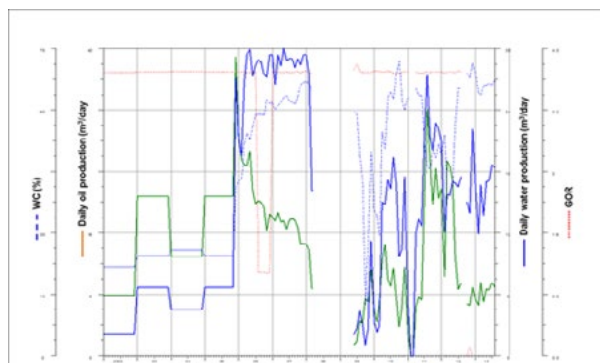
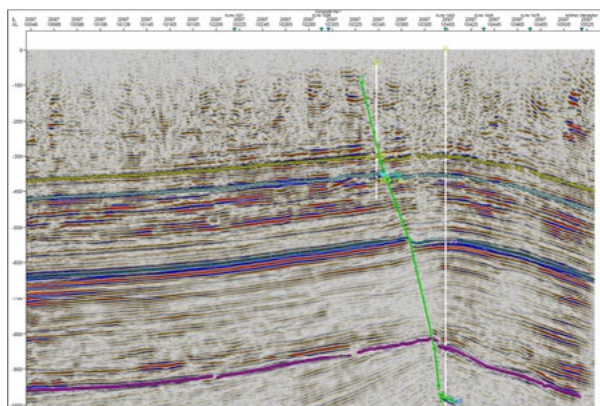
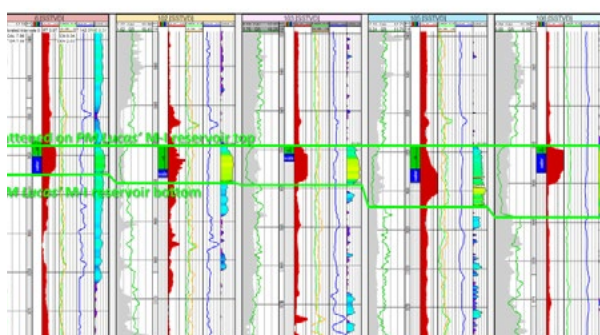
- 1) Data collection, Analysis and Validation
- 2) Structural Model Checking
- 3) Petrophysical Model Checking
- 4) OOIP Calculations Checking
- 5) Production Data Base Creation
- 6) Production History Analysis
- 7) WFP for key wells
- 8) 3D Dynamic Model Checking
- 9) Field Development Scenarios
- 10) Production Forecast
- 11) Capital Costs Estimation
- 12) Operation Cost Estimation
- 13) The Main Uncertainties and Risks

Field overview - productive oil horizons



log correlation reservoir M-I - PM Lucas vs KazNigri

-there are discrepancies between PM Lucas and KazNigri's well correlation



PROJECT:

RESERVOIR STUDY-SOUTH KOZHA OIL FIELD

CLIENT: PM Lucas Enterprises, Kazakhstan

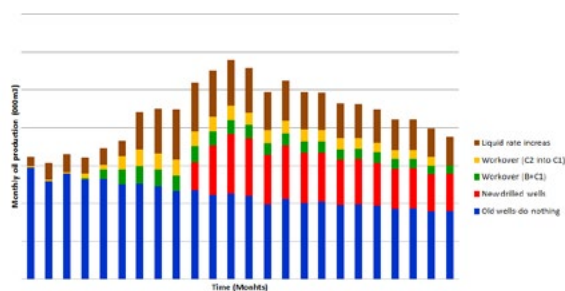
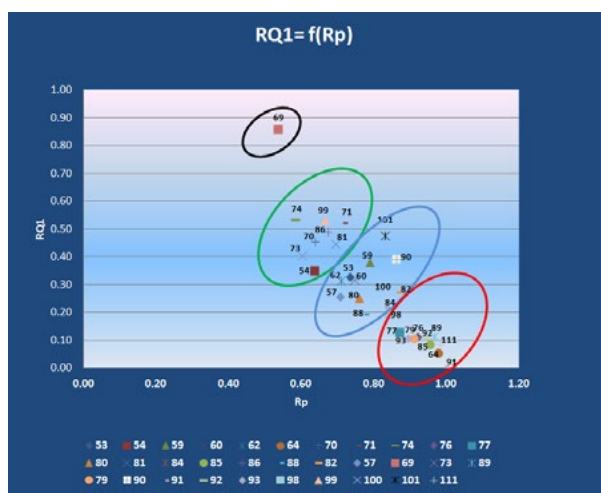
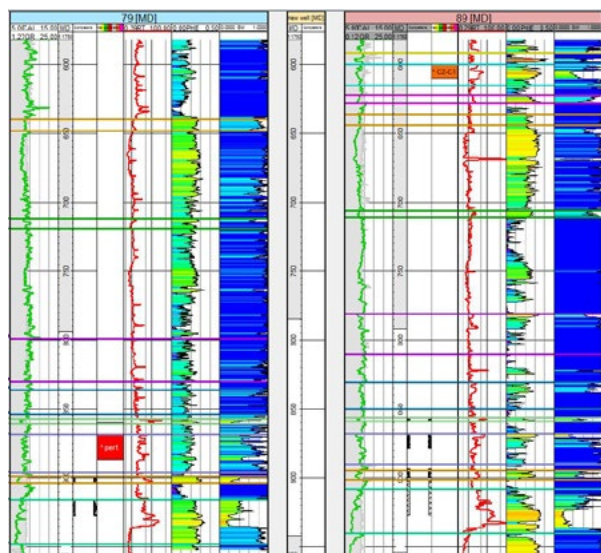
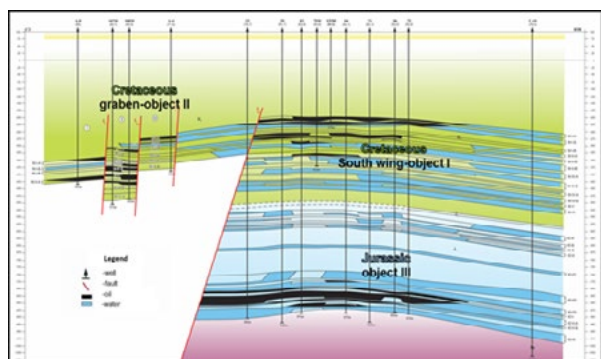
SERVICES: OOIP Evaluations, Recovery Factor and Oil Production Forecast Evaluation

COMMENCEMENT: August 2013

COMPLETION: September 2013

RESERVOIR STUDY INCLUDED:

- 1) Data Analysis and Validation
- 2) Structural Model Checking
- 3) Petrophysical Model Checking
- 4) OOIP Calculations Checking
- 5) Production History Analysis
- 6) Recovery Factor Calculations
- 7) Production Forecast Estimation
- 8) The main Uncertainties and Risks



PROJECT:

RESERVOIR STUDY-KYRYKMYLYK OIL FIELD

CLIENT: K&D Capital Partners LP, London

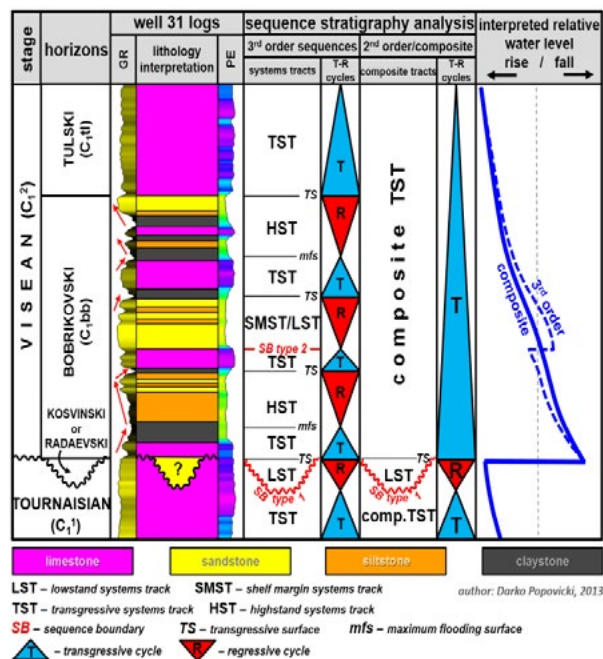
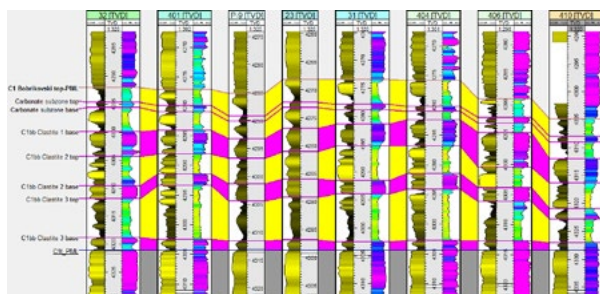
SERVICES: OOIP Evaluations, Recovery Factor and Oil Production Forecast Evaluation

COMMENCEMENT: July 2013

COMPLETION: August 2013

RESERVOIR STUDY INCLUDED:

- 1) Data collection, Analysis and Validation
- 2) Structural Model Checking
- 3) Petrophysical Model Checking
- 4) OOIP Calculations Checking
- 5) Production data Base Creation
- 6) Production History Analysis
- 7) Base Line Production Definition for Jurassic Reservoirs
- 8) Short term Activities for Production Increase for Jurassic Reservoirs
- 9) Short Term Production Forecast for Jurassic Reservoirs
- 10) Estimated Short Term Capital Costs
- 11) The Main Uncertainties and Risks



PROJECT:

RESERVOIR STUDY-BOBRIKOVSKI OIL RESERVOIR

CLIENT: ZhaikMunai LLP, Kazakhstan

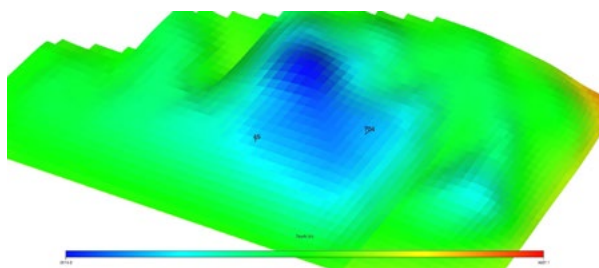
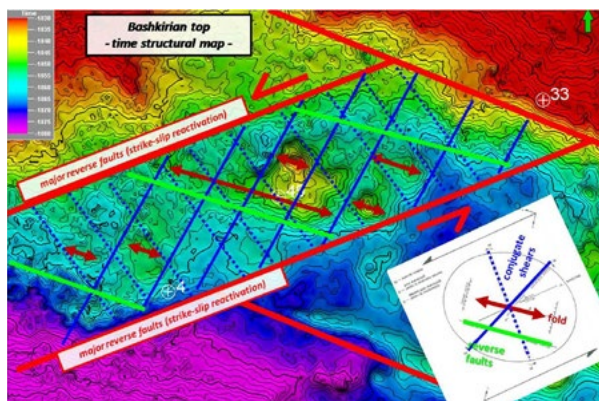
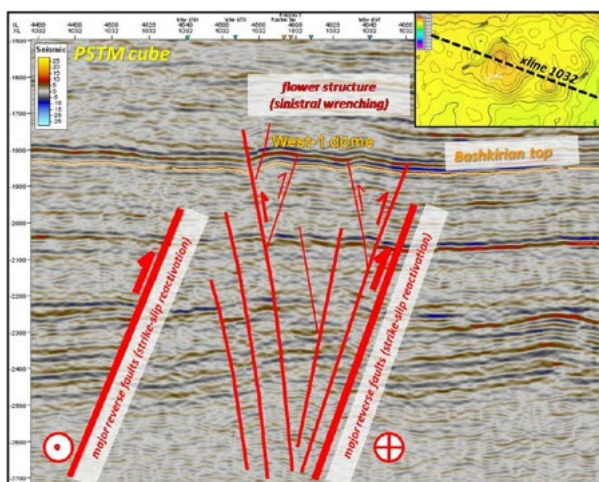
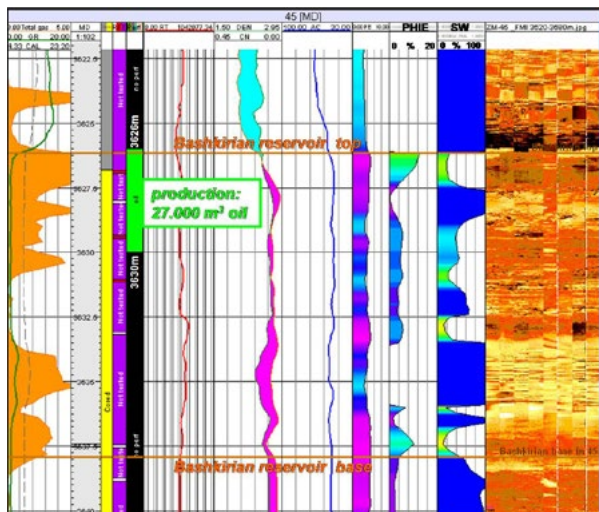
SERVICES: Regional Stratigraphy, Seismic Interpretation, 3D Geological Model Building, Volumetrics

COMMENCEMENT: June 2013

COMPLETION: July 2013

RESERVOIR STUDY INCLUDED:

- 1) Regional Stratigraphy of Lower Visian
- 2) Sequence Stratigraphy Analysis of Lower Visian
- 3) Determination of Depositional Environment in Bobrikovski horizon
- 4) Seismic Interpretation
- 5) 3D Structural Modeling
- 6) 3D Petrophysical Modeling
- 7) Volumetrics



PROJECT:
RESERVOIR STUDY- BASHKIRIAN OIL RESERVOIR (WEST POOL)

CLIENT: ZhaikMunai LLP, Kazakhstan

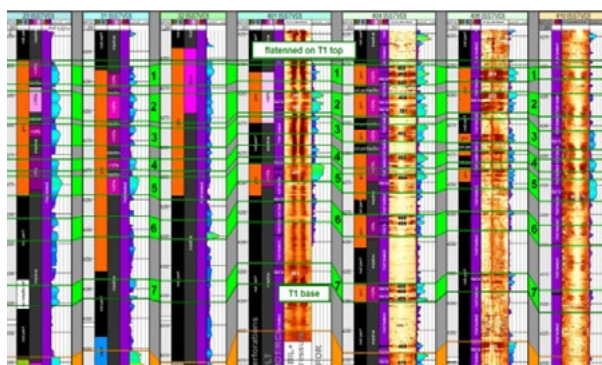
SERVICES: 3D Geological Model Building, History Matching, 3D Dynamic Modelling and Recovery Factor and Production Profile Estimation for Different Scenarios for Bashkirian Reservoir, Chinarevskoe Oil Field, West Pool

COMMENCEMENT: April 2013

COMPLETION: June 2013

RESERVOIR STUDY INCLUDED:

- 1) The geological model construction (structural and petrophysical modeling) based on available information (well data, well testing, pilot production data, pressure transient data)
- 2) OOIP calculation based on 3D model
- 3) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 4) In simulation was used ECLIPSE 100
- 5) Establishing a basic scenario, which served for comparison of all the other field development cases
- 6) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 7) Natural water inflow and natural pressure support were considered as the main development approach



PROJECT:

RESERVOIR STUDY UP-DATE OF GAS-CONDENSATE RESERVOIR T1 (SOUTH BLOCK OF CHINAREVSKOE GAS-OIL FIELD)

CLIENT: ZhaikMunai LLP, Kazakhstan

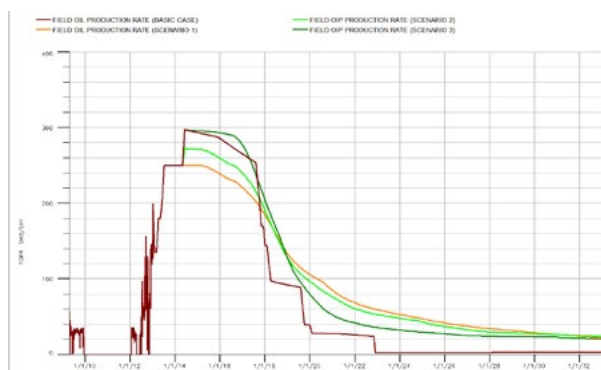
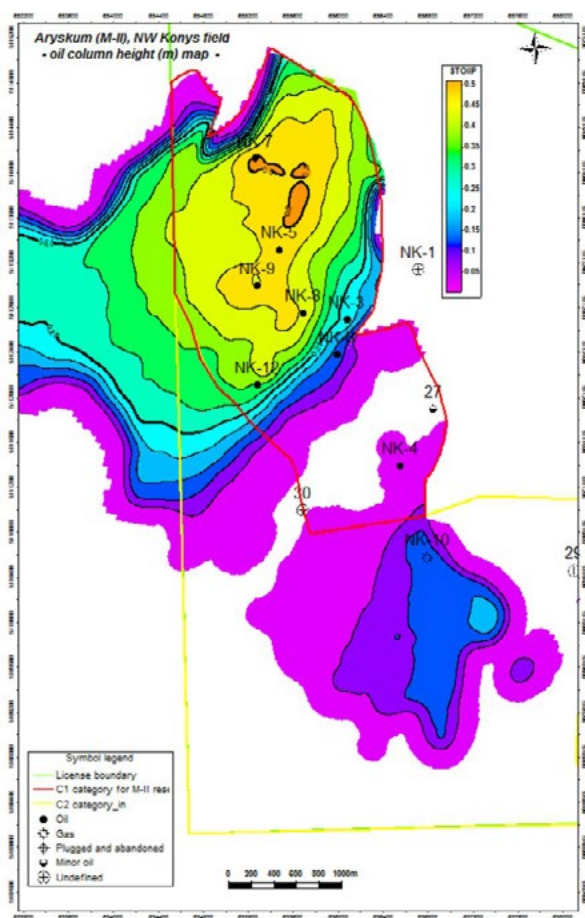
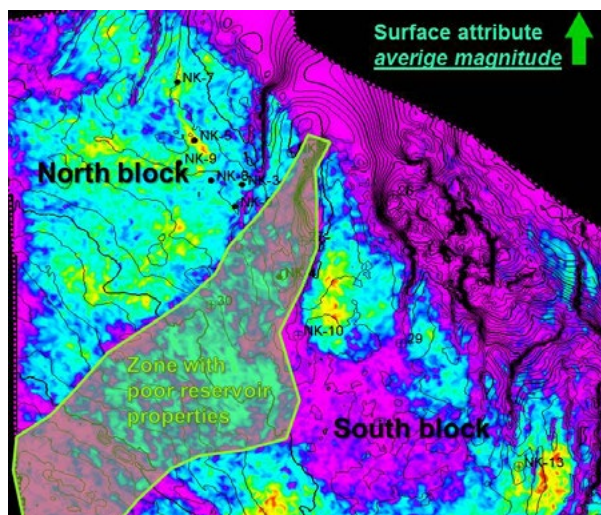
SERVICES: 3D Geological Model Re-Building and Dynamic Modelling and Recovery Factor and Production Profile Re-Estimation for Different Scenarios, Influence of New Well Data on Production Forecast of The Existing Wells

COMMENCEMENT: April 2013

COMPLETION: May 2013

RESERVOIR STUDY INCLUDED:

- 1) The geological model updating-construction (structural and petrophysical) based on available information (new wells, production data, pressure transient data, PLT interpretation data)
- 2) Model up-scaling was done, respecting all reliable data
- 3) OOIP calculation based on new-updated 3D model
- 4) In simulation was used ECLIPSE 300
- 5) Old Calibration of the model was applied
- 6) Establishing a basic scenario, which served for comparison of all the other field development cases
- 7) Working out prediction scenarios that reflected influence of different development options on production forecast of the projected wells and the reservoir as a whole



PROJECT:
RESERVOIR STUDY OIL RESERVOIRS M-II (N-W KONYS OIL FIELD)

CLIENT: Galaz and Company LLP

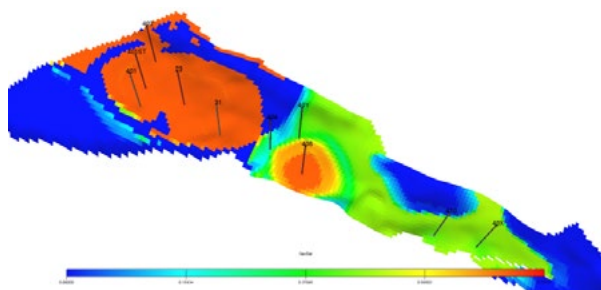
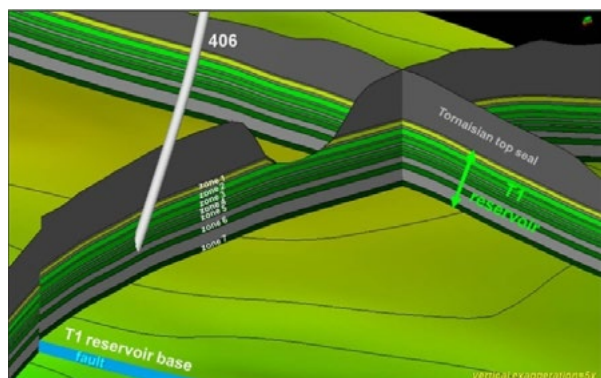
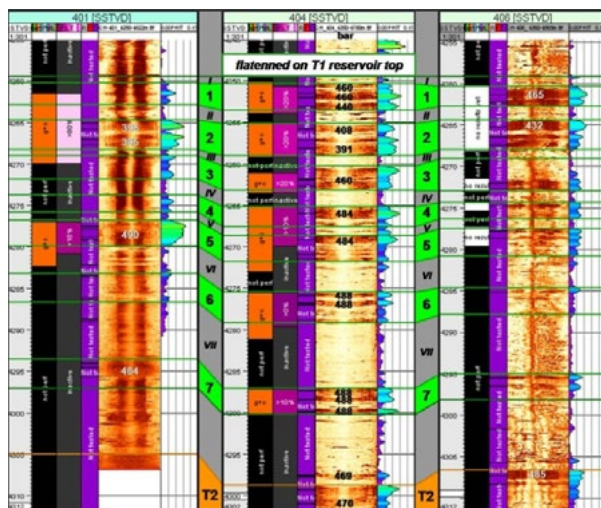
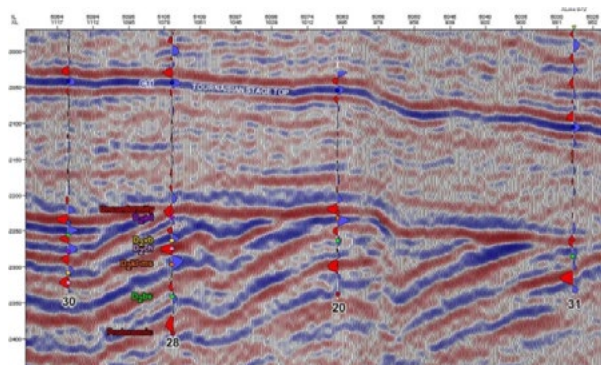
SERVICES: 3D Geological Model Building, History Matching and Dynamic Modelling and Recovery Factor and Production Profile Estimation for Different Scenarios for M-II Reservoir (Ariskum Formations)

COMMENCEMENT: November 2012

COMPLETION: December 2012

RESERVOIR STUDY INCLUDED:

- 1) The geological model construction (structural and petrophysical) based on available information (new wells, well testing, pilot production data, pressure transient data, PLT interpretation data)
- 2) OOIP calculation based on new 3D model
- 3) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 4) In simulation was used ECLIPSE 100
- 5) Establishing a basic scenario, which served for comparison of all the other field development cases
- 6) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 7) Water flooding efficiency and pressure maintenance were considered as the main development approach



PROJECT:

**RESERVOIR STUDY OF GAS-CONDENSATE RESERVOIR T1
(SOUTH BLOCK OF CHINAREVSKOE GAS-OIL FIELD)**

CLIENT: ZhaikMunai LLP, Kazakhstan

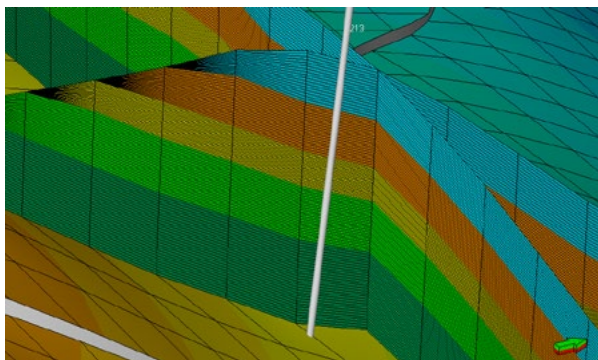
SERVICES: 3D Geological Model Building, History Matching and
Dynamic Modelling and Recovery Factor and Production
Profile Estimation for Different Scenarios

COMMENCEMENT: September 2012

COMPLETION: November 2012

RESERVOIR STUDY INCLUDED:

- 1) The geological model construction (structural and petrophysical) based on available information (new wells, production data, pressure transient data, PLT interpretation data)
- 2) Model up-scaling was done, respecting all reliable data
- 3) OOIP calculation based on new 3D model
- 4) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 5) In simulation was used ECLIPSE 300
- 6) Establishing a basic scenario, which served for comparison of all the other field development cases
- 7) Working out prediction scenarios that reflected different development options and operating conditions in the field



PROJECT:

RESERVOIR STUDY OF GAS-CONDENSATE RESERVOIR AR-DATOVSKI (NORTH-EAST BLOCK OF CHINAREVSKOE GAS-OIL FIELD)

CLIENT: ZhaikMunai LLP, Kazakhstan

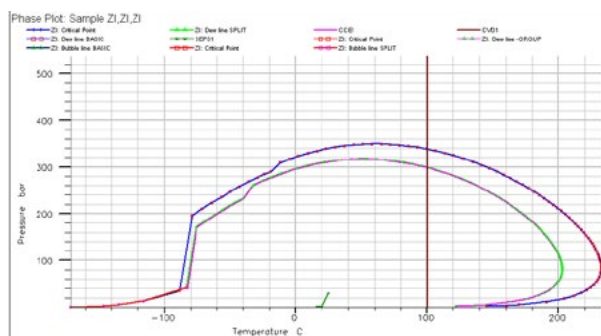
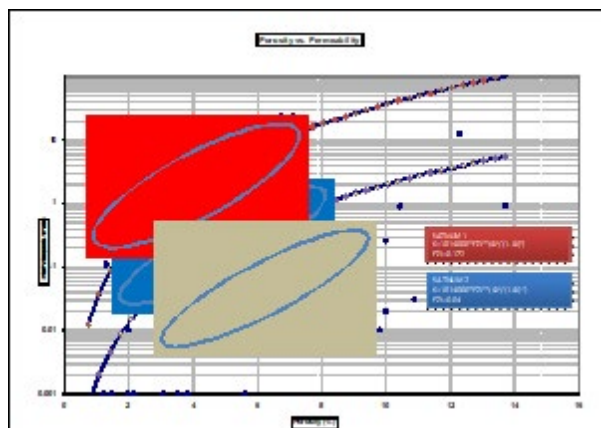
SERVICES: 3D Dynamic Modelling Based on Geological Model Done 2011, Using New Production Data (New Production Allocation was Done) and Recovery Factor and Production Profile (Recoverable Reserves Calculation for Different Scenarios) were Predicted

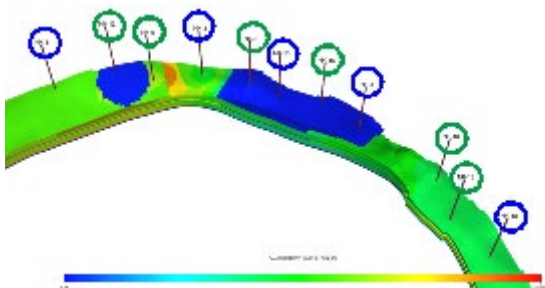
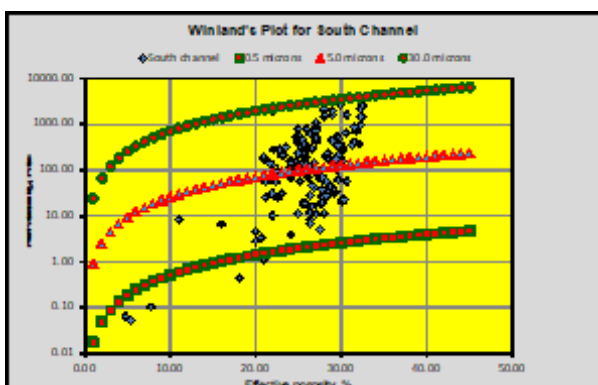
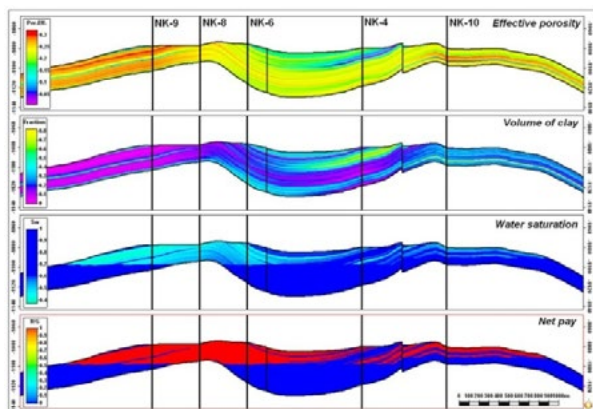
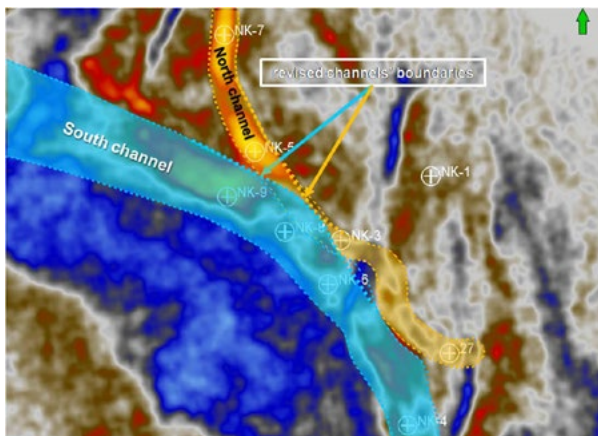
COMMENCEMENT: June 2012

COMPLETION: August 2012

RESERVOIR STUDY INCLUDED:

- 1) The reservoir simulation model constructions, based on the geological model previously completed by a third party and updating the model by new production data (2nd data set)
- 2) Calibration of the model so as to satisfactorily reflect available pressure and fluid production allocation
- 3) Establishing a basic scenario, which served as a benchmark for comparison of all the other field development cases
- 4) Working out a prediction scenarios that reflected different operating conditions in the field
- 5) Provided a range of forecast results that will be used in further economic calculations to determine the best field development plan





PROJECT:

RESERVOIR STUDY OIL RESERVOIRS J-O-1 (N-W KONYS OIL FIELD)

CLIENT: Galaz and Company LLP

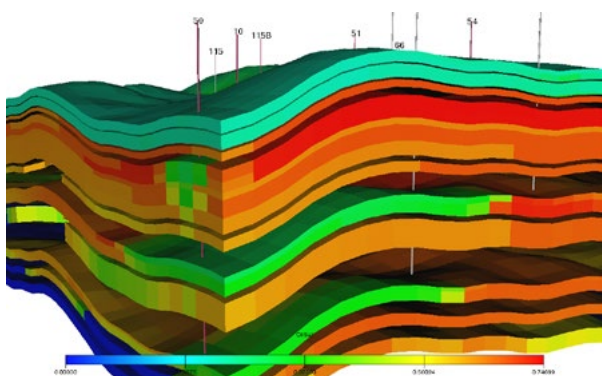
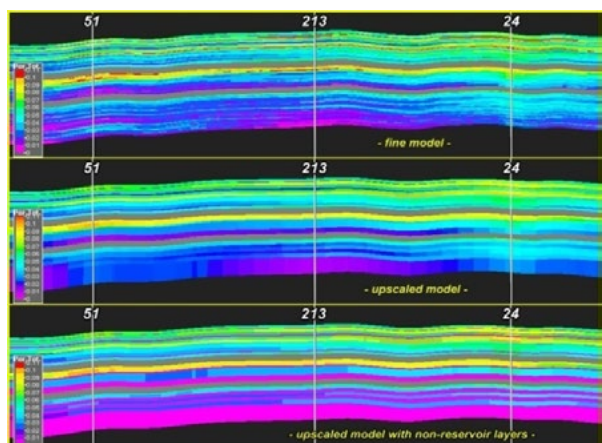
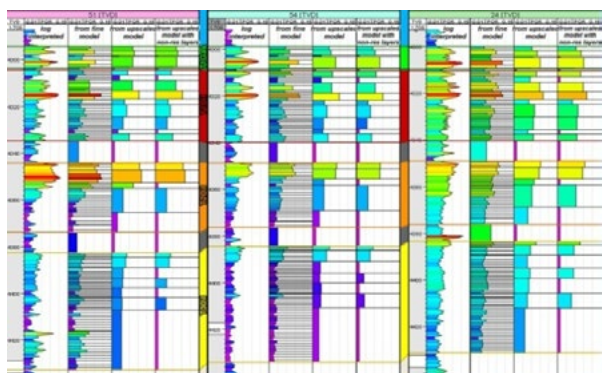
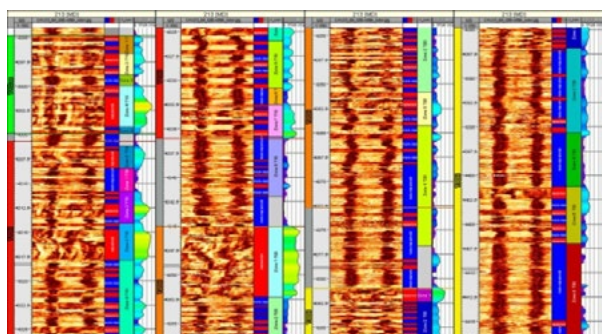
SERVICES: 3D Geological Model Building, History Matching and Dynamic Modelling and Recovery Factor and Production Profile Estimation for Different Scenarios for South and North Channel of Akshabulak Formations

COMMENCEMENT: June 2012

COMPLETION: November 2012

RESERVOIR STUDY INCLUDED:

- 1) The geological model construction (structural and petrophysical) based on available information (new wells, pilot production data, pressure transient data, PLT interpretation data)
- 2) OOIP calculation based on new 3D model
- 3) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 4) In simulation was used ECLIPSE 100
- 5) Establishing a basic scenario, which served for comparison of all the other field development cases
- 6) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 7) Water flooding and gas re-injection were considered



PROJECT:

RESERVOIR PRESSURE MAINTENANCE AND DISPLACEMENT EFFICIENCY BY WATER-FLOODING (CHINAREVSKOE GAS-OIL FIELD, TOURNAISIAN FORMATION, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP, Kazakhstan

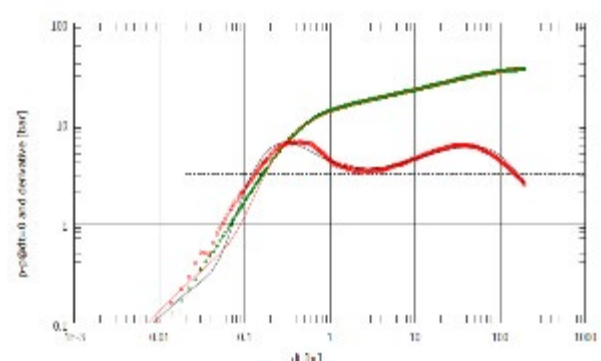
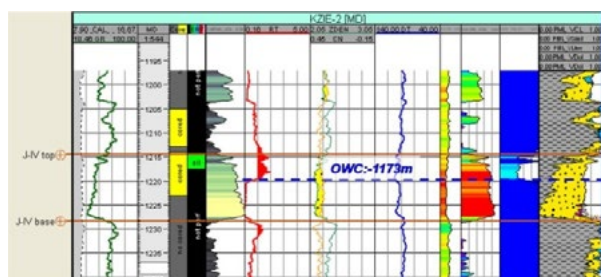
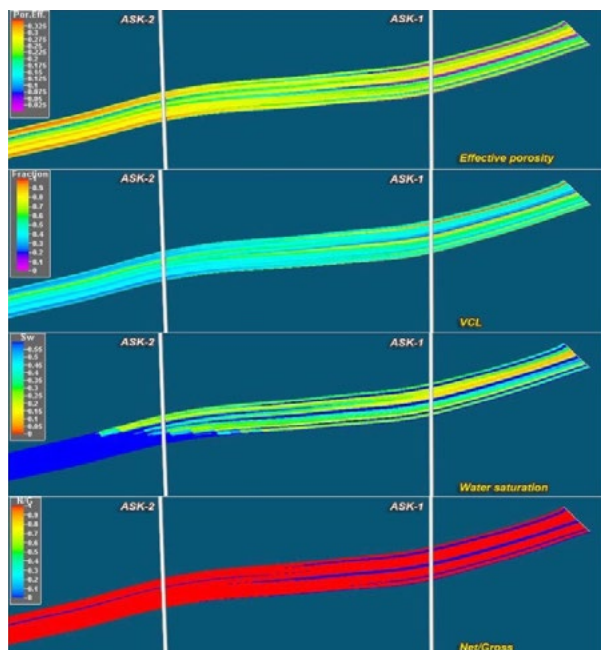
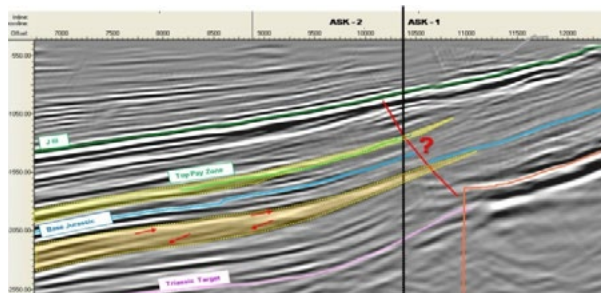
SERVICES: 3D Geological Model Up-grading, History Matching and Dynamic Modelling for Tournaisian Formation, North-East Block

COMMENCEMENT: December 2011

COMPLETION: May 2012

RESERVOIR STUDY INCLUDED:

- 1) The geological model construction (structural and petrophysical) based on new information (new wells, production data, pressure transient data, PLT interpretation data)
- 2) New up-scaling approach was applied
- 3) OOIP calculation based on new 3D model
- 4) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 5) In simulation was used ECLIPSE 300 and all wells were considered as unique systems (commingled production)
- 6) Establishing a basic scenario, which served for comparison of all the other field development cases
- 7) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 8) Providing a range of forecast results that will be used in further economic calculations to define the best development plan



PROJECT:

EXPLORATION OF THE GROUP OF RESERVOIRS IN MANGISTAU REGION (ASANKETKEN, BORKYLDAKTY, KYZYLZHAR EAST, SAGIZ WEST AND ZHANA MAKAT)

CLIENT: **PROBELL**

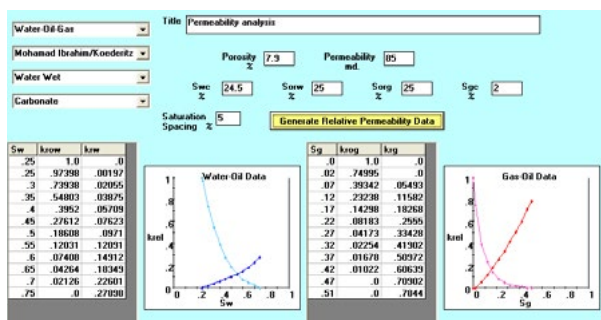
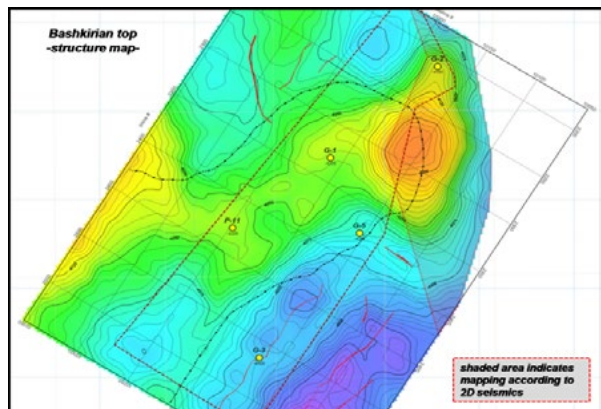
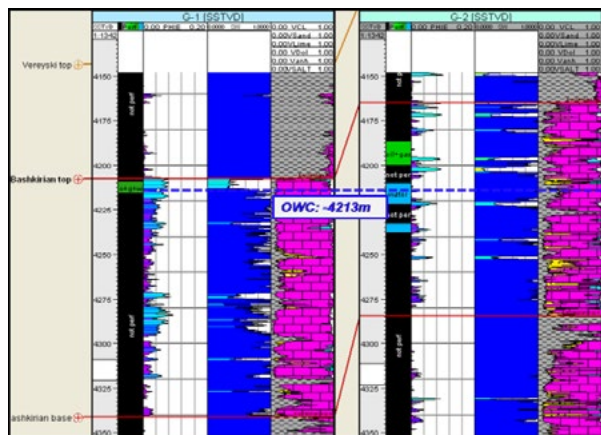
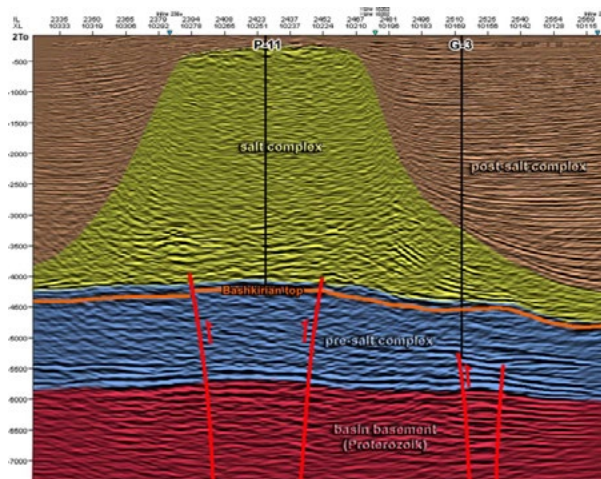
SERVICES: **OOIP Assessment of the Exploration License Blocks Area**

COMMENCEMENT: **June 2012**

COMPLETION: **July 2012**

RESERVOIR STUDY INCLUDED:

- 1) Geological Data Overview and Analysis
- 2) Tectonic Style
- 3) Well Log Data Correlations
- 4) Structural Models Definition
- 5) Reservoir Rocks
- 6) Oil-Water Contact Definition
- 7) Volumetric Calculations
- 8) Well Testing Analysis
- 9) Recovery Factor Calculation
- 10) Production Forecast Evaluation



PROJECT:

EXPLORATION OF DARINSKOE LICENSE BLOCK (BASHKIRIAN)

CLIENT: PM Lucas

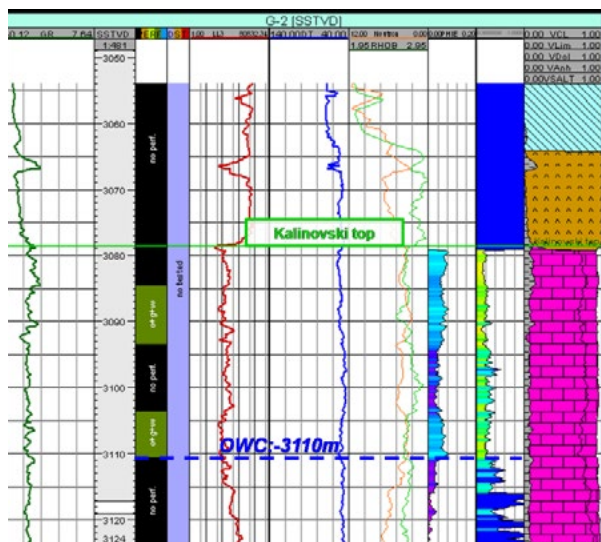
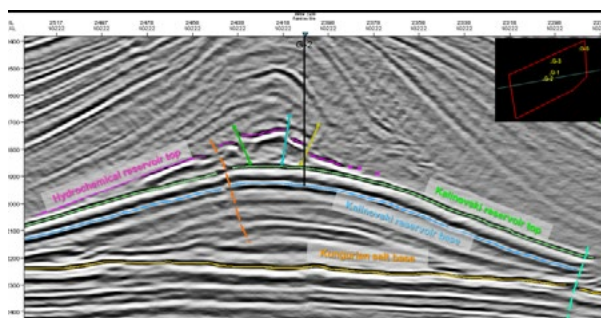
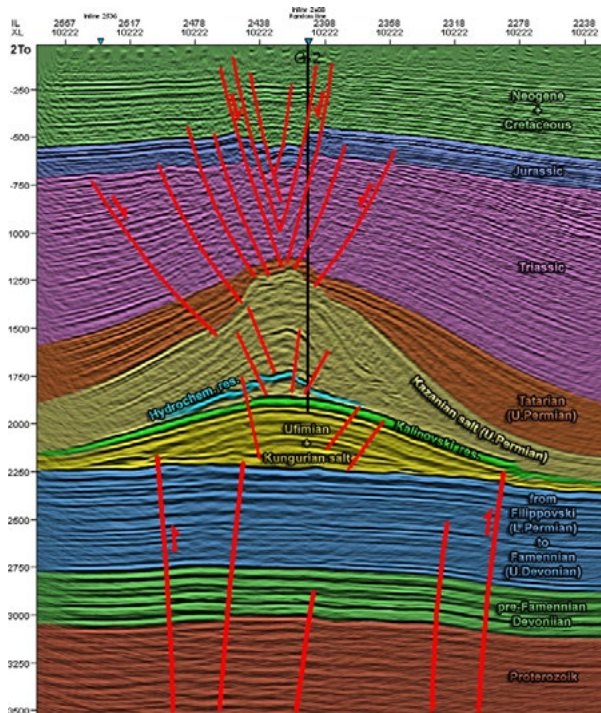
SERVICES: OOIP Assessment of the Exploration License Block Area

COMMENCEMENT: March 2012

COMPLETION: April 2012

RESERVOIR STUDY INCLUDED:

- 1) Geological Data Overview and Analysis
- 2) Tectonic Style
- 3) Well Log Data Correlations
- 4) Structural Models Definition
- 5) Reservoir Rocks
- 6) Oil-Water Contact Definition
- 7) Volumetric Calculations
- 8) PVT Analysis
- 9) Well Testing Analysis
- 10) Permeability and Inflow Characteristics
- 11) Recovery Factor Calculation



PROJECT:

EXPLORATION OF GREYACHINSKOE LICENSE BLOCK (UPPER PERMIAN)

CLIENT: PM Lucas

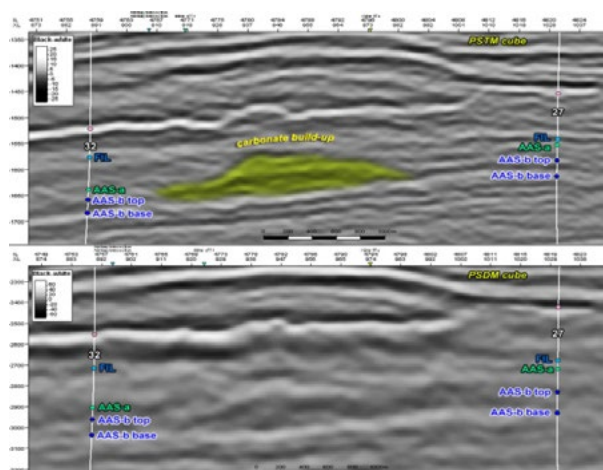
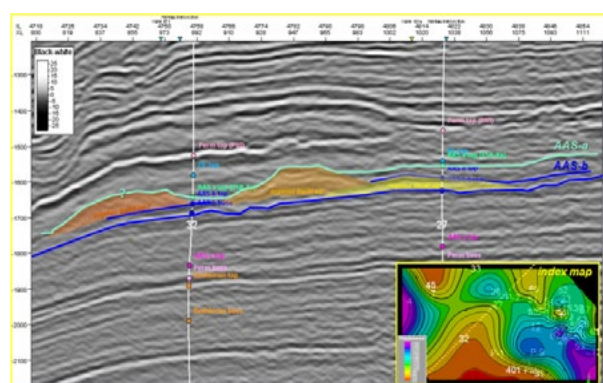
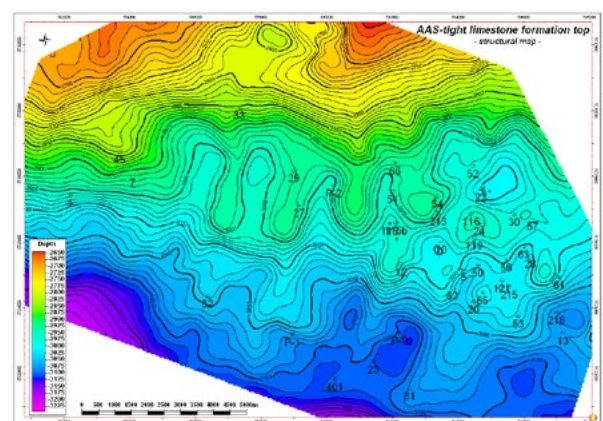
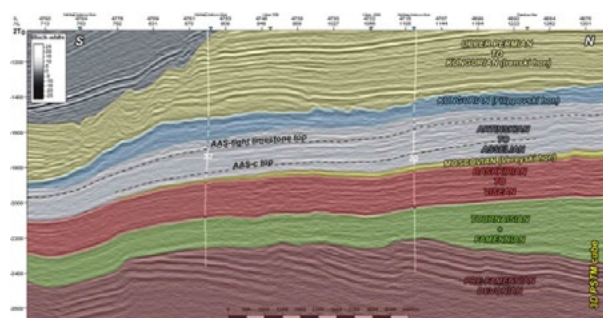
SERVICES: OOIP Assessment of the Exploration License Block Area

COMMENCEMENT: February 2012

COMPLETION: March 2012

RESERVOIR STUDY INCLUDED:

- 1) Geological Data Overview and Analysis
- 2) Well Log Data Correlation and Interpretation
- 3) Seismic Data Overview
- 4) Tectonic Style
- 5) Reservoir Rocks
- 6) Seismic Data Interpretation
- 7) 3D Structural modeling
- 8) Oil-Water Contacts
- 9) 3D Petrophysical modeling
- 10) Volumetric Calculations
- 11) PVT Analysis
- 12) Well Testing Analysis
- 13) Permeability and Inflow Characteristics
- 14) Recovery Factor Calculation



PROJECT:

EXPLORATION OF ARTINSKIAN-ASSELIAN FORMATIONS OF THE CHINAREVSKOE GAS-OIL FIELD

CLIENT: ZhaikMunai LLP, Kazakhstan

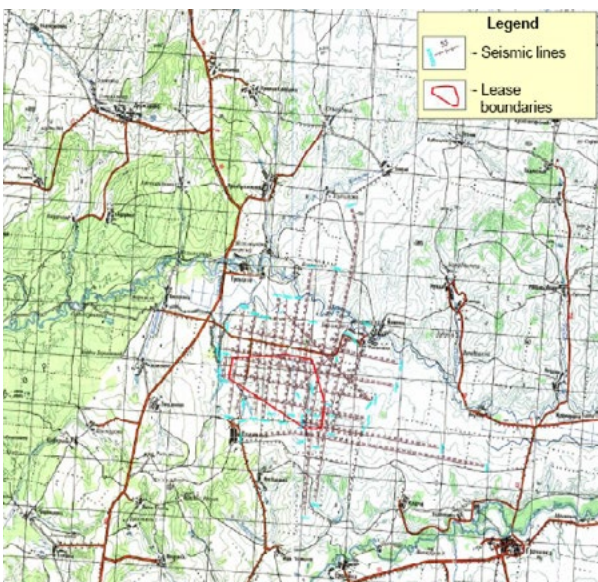
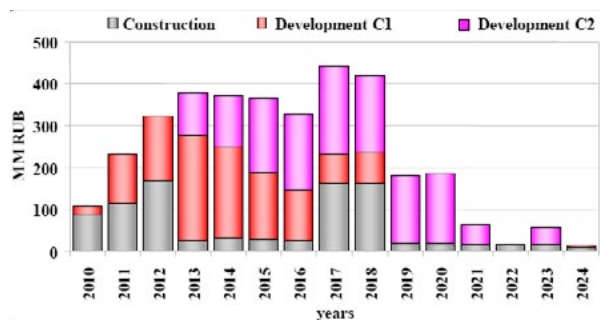
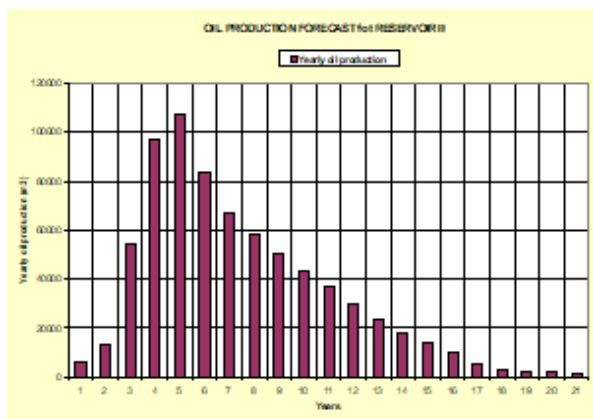
SERVICES: Definition of Exploration Strategy and the Main Uncertainties Related to the Exploration of Artinskian-Asselian Formations

COMMENCEMENT: January 2012

COMPLETION: February 2012

RESERVOIR STUDY INCLUDED:

- 1) Reservoir Geology Consideration (Structural and Petrophysical Model)
- 2) OGIP Calculation by Volumetrics
- 3) The Main Uncertainties Definition
- 4) Appraisal Drilling Strategy
- 5) Appraisal Drilling Program



PROJECT:
PROJECT DEVELOPMENT -SCOUTING

CLIENT: **Eriston- KMG-PM Lucas**

SERVICES: **Pogromenskoe Oil Field Development Program Overview**

COMMENCEMENT: **October 2011**

COMPLETION: **December 2012**

RESERVOIR STUDY INCLUDED:

- 1) Scouting Report
- 2) Data Collection and Data Analysis
- 3) G&G Consideration
- 4) Well Integrity Assessments
- 5) Project Development Review
- 6) Investment Estimation

PROJECT:
BROWN FIELD PROJECT DEVELOPMENT -SCOUTING

CLIENT: **Eriston- KMG-PM Lucas, Kazakhstan**

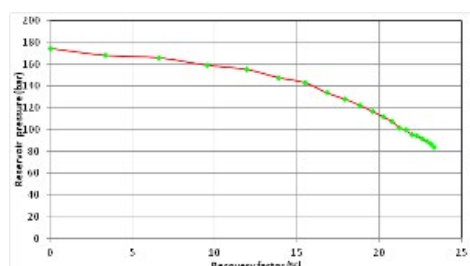
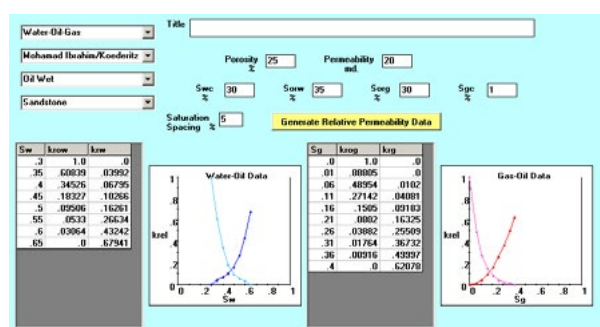
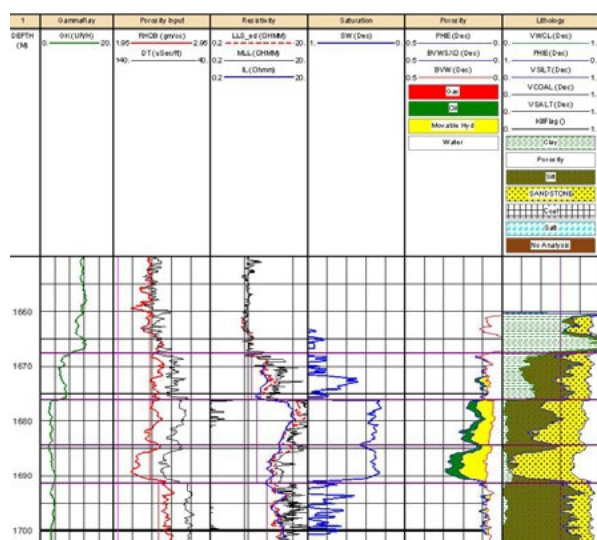
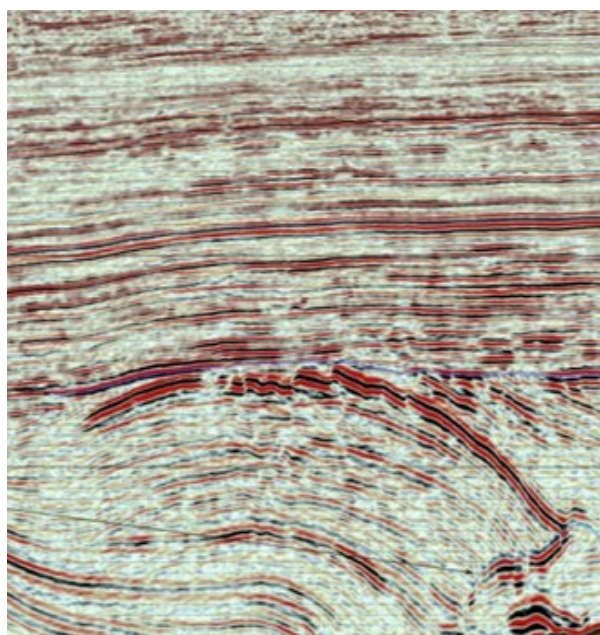
SERVICES: **Tverdilovskoe Oil Field Development Program Overview**

COMMENCEMENT: **October 2011**

COMPLETION: **December 2011**

RESERVOIR STUDY INCLUDED:

- 1) Scouting Report
- 2) Data Collection and Data Analysis
- 3) G&G Consideration
- 4) Well Integrity Assessments
- 5) Project Development Review
- 6) Investment Estimation



PROJECT:

TABINAY PROJECT ASSESSMENT

CLIENT: Tabinay-PM Lucas, Kazakhstan

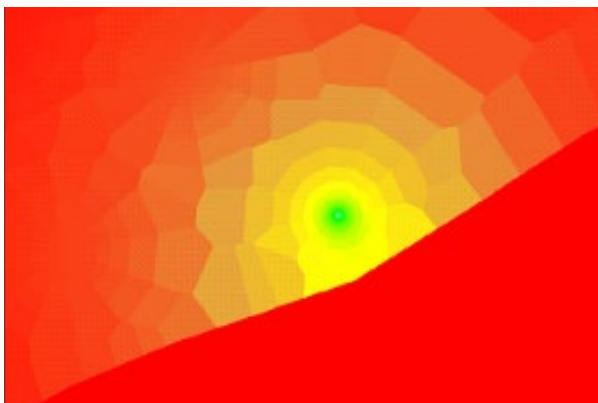
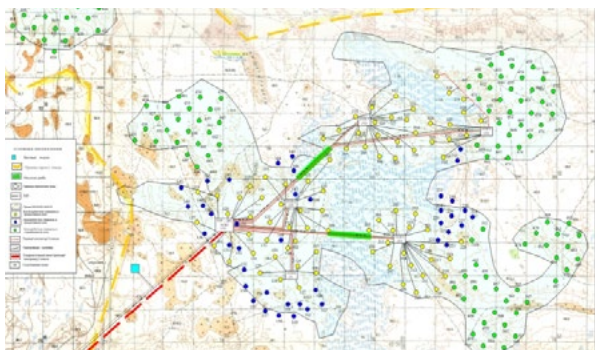
SERVICES: Data Overview, Data Analysis, OOIP and Reserves Estimation

COMMENCEMENT: October 2011

COMPLETION: December 2012

RESERVOIR STUDY INCLUDED:

- 1) Data Overview
- 2) Geological Settings
- 3) Well Log Re-interpretation
- 4) Well Testing Data Analysis
- 5) Well Integrity Assessments
- 6) Production Analysis
- 7) Volumetric Data Review
- 8) OOIP Calculations
- 9) Preliminary Reserves Calculation by Material Balance Calculations
- 10) Reservoir Development Strategy
- 11) Investment Estimation



PROJECT:

SHAGIRLY-SHOMSHITY GAS FIELD

CLIENT: Eriston-KMG-PM Lucas, Kazakhstan

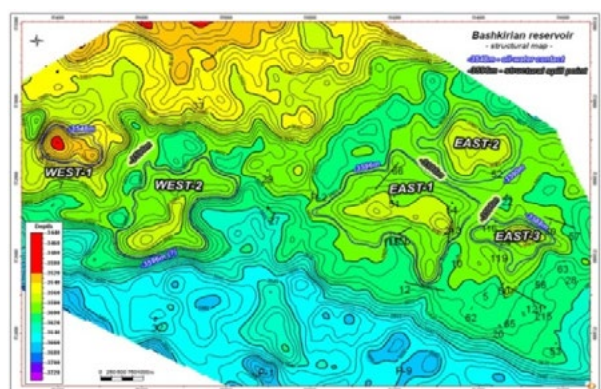
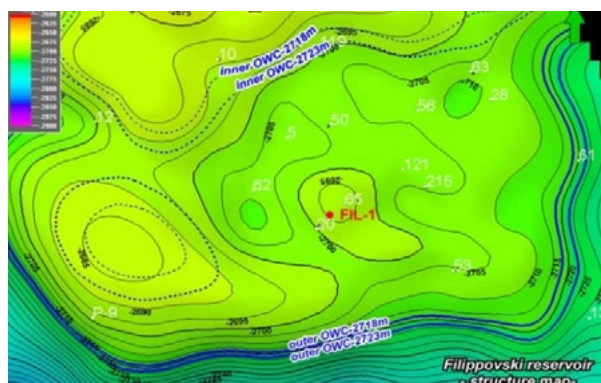
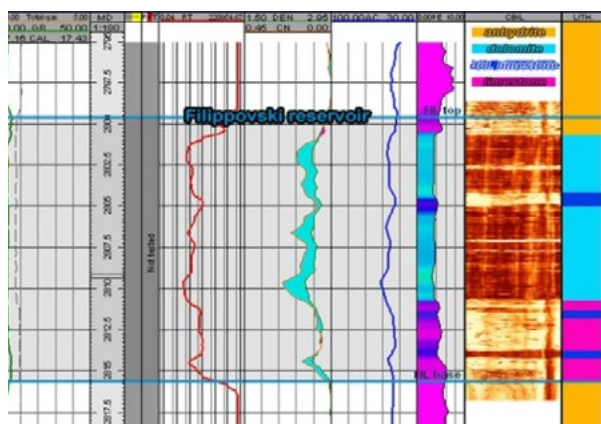
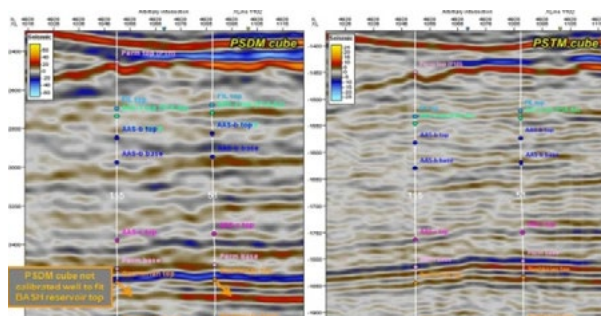
SERVICES: Project Review-Investment Opportunities

COMMENCEMENT: September 2011

COMPLETION: November 2011

RESERVOIR STUDY INCLUDED:

- 1) Data Overview
- 2) Transient Pressure Analysis
- 3) Well Log Re-interpretation
- 4) Well Testing Data Analysis
- 5) Well Integrity Assessments
- 6) Volumetric Data Review
- 7) Phased Development Options Considerations



PROJECT:

EXPLORATION OF FILIPOVSKI AND BASHKIRIAN FORMATIONS OF THE CHINAREVSKOE GAS-OIL FIELD

CLIENT: ZhaikMunai LLP, Kazakhstan

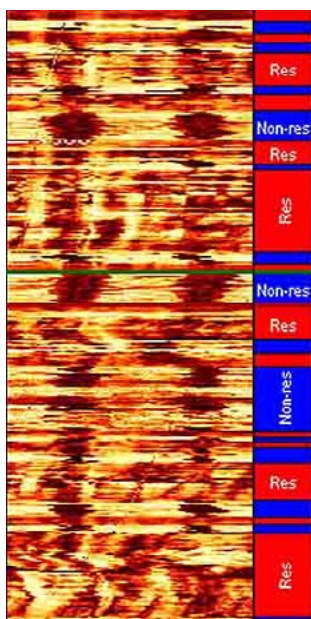
SERVICES: Definition of Exploration Strategy and the Main Uncertainties Related to the Filippovski and Bashkirian Formations

COMMENCEMENT: November 2011

COMPLETION: December 2011

RESERVOIR STUDY INCLUDED:

- 1) Reservoir Geology Consideration (Structural and Petrophysical Model)
- 2) OGIP Calculation by Volumetrics
- 3) The Main Uncertainties Definition
- 4) Appraisal Drilling Strategy
- 5) Appraisal Drilling Program



PROJECT:
**RESERVOIR EVALUATION OF THE TOURNAISIN FORMATIONS
 (SOUTH BLOCK OF THE CHINAREVSKOE GAS-OIL FIELD)**

CLIENT: ZhaikMunai LLP, Kazakhstan

SERVICES: Reservoir Evaluations of The South Tournaishian
 Block, 3D Geological Modelling, Reservoir
 Engineering Considerations, and Summary Report

COMMENCEMENT: January 2011

COMPLETION: March 2011

RESERVOIR STUDY INCLUDED:

1) Reservoir Geology Consideration (Structural and Petrophysical Model)

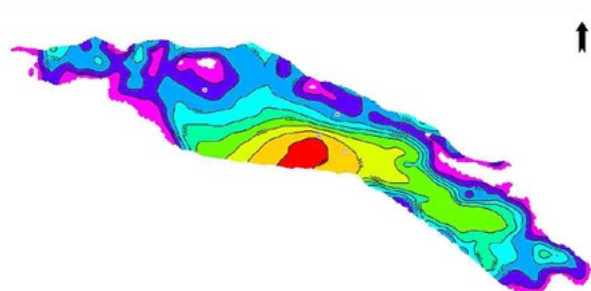
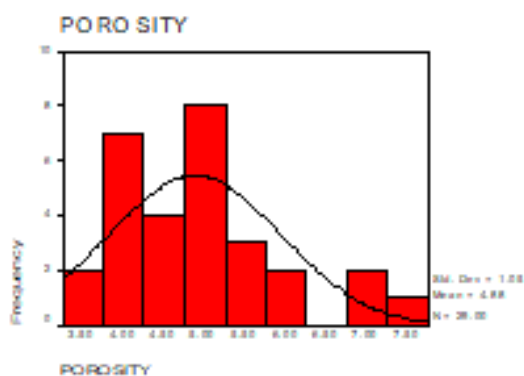
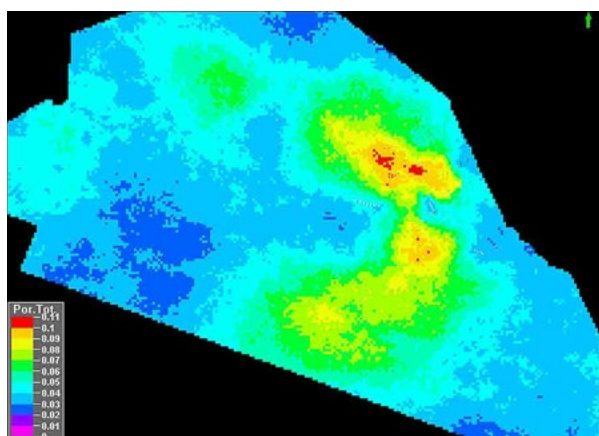
2) OGIP Calculation by:

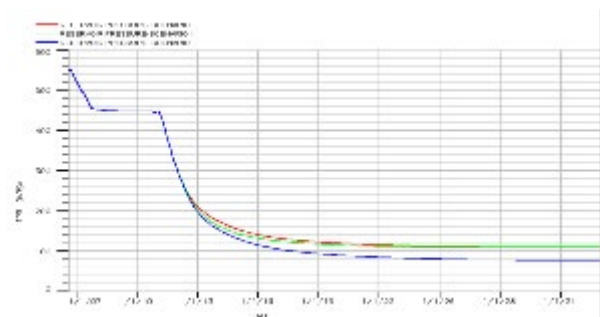
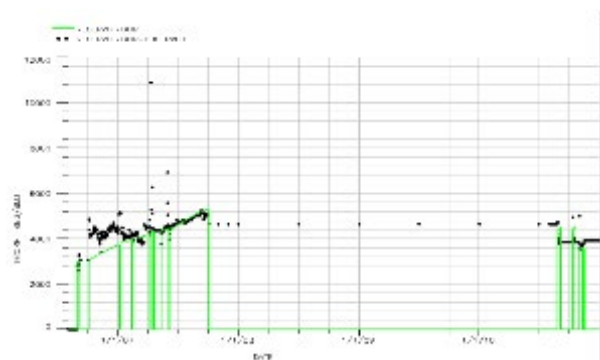
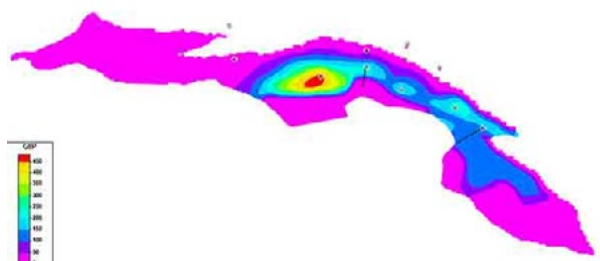
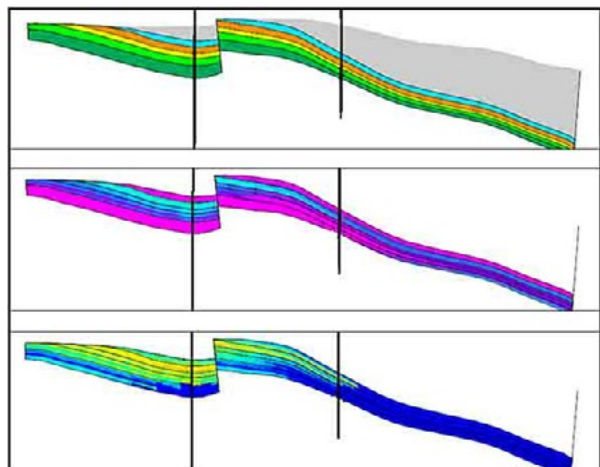
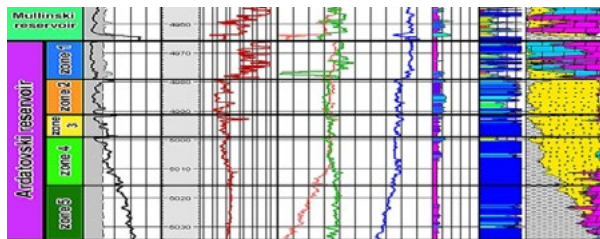
- Volumetrics
- Material Balance Calculations
- Probabilistic Approach

3) The Main Uncertainties Definition

4) Appraisal Drilling Program:

- Appraisal Drilling Strategy
- Operation Practice in The Well Testing/Stimulation and Obtaining Results from Key Wells
- Well Drilling and Completion
- Testing and Well Stimulation





PROJECT:

**RESERVOIR STUDY OF GAS-CONDENSATE RESERVOIR
ARDATOVSKY (NORTH-EAST BLOCK OF CHINAREVSKOE
GAS-OIL FIELD)**

CLIENT: ZhaikMunai LLP, Kazakhstan

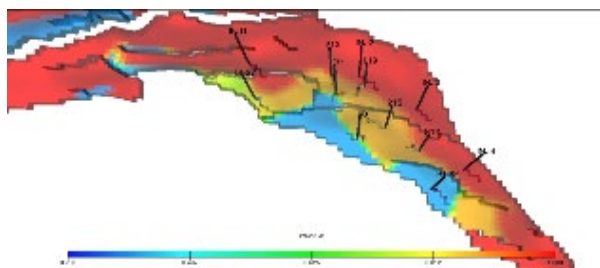
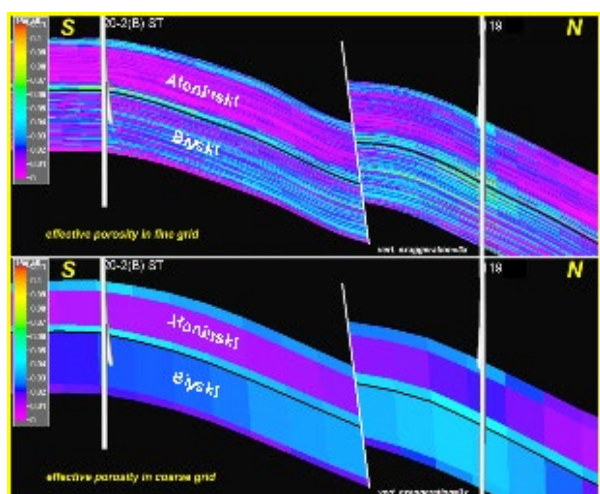
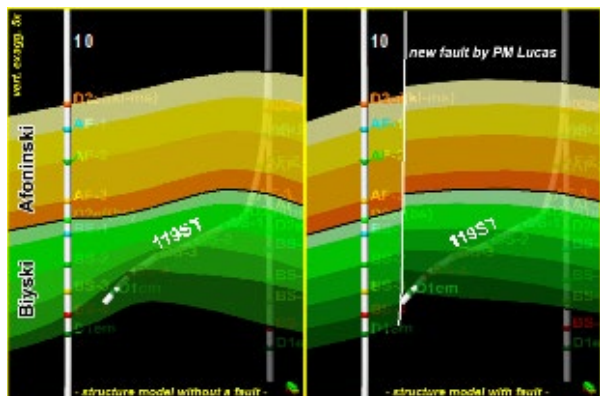
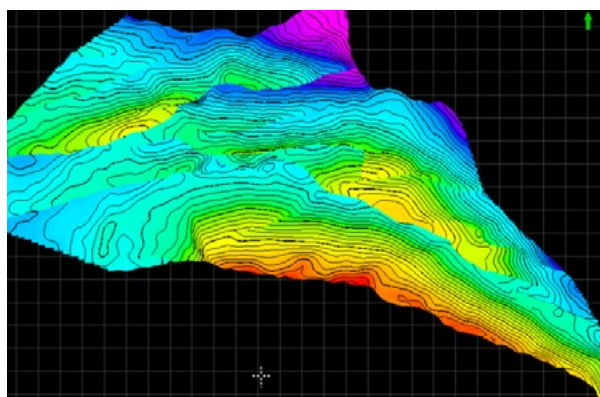
SERVICES: 3D Geological Modelling (Structural and Property Modelling), OGIP/OCIP Estimation and Recovery Factor (Recoverable Reserves Calculation for Different Scenarios)

COMMENCEMENT: January 2011

COMPLETION: May 2011

RESERVOIR STUDY INCLUDED:

- 1) The reservoir simulation model constructions, based on the geological model previously completed by a third party and updating the model by new well data
- 2) Calibration of the model so as to satisfactorily reflect available pressure and fluid production measurements
- 3) Establishing a basic scenario, which served as a benchmark for comparison of all the other field development cases
- 4) Working out a prediction scenarios that reflected different operating conditions in the field
- 5) Provided a range of forecast results that will be used in further economic calculations to determine the best field development plan



PROJECT:

**RESERVOIR STUDY OF GAS-CONDENSATE RESERVOIR
BIYSKI/AFONINSKI (NORTH-EAST BLOCK OF
CHINAREVSKOE GAS-OIL FIELD)**

CLIENT: ZhaikMunai LLP, Kazakhstan

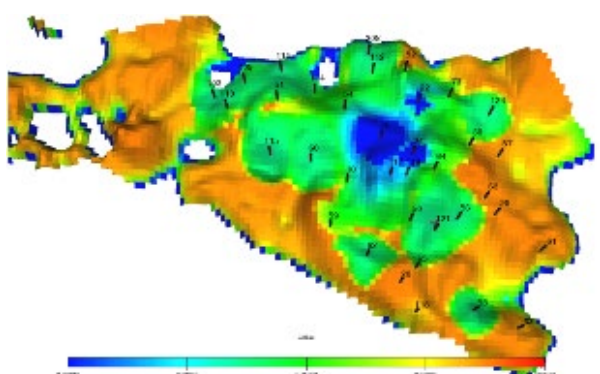
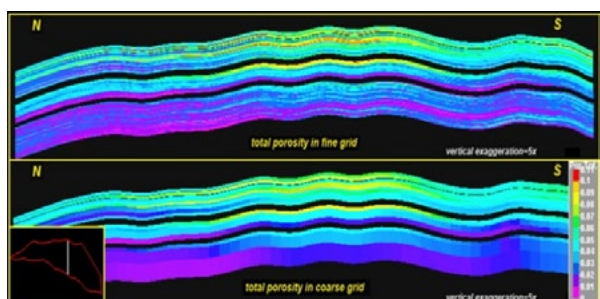
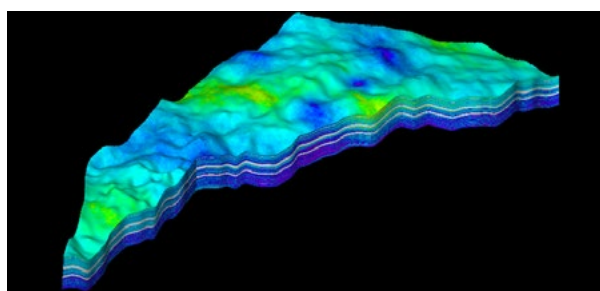
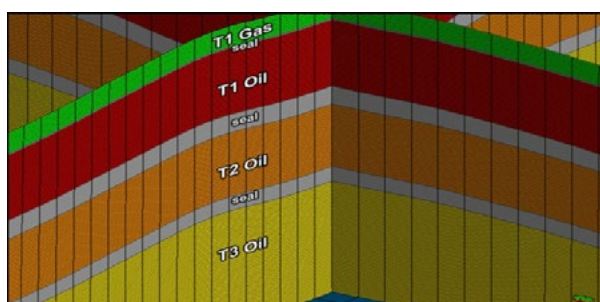
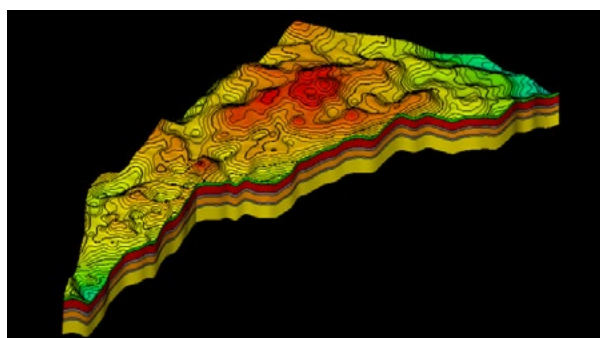
SERVICES: 3D Geological Modelling (Structural and Property Modelling), OGIP/OCIP Estimation and Recovery Factor (Recoverable Reserves Calculation for Different Scenarios)

COMMENCEMENT: November 2010

COMPLETION: January 2011

RESERVOIR STUDY INCLUDED:

- 1) Construction of the reservoir simulation model based on the geological model previously completed by a third party
- 2) The model up-data, using new well data
- 3) The model calibration to reflect good matching between calculated and available observation data (production and pressure data)
- 4) The base scenario prediction, which served for comparison of all the other field development cases
- 5) Working out a prediction scenarios that reflected different operating conditions in the field
- 6) Providing a range of forecast results that will be used in further economic calculations to determine the best field development plan



PROJECT:

RESERVOIR PRESSURE MAINTENANCE AND DISPLACEMENT EFFICIENCY BY WATERFLOODING (CHINAREVSKOE GAS-OIL FIELD, TOURNAISIAN FORMATION, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP, Kazakhstan

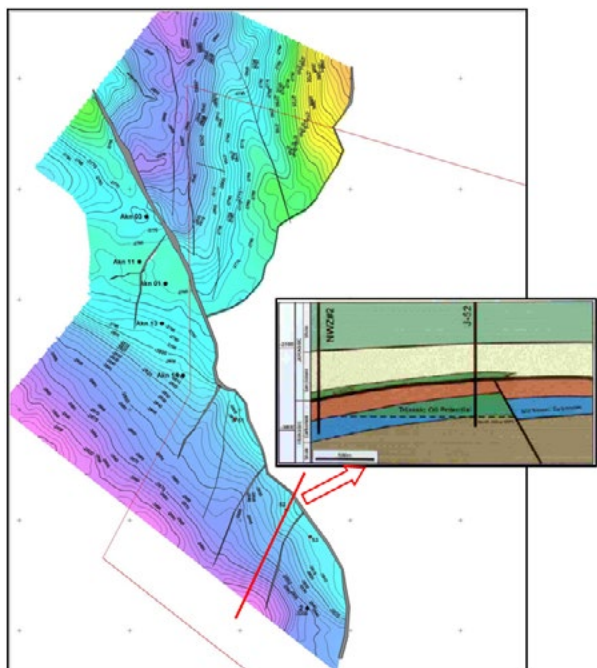
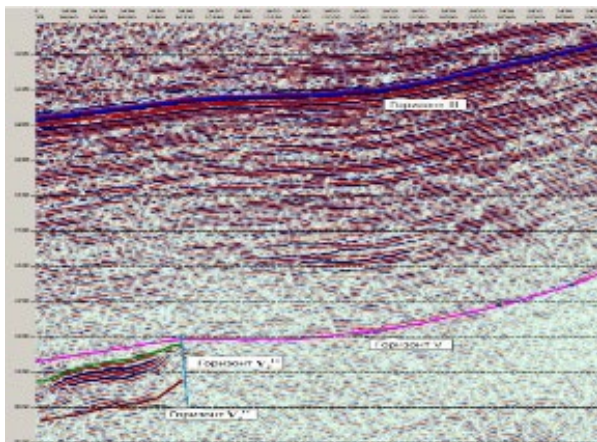
SERVICES: 3D Geological Model Up-grading, History Matching and Dynamic Modelling for Tournaisian Formation, North-East Block

COMMENCEMENT: April 2010

COMPLETION: July 2010

RESERVOIR STUDY INCLUDED:

- 1) The geological model construction (structural and petrophysical) based on new information (new wells, production data, pressure transient data, PLT interpretation data)
- 2) OOIP calculation based on new 3D model
- 3) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 4) Simulation using ECLIPSE 300 and all wells were considered as unique systems (commingled production)
- 5) Establishing a basic scenario, which served for comparison of all the other field development cases
- 6) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 7) Providing a range of forecast results that will be used in further economic calculations to determine the best field development plan



PROJECT:
EXPLORATION BLOCK 31 (KAZAKHSTAN)

CLIENT: Jupiter Energy LTD-PM Lucas

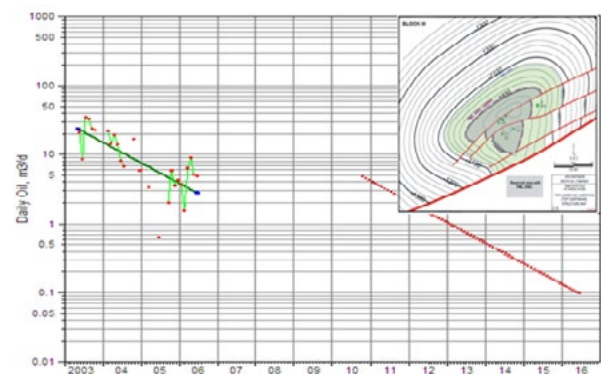
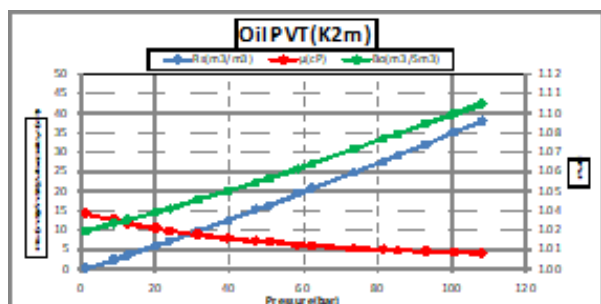
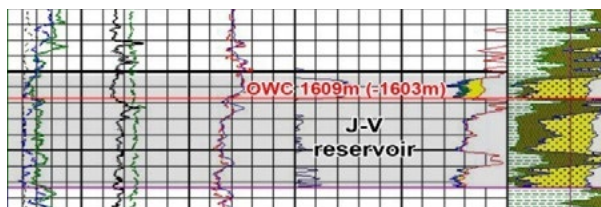
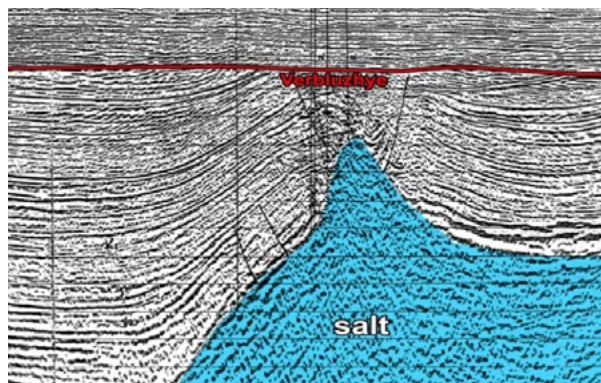
SERVICES: Geological Evaluation and Geological Report Using: Seismic Data, Well Log Data, Well Testing Data, Drilling Data, Pressure Transient Data, Well Integrity

COMMENCEMENT: March 2011

COMPLETION: April 2011

RESERVOIR STUDY INCLUDED:

- 1) Data overview and quality control
- 2) Geological settings considerations and analysis
- 3) Core data analysis and well log re-interpretations
- 4) Well testing data review and analysis
- 5) Volumetric data review
- 6) OOIP checking
- 7) Material balance calculations



PROJECT:

RESERVOIR EVALUATION STUDY OF THE VERBLUZJE OIL FIELD

CLIENT: Astrahan Oil Co-PM Lucas, RF

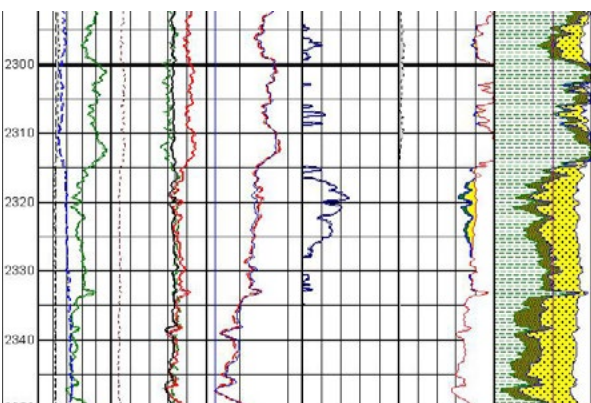
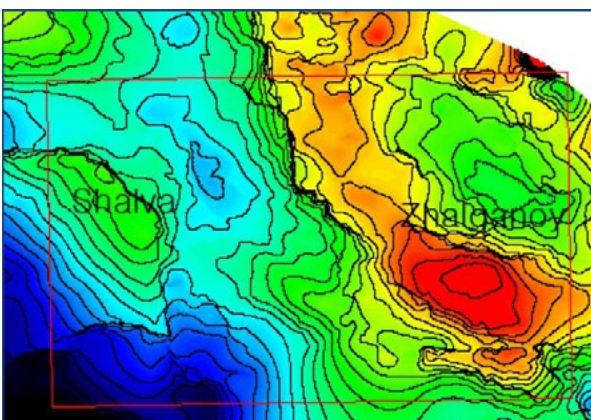
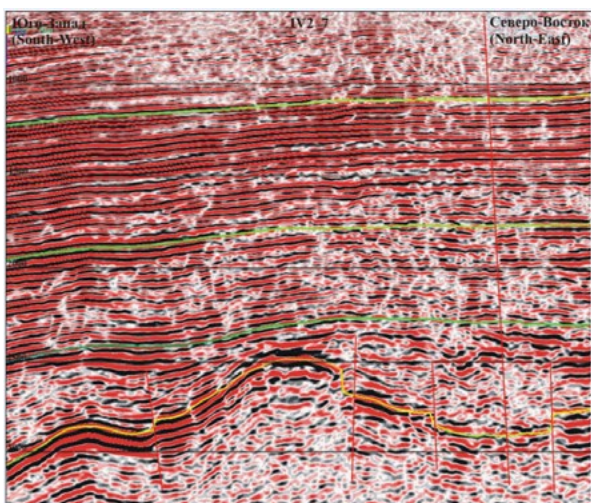
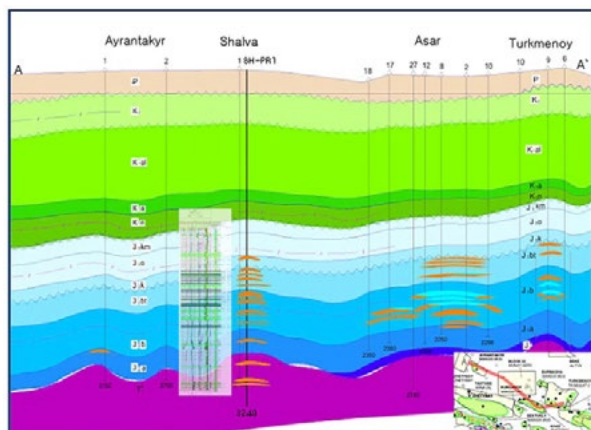
SERVICES: Verbluzje Licence Area Evaluations Based on:
Geological Studies-Reports, Geological Data,
Seismic Data, Well data

COMMENCEMENT: September 2010

COMPLETION: November 2010

RESERVOIR STUDY INCLUDED:

- 1) Geological settings of the area
- 2) Discovered and proved oil reservoirs
- 3) Seismic data overview
- 4) Well data analysis
- 5) Workover data analysis
- 6) Well log data interpretation
- 7) Core data interpretation
- 8) Well testing data review
- 9) Volumetric data review
- 10) Dual porosity system analysis
- 11) Water contact estimations
- 12) PVT data analysis
- 13) Production data decline analysis
- 14) Hydrocarbon reserves
- 15) Recovery factor calculations
- 16) Upside (exploration) potential



PROJECT:

EXPLORATION BLOCK SHALVA-ZHALGONAY

CLIENT: TОО Munai Service-PM Lucas, Kazakhstan

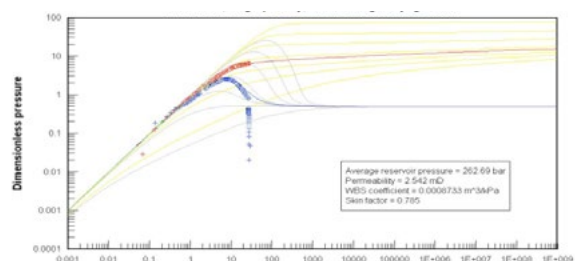
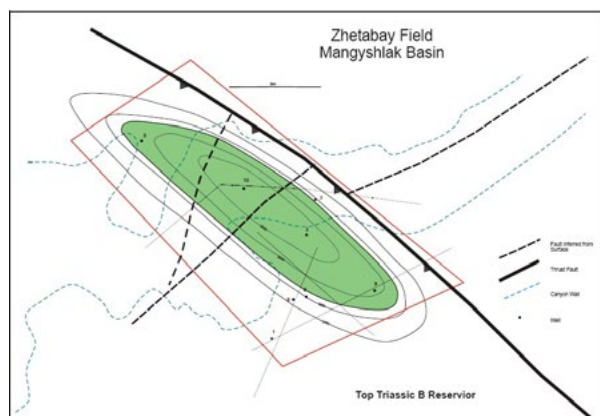
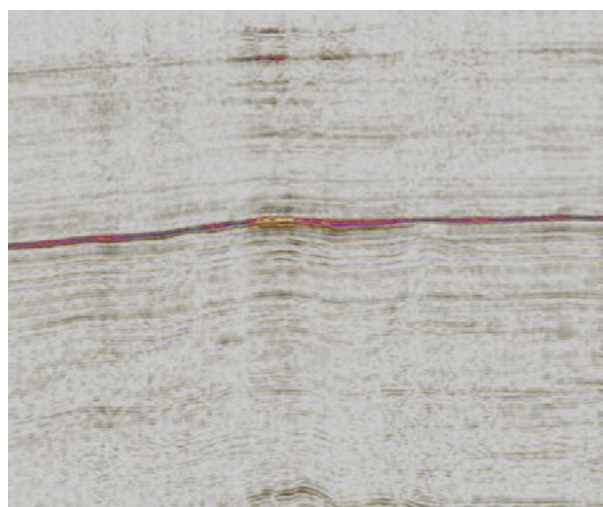
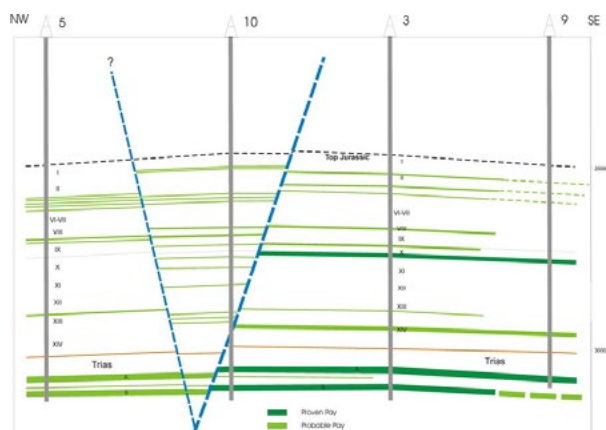
SERVICES: Geological Evaluations of the Oil Field Shalva-Zhalganoy

COMMENCEMENT: November 2010

COMPLETION: Dec 2010

RESERVOIR STUDY INCLUDED:

- 1) Data overview, history of the field
- 2) Geological and petroleum system analysis
- 3) 3D seismic data acquisition analysis
- 4) 3D seismic data processing (PSDM) analysis
- 5) 3D seismic data interpretation analysis
- 6) Potential prospects proposals
- 7) Volumetrics and OOIP estimation



PROJECT:
CONCESSION BLOCK NORTHWEST ZHETYBAY

CLIENT: KOR-TAZH LLP-PM Lucas

SERVICES: Geological Evaluations of the Oil Field Northwest Zhetiby

COMMENCEMENT: April 2010

COMPLETION: May 2010

RESERVOIR STUDY INCLUDED:

- 1) Reservoir geology
- 2) Seismic data analysis
- 3) Reservoir petrophysics
- 4) Structural model
- 5) Petrophysical results
- 6) OOIP estimation (applied methodology)
- 7) Future development of the field
- 8) Investment estimation



PROJECT:
EXPLORATION BLOCK XXIX-15-16 METKEN, INVESTMENT ESTIMATION

CLIENT: Almas International Trading Co-PM Lucas

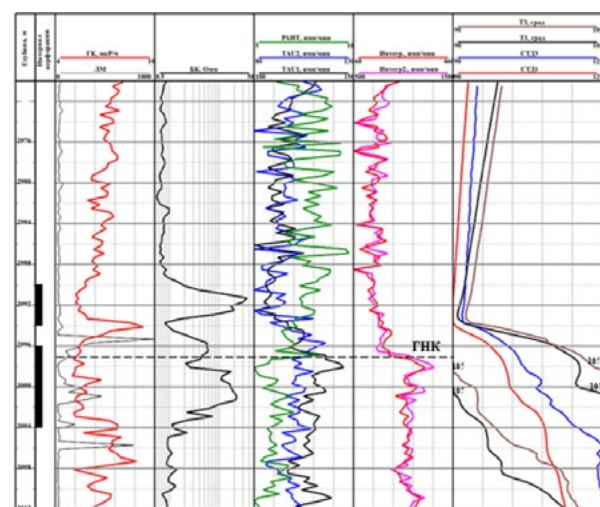
SERVICES: Geological Data Overview and Block Preliminary OOIP Estimation and Economical Analysis

COMMENCEMENT: November 2010

COMPLETION: December 2010

RESERVOIR STUDY INCLUDED:

- 1) Reservoir geology
- 2) Neighboring oil fields
- 3) Petrophysical results
- 4) Well integrity risk assessments
- 5) Metken geological structures
- 6) OOIP estimation
- 7) Block development strategy
- 8) Investments estimation



PROJECT:
KAMENISTOYE OIL FIELD-INVESTMENT ESTIMATION

CLIENT: Kamenistoye LLP-PM Lucas

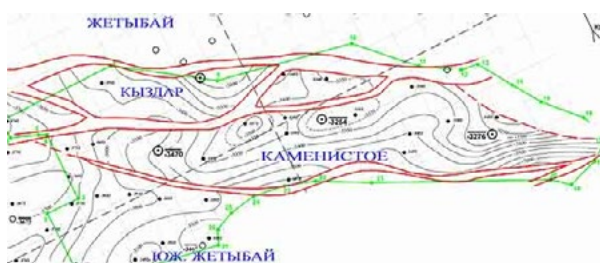
SERVICES: Kamenistoye Oil Field-Reserve and Geological Evaluations

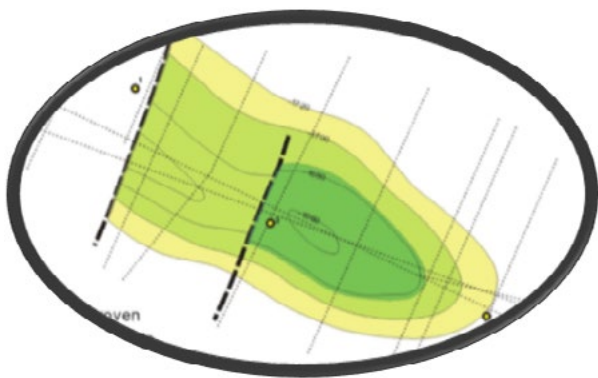
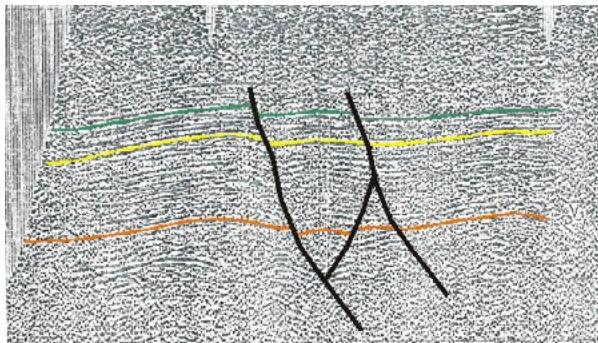
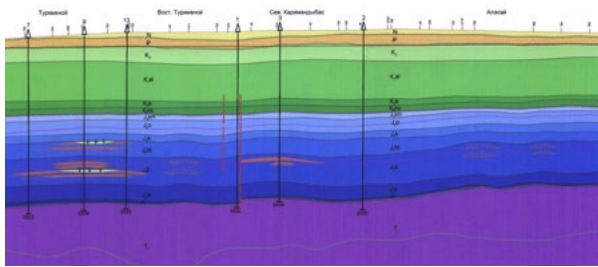
COMMENCEMENT: May 2009

COMPLETION: June 2009

RESERVOIR STUDY INCLUDED:

- 1) Exploration history
- 2) Geology
- 3) Log analysis
- 4) Reserves
- 5) Well workover history
- 6) Well Integrity assessment
- 7) ALS selection and design
- 8) Early production system consideration





PROJECT:
NORTH KARAMANDYBAS-INVESTMENT ESTIMATION

CLIENT: Dala Geo-PM Lucas, Kazakhstan

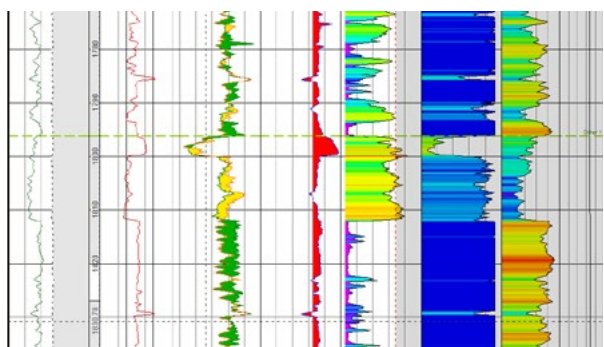
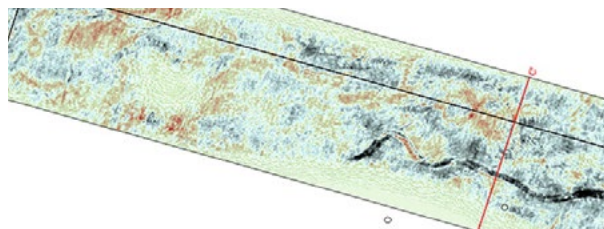
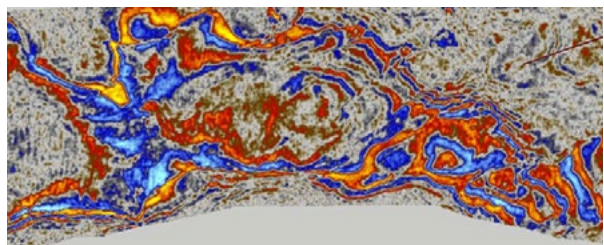
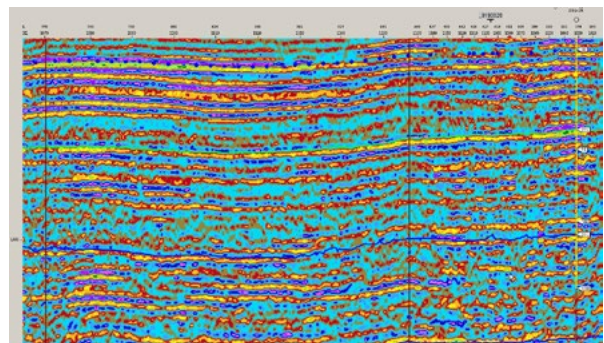
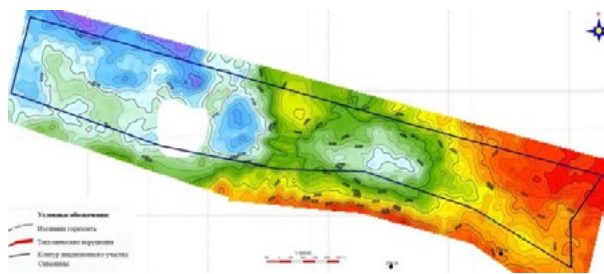
SERVICES: Geological Data Overview, Preliminary OOIP Estimation and Investment Estimation

COMMENCEMENT: March 2010

COMPLETION: April 2010

RESERVOIR STUDY INCLUDED:

- 1) Reservoir geology
- 2) Neighboring oil fields
- 3) Petrophysical results
- 4) North Karamandybas geological structures
- 5) OOIP estimation
- 6) Block development strategy
- 7) Investments estimation



PROJECT:
**TASTOBE OIL FIELD, EXPLORATION OPPORTUNITIES
ASSESSMENT**

CLIENT: Arna Petroleum, Kazakhstan

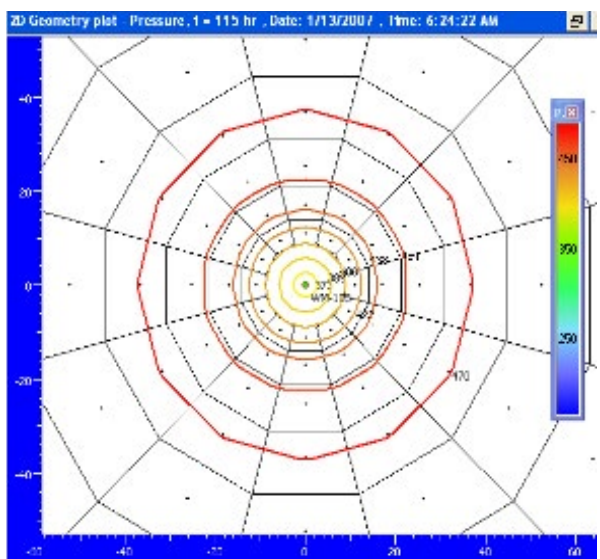
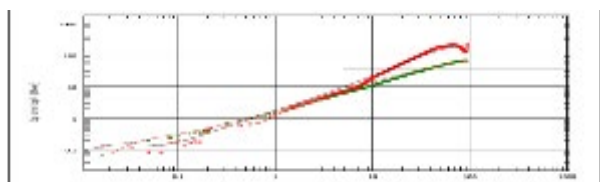
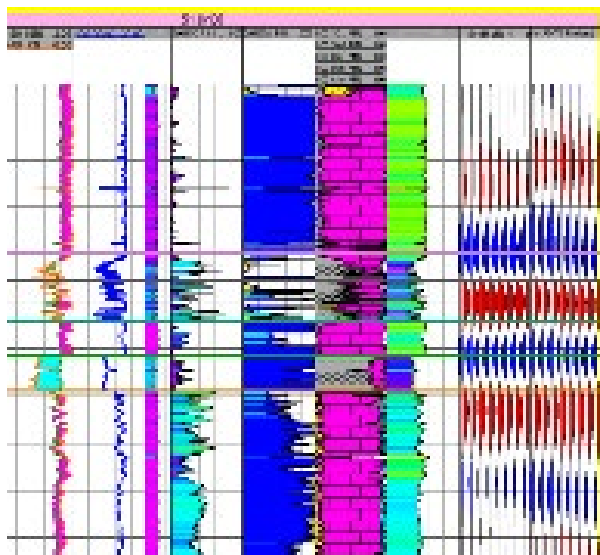
SERVICES: Geological Data Overview, Preliminary OOIP Estimation and
3D Seismic Data Interpretation Overview, Data Analysis and
OOIP Estimation

COMMENCEMENT: April 2010

COMPLETION: May 2010

RESERVOIR STUDY INCLUDED:

- 1) Data Overview
- 2) Geological Settings
- 3) Seismic Acquisition Parameters Overview
- 4) Seismic Data processing Overview
- 5) Seismic Data Interpretation Overview and Analysis
- 6) Well Log Re-interpretation for exploration well
- 7) OOIP Estimations
- 8) Prospective Objects
- 9) Recommendations for Further Activities



PROJECT:
RESERVOIR EVALUATION STUDY OF THE WEST MEDVEDJE

CLIENT: Victoria Oil, RF

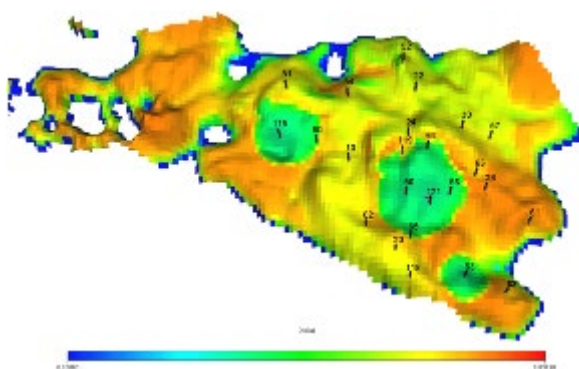
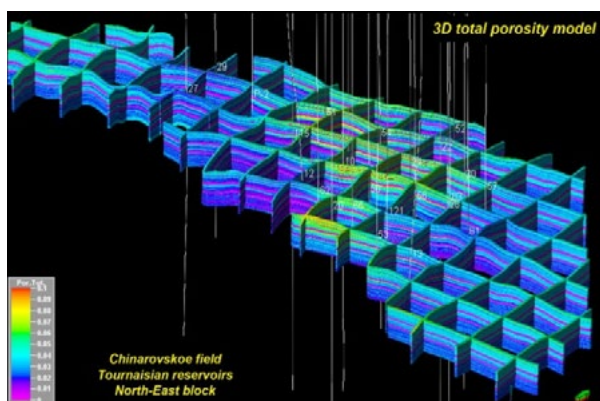
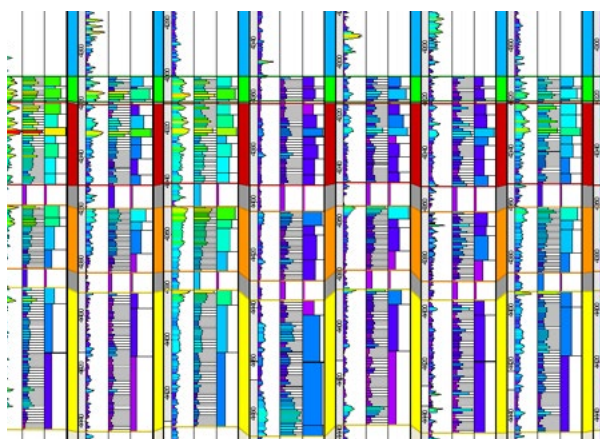
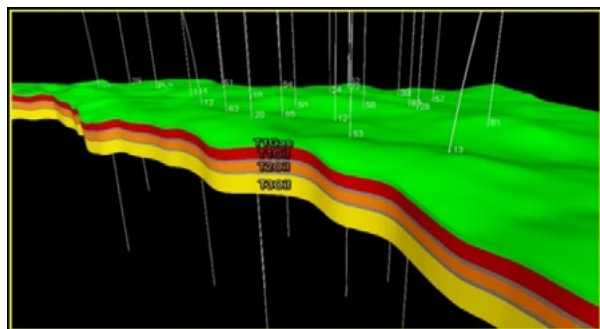
SERVICES: Geological Data Overview and Reservoir Engineering Calculations

COMMENCEMENT: July 2009

COMPLETION: August 2009

RESERVOIR STUDY INCLUDED:

- 1) Reservoir geology overview
- 2) Petrophysical analysis
- 3) OOIP-volumetric calculations
- 4) Pressure transient analysis
- 5) Well integrity assessments
- 6) Material balance calculations



PROJECT:

WATER INJECTION STUDY (CHINAREVSKOE GAS-OIL FIELD, TOURNAISIAN FORMATIONS, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP, Kazakhstan

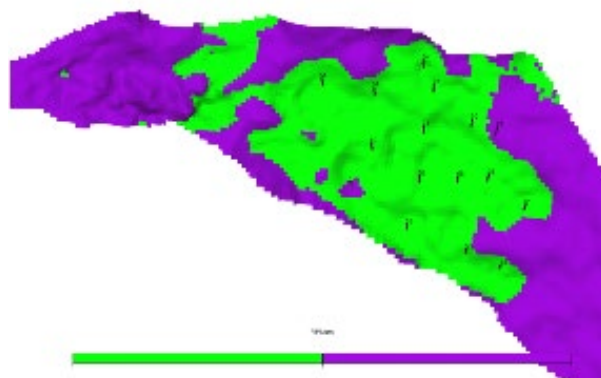
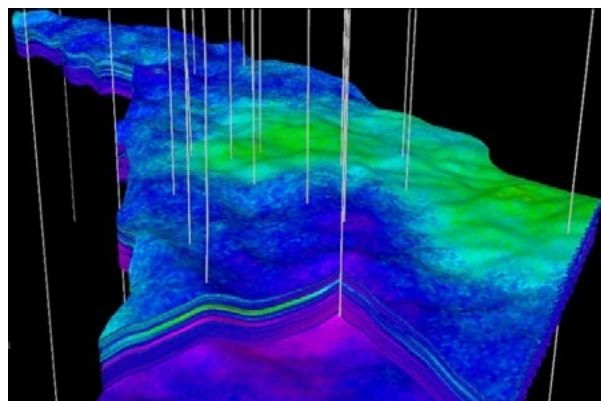
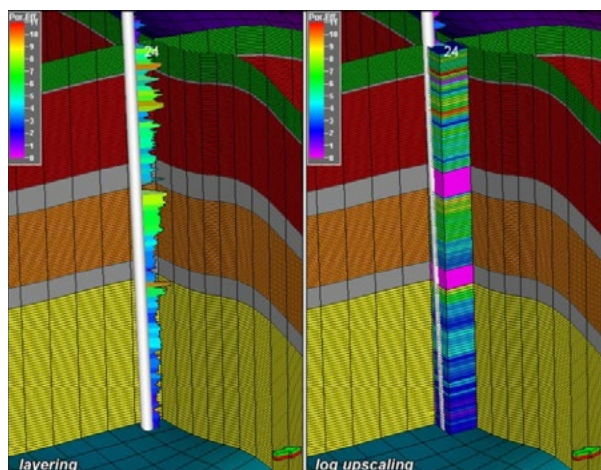
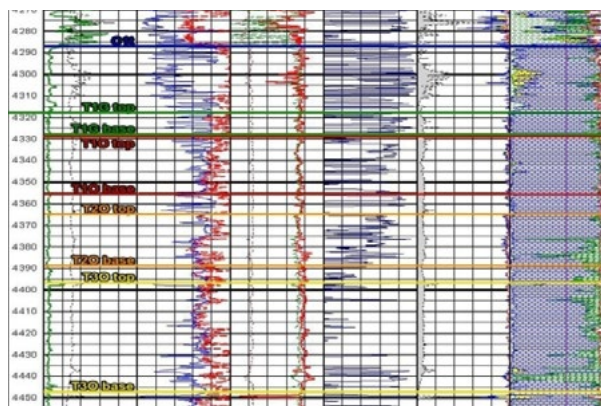
SERVICES: 3D Geological Model Up-grading, History Matching and Dynamic modelling for Tournaisian Formations, North-East Block

COMMENCEMENT: May 2009

COMPLETION: September 2009

RESERVOIR STUDY INCLUDED:

- 1) The geological model updating (structural and petrophysical) based on new information (new wells, production data, pressure transient data, PLT interpretation data)
- 2) OOIP calculation based on new 3D model
- 3) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 4) Simulation ECLIPSE 100 for oil reservoirs and ECLIPSE 300 for gas condensate reservoir
- 5) Oil wells were considered as unique systems (commingled production), and production from gas-condensate reservoir was simulated separately
- 6) Establishing a basic scenario, which served for comparison of all the other field development cases
- 7) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 8) Well integrity assessments
- 9) Providing a range of forecast results that will be used in further economic calculations to define the best development plan



PROJECT:

3D RESERVOIR MODELING STUDY (CHINAREVSKOE GAS-OIL FIELD, TOURNAISIAN FORMATIONS, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP, Kazakhstan

SERVICES: 3D Geostatic Model Upgrading, and 3D Dynamic modelling for Tournaisian Formations, North-East Block

COMMENCEMENT: June 2008

COMPLETION: October 2008

RESERVOIR STUDY INCLUDED:

- 1) The geological model construction (structural and petrophysical) based on new information (new wells, production data, pressure transient data, PLT interpretation data)
- 2) OOIP calculation based on new 3D model
- 3) Calibration of the model by satisfactory matching between calculated and observation data (production and pressure data)
- 4) In simulation was used ECLIPSE 100 for oil reservoirs and ECLIPSE 300 for gas condensate reservoir
- 5) Oil wells were considered as separate systems (no-commingled production)
- 6) Establishing a basic scenario, which served for comparison of all the other field development cases
- 7) Working out prediction scenarios that reflected different development options and operating conditions in the field
- 8) Providing a range of forecast results that will be used in further economic calculations to define the best development plan



PROJECT:
KARATON OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

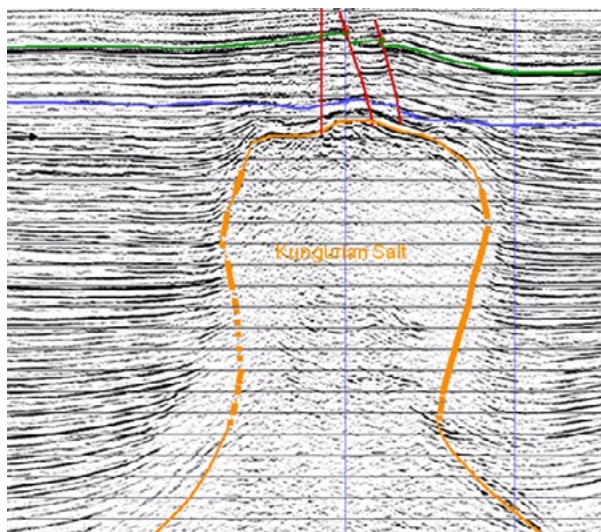
SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves overview
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations



PROJECT:
KULSARY OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

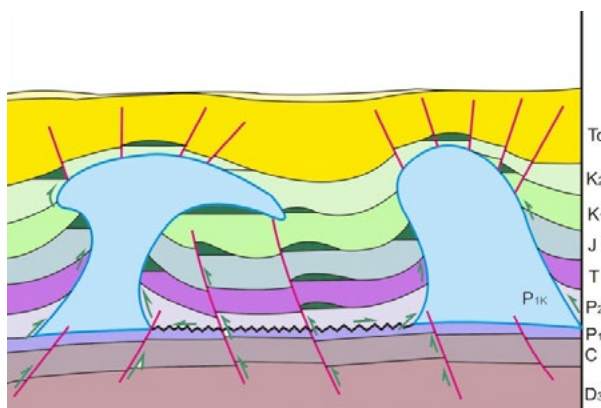
SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves overview
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations



PROJECT:
DOSSOR OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

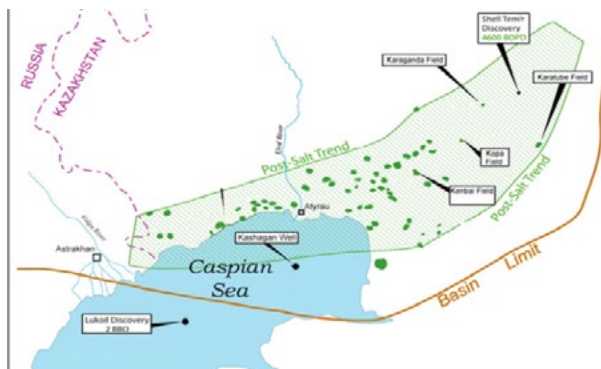
SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves overview
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations



PROJECT:

BAYCHUNAS OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves estimation
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations

ERA	PERIOD	EPOCH	AGE	OIL FIELDS											
				BAYCHYNAS	KARATON	KOSCHAGIL	KULSARY	MAKAT							
				E-wings	SW-wings	NE-wings	N-wings	S-wings	E-wings	NE-wings	S-wings	E-wings	NE-wings	S-wings	E-wings
PHANEROZOIC	MESOZOIC	CRETACEOUS	Albanian												
			Albanian												
		TERTIARY	Albanian												
			Albanian												
	PALEOZOIC	DEVONIAN	Albanian												
			Albanian												
		CARBONIFEROUS	Albanian												
			Albanian												
		PERMIAN	Albanian												
			Albanian												

PROJECT:

MAKAT OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

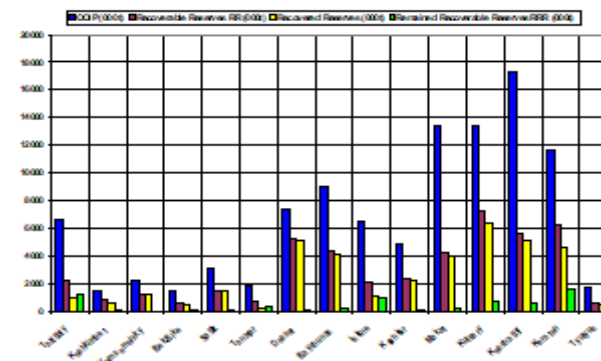
SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves estimation
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations



PROJECT:

KOSCHAGIL OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

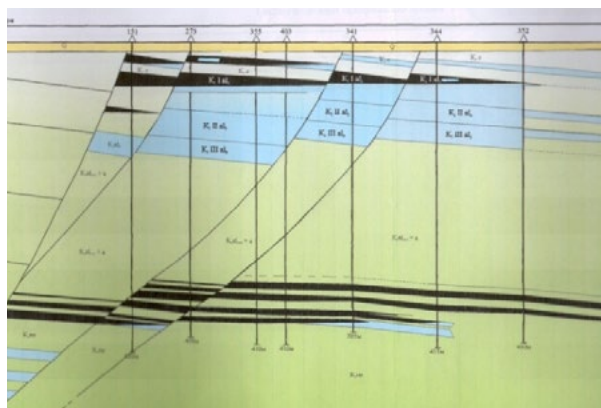
SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

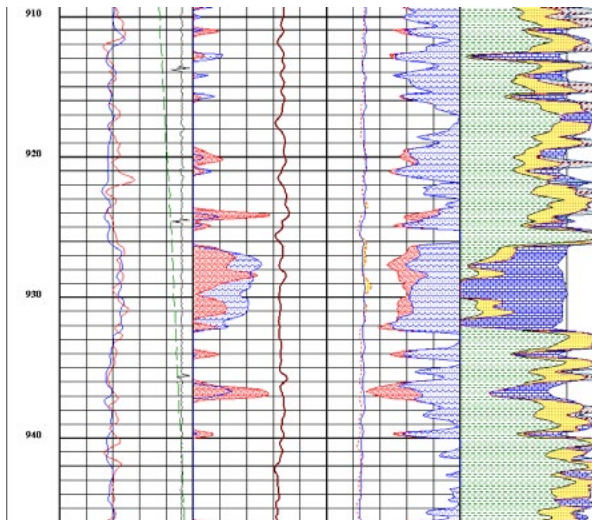
COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves estimation
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations





PROJECT:

KOSHKAR OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

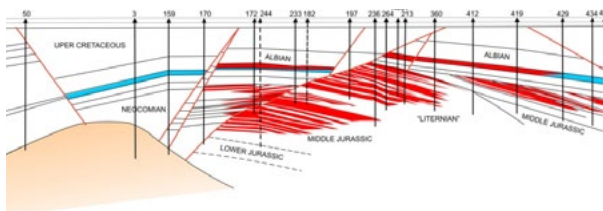
SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves overview
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations



PROJECT:

TULUS OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

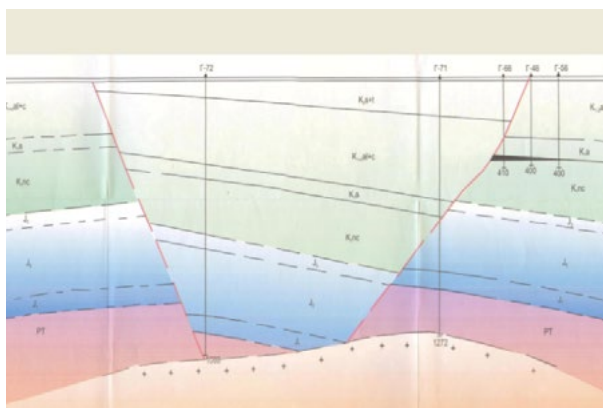
SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves overview
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations



PROJECT:

ISKENE OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

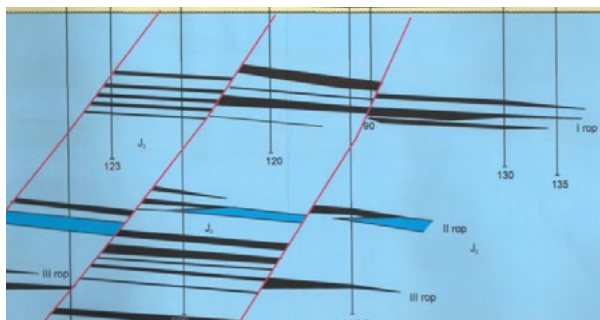
SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves overview
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations



PROJECT:

TANATAR OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves overview
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations



PROJECT:

TAZIGALI OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

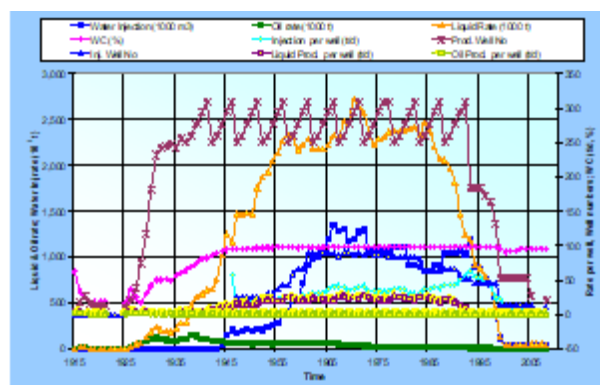
SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves overview
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations



PROJECT:

BEKBIKE OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

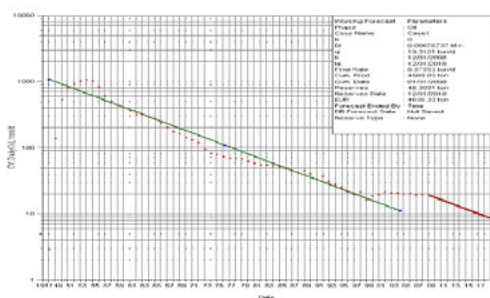
SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves overview
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations



PROJECT:

SAGIZ OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves overview
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations

PROJECT:

KOSKIMBET OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves overview
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations

PROJECT:

KOMSOMOLSKOE OIL FIELD, TECHNO-ECONOMICAL STUDY

CLIENT: KazMunaiGas-Eriston-PM Lucas, Kazakhstan

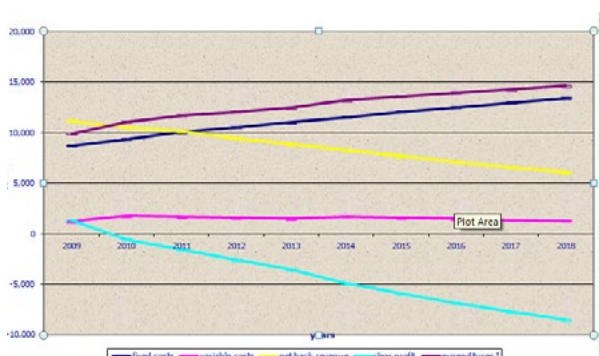
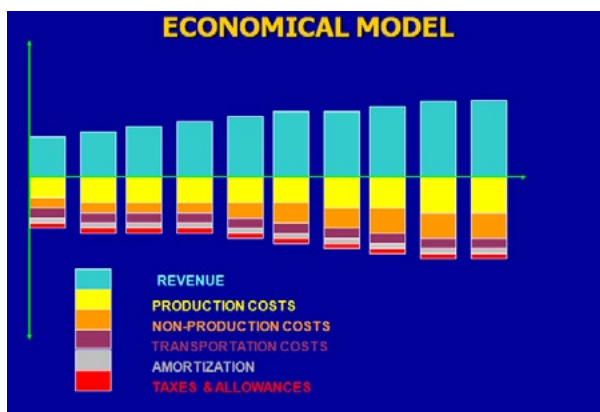
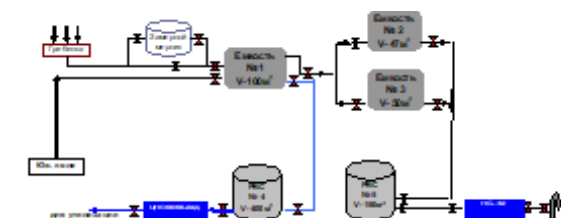
SERVICES: Geological and Production Data Collection, Data QC, Field Re-development Planning, Recoverable Reserves Estimation and Economic Analysis

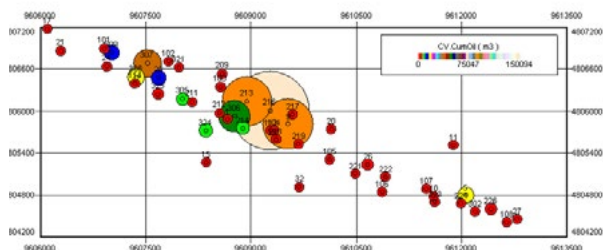
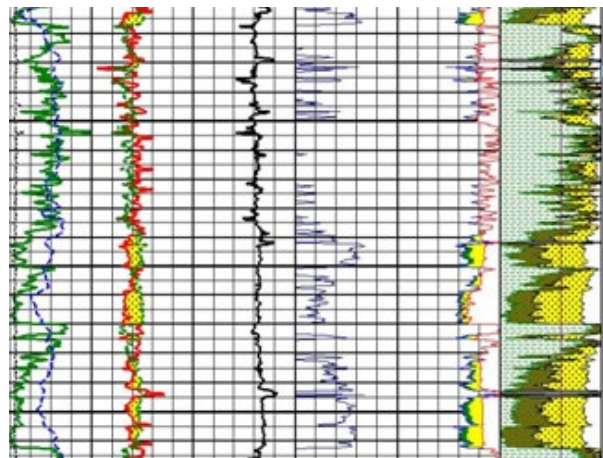
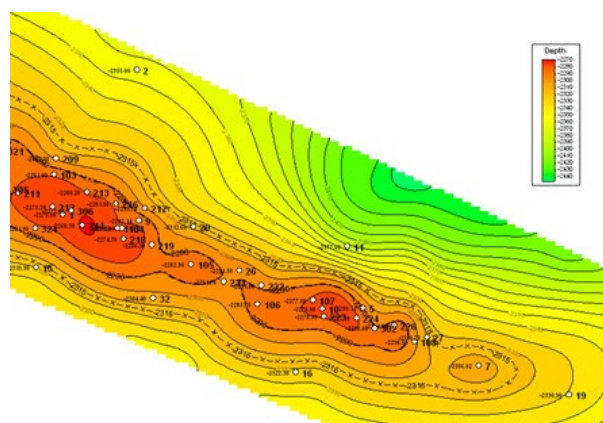
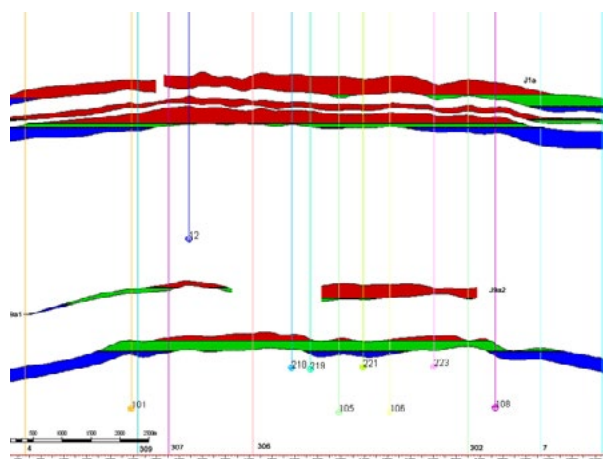
COMMENCEMENT: July 2007

COMPLETION: June 2009

SERVICES INCLUDED:

- 1) Geological and petrophysical overview
- 2) Reservoir fluid characterization and PVT analysis
- 3) OOIP and reserves overview
- 4) Well integrity studies
- 5) Production and development history of the field and current development status
- 6) Production forecast
- 7) Economical evaluations





PROJECT:
OPERATIONS AND PETROLEUM ENGINEERING SUPPORT

CLIENT: OMV-TOC LLP, Kazakhstan

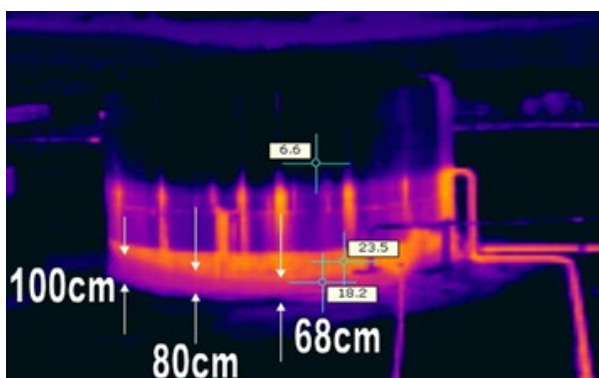
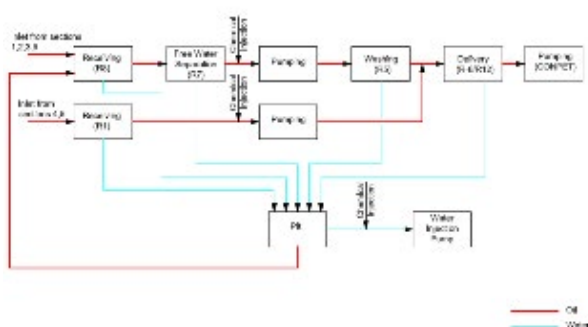
SERVICES: Monitoring, Analysis and Production Optimization of The Tasbulat, Turkmenoi and Aktas Oil Field

COMMENCEMENT: November 2007

COMPLETION: December 2008

RESERVOIR STUDY INCLUDED:

- 1) Daily production wells performance analysis
- 2) Daily water wells performance analysis
- 3) Daily production reporting
- 4) Well test supervising
- 5) Well test interpretation
- 6) Well log interpretation
- 7) Well flow performance analysis
- 8) Well problem & Integrity analysis, diagnosis and recommended options
- 9) Artificial lift system design, monitoring, analysis and optimization
- 10) WO planning
- 11) WO well end reports



PROJECT:

PRODUCTION OPERATION PRACTICE AUDITING

CLIENT: OMV Petrom , Romania

SERVICES: Production Operation Practice & Well Integrity Auditing for 9 The Biggest Oil Fields in Romania:

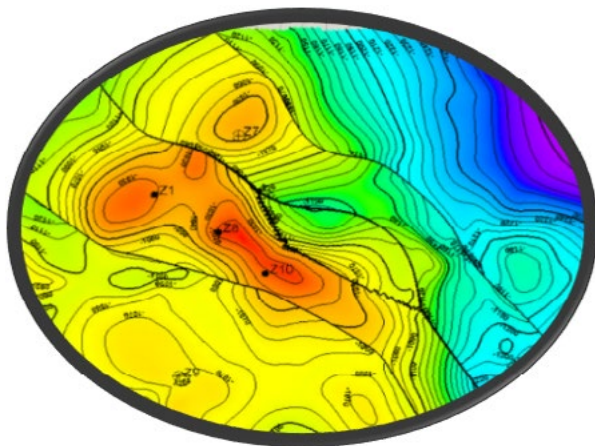
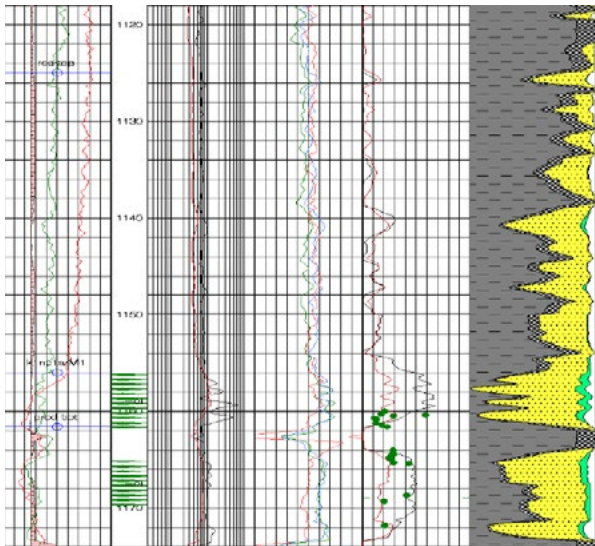
- Suplac
- Videle
- Ticleni
- Madulari
- Poiana Lacului
- Independenta
- Albotesti -Moinesti
- Poeni
- Margita

COMMENCEMENT: 2007

COMPLETION: 2008

RESERVOIR STUDY INCLUDED:

- 1) Operations MS and Practice Review
- 2) Gathering and Crude Oil Treatment System
 - Field Metering Practice
 - Production Rate Testing
 - Differences in Production
- 3) Flow Process Control
- 4) Production Operation Practice
- 5) Quality System Implementation
- 6) ALS Overview
- 7) Well Problem & Integrity



PROJECT:
OPERATIONS AND PETROLEUM ENGINEERING SUPPORT

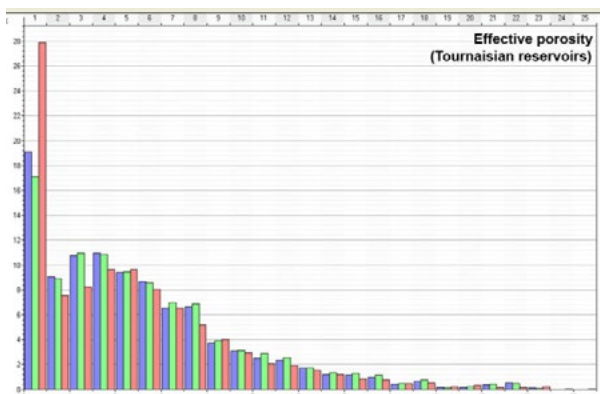
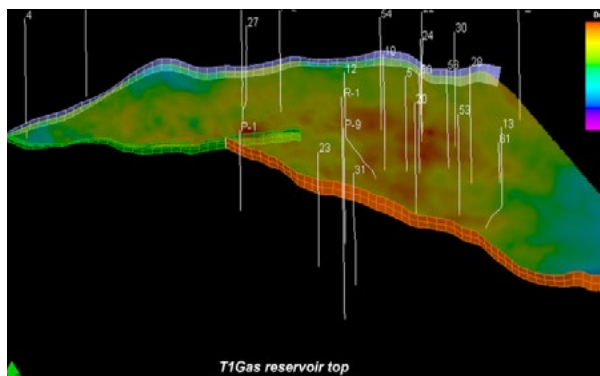
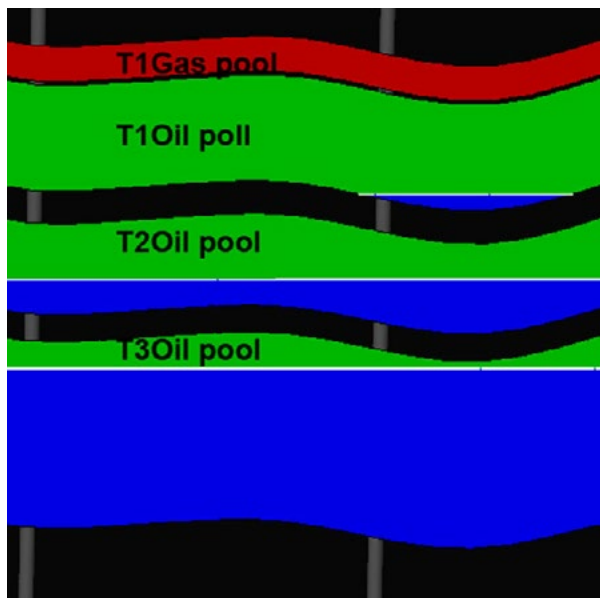
CLIENT: OMV-TOC LLP, Kazakhstan
SERVICES: Monitoring, Analysis and Production Optimization
of The Zhilankir Oil Field

COMMENCEMENT: November 2008

COMPLETION: December 2009

RESERVOIR STUDY INCLUDED:

- 1) Daily production performance monitoring
- 2) Well problem analysis
- 3) Artificial lift system design
- 4) WO planning
- 5) Well integrity



PROJECT:

3D RESERVOIR MODELING STUDY (CHINAREVSKOE GAS-OIL FIELD, TOURNAISIAN FORMATIONS, NORTH-EAST BLOCK)

CLIENT: ZhaikMunai LLP, Kazakhstan

SERVICES: 3D Geostatic Model Review and 3D Dynamic Modelling for Tournaisian Formations, North-East Block

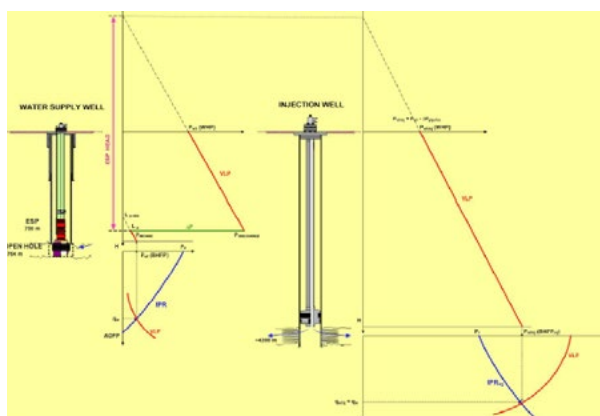
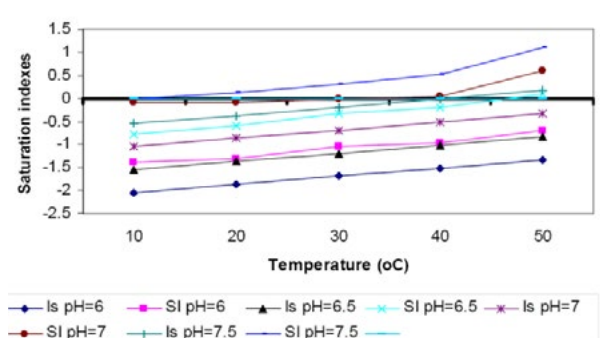
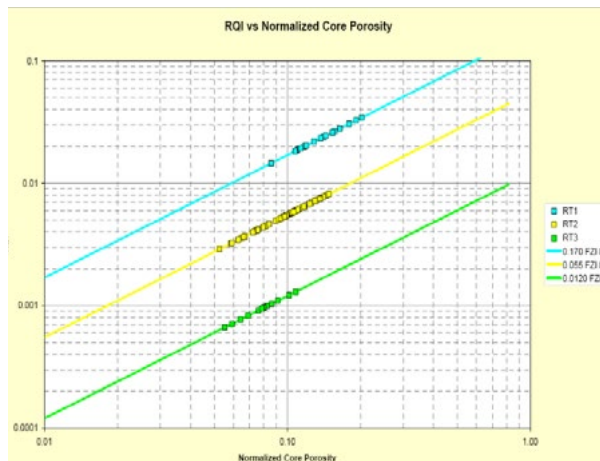
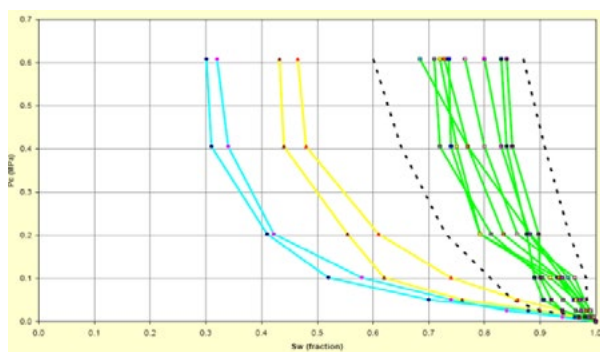
COMMENCEMENT: May 2007

COMPLETION: August 2007

RESERVOIR STUDY INCLUDED:

- 1) The 3D geological model checking (done by third party)
- 2) Calibration of the model
- 3) In simulation was used ECLIPSE 100 for oil reservoirs and ECLIPSE 300 for gas condensate reservoir
- 4) Oil wells were considered as separate systems (no-commingled production)
- 5) Basic scenario establishing which served for comparison of all the other field development cases
- 6) Working out prediction scenarios that reflected different development options and operating conditions in the field (edge and pattern waterflooding)

Providing a range of forecast results that will be used to define the best development plan



PROJECT:

WATERFLOODING FEASIBILITY STUDY FOR TOURNAISIAN FORMATIONS (NORTH EAST BLOCK OF THE CHINAREVSKOE GAS-OIL FIELD)

CLIENT: ZhaikMunai LLP, Kazakhstan

SERVICES: Study of Preparation, Treatment of Ground Water and Process Water for Injection in Tournaisian Formations of the Chinarevskoe Gas-Oil Field and Reservoir Engineering Aspects of Waterflooding

COMMENCEMENT: February 2007

COMPLETION: March 2007

RESERVOIR STUDY INCLUDED:

1) Source water considerations

- Water supply sources
- Water analysis

2) Ground water production system performance:

- Well completion
- Well flow performance

3) Injection system performance

4) Project definition and execution plan

5) Water quality monitoring

6) Reservoir engineering aspects of waterflooding:

- Reservoir rock properties
- Fluid properties and PVT data
- Fractional flow calculations
- Displacement efficiency calculations
- Material balance calculations
- Improved water flooding opportunity-screening criteria
- Well integrity



PROJECT:

**EOR PILOT TEST FACILITY CONCEPTUAL ENGINEERING STUDY,
THE OIL FIELD WIDELE VADU-LAT, BLOCK G2 (ROMANIA)**

CLIENT: **OMV Petrom, Romania**

SERVICES: **Conceptual Engineering Study, The Oil Field Widele Vadu-Lat, Block G2 (Romania) for Polymer and Hot Water Injection**

COMMENCEMENT: **February 2007**

COMPLETION: **June 2007**

SERVICES INCLUDED:

1) **The main aim of the study**

2) **Design conditions**

3) **Site design conditions**

- Source water, and water treatment design rates
- Process design data
- Electrical area classification

4) **Process description:**

- Hot water system
- Polymer system
- Flare system

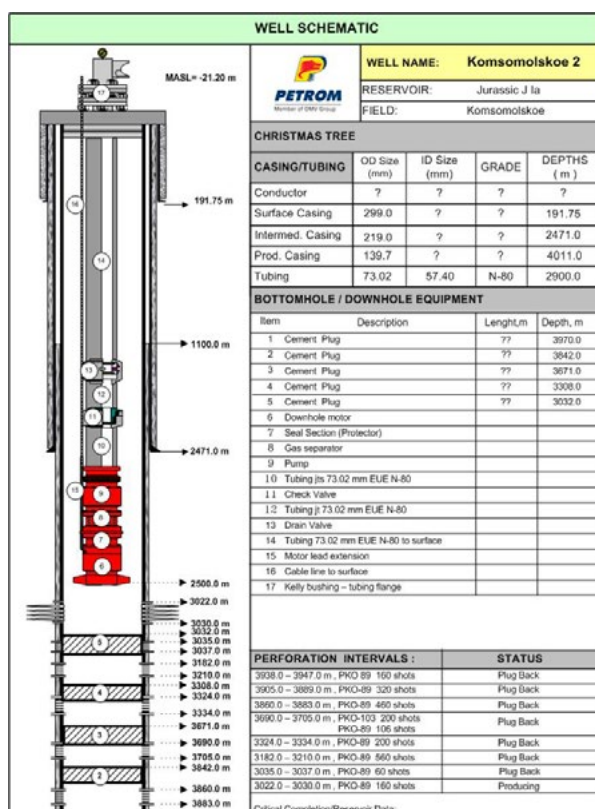
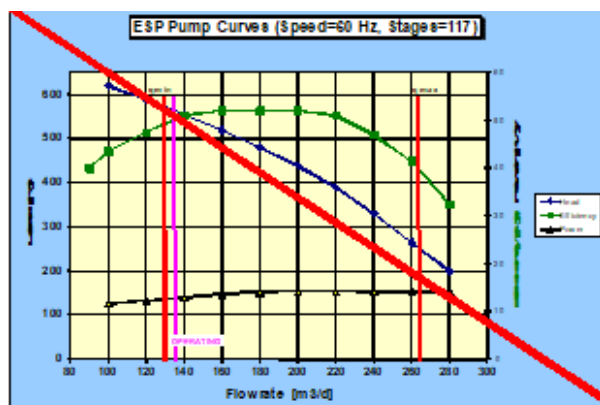
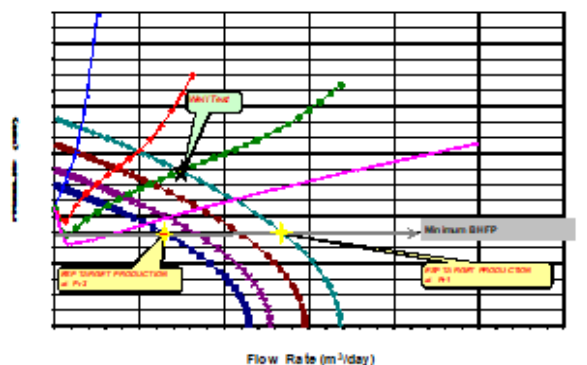
5) **Major equipment packages and utility system:**

- Foundations
- Process buildings
- Electrical power
- Control systems
- Communications
- Measurements
- Gas detection and instrument air
- Fuel system
- Drain tank
- Camp

6) **General considerations (piping, civil work, instrumentation, electrical, buildings, isolations, heat tracing**

7) **Well Integrity of existing wells**

8) **Regulatory requirements, design codes, standards and specifications**



PROJECT:

ARTIFICIAL LIFT SYSTEM DESIGN FOR KOMSOMOLSKOE OIL FIELD

CLIENT: Kom Munai LLP Kazakhstan

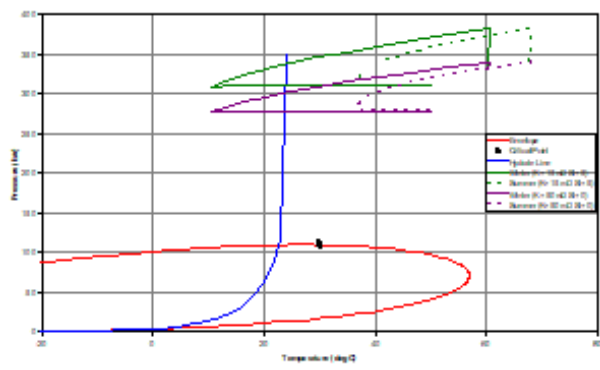
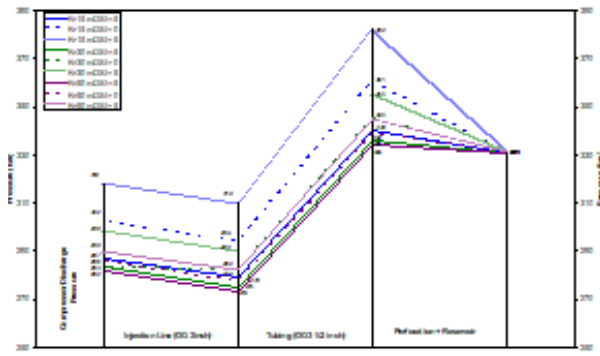
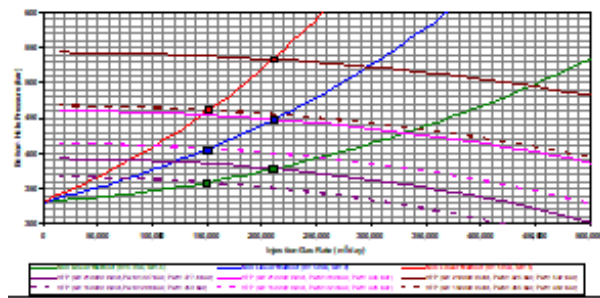
SERVICES: Artificial Lift Selection, Design and Procurement Support
(Technical Requisitions-Data Sheets)

COMMENCEMENT: January, 2007

COMPLETION: February, 2007

SERVICES AND FACILITIES INCLUDED:

- 1) Data collection
- 2) Single well production performance analysis
- 3) Well integrity
- 4) Single well test data review (interpretation / re-interpretation - optionally)
- 5) Single well system (NODAL) analyses - well flow performance:
 - Current IPRs
 - Future IPRs
 - ALS target production definition
- 6) Single well ALS selection by multi-criteria method
- 7) Single well ALS design
- 8) Procurement Support



PROJECT:
**KOMSOMOLSKOE OIL FIELD DEVELOPMENT-GAS INJECTION
SYSTEM PERFORMANCE**

CLIENT: Kom Munai LLP, Kazakhstan

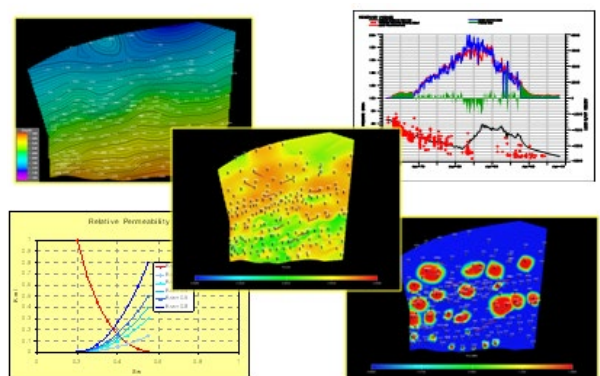
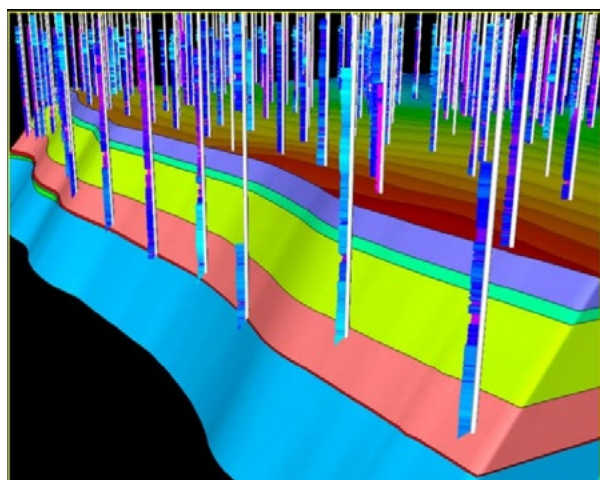
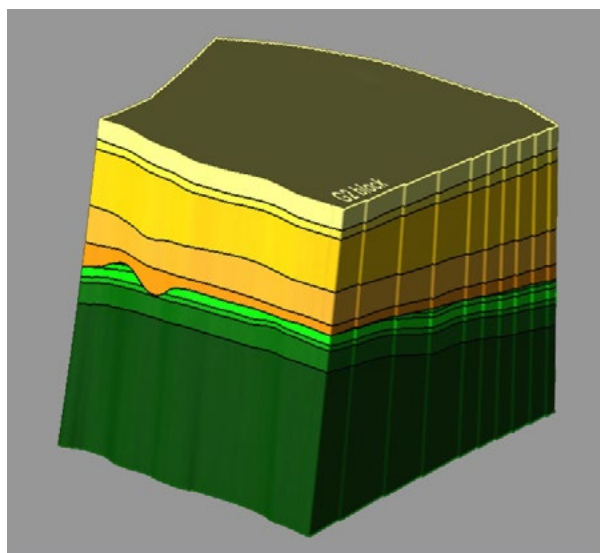
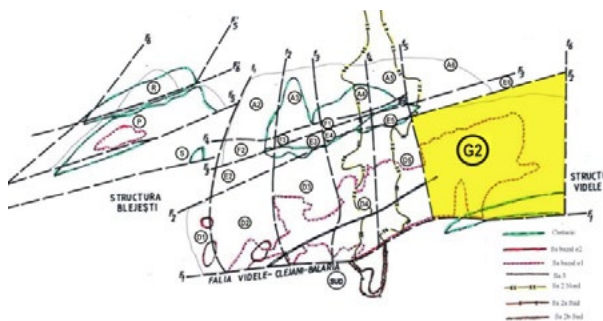
SERVICES: System Analysis and Pressure Profile Calculation across
entire System

COMMENCEMENT: January 2007

COMPLETION: February 2007

SERVICES AND FACILITIES INCLUDED:

- 1) Input data collection
- 2) Fracturing pressure estimation
- 3) Gas injection IPR curves calculations for different permeability (K) and different formation damages (S)
- 4) Well integrity
- 5) Future IPR curves calculations
- 6) Tubing size calculation
- 7) Well injection performance analysis
- 8) P,T Sensitive analysis, PTC envelope and hydrate line definition
- 9) Pressure drop through the injection system calculation
- 10) Pressure distribution calculations
- 11) Compressor discharge pressure determination



PROJECT:

IOR FEASIBILITY STUDY (HOT WATER AND POLYMER INJECTION)

CLIENT: OMV Petrom, Romania

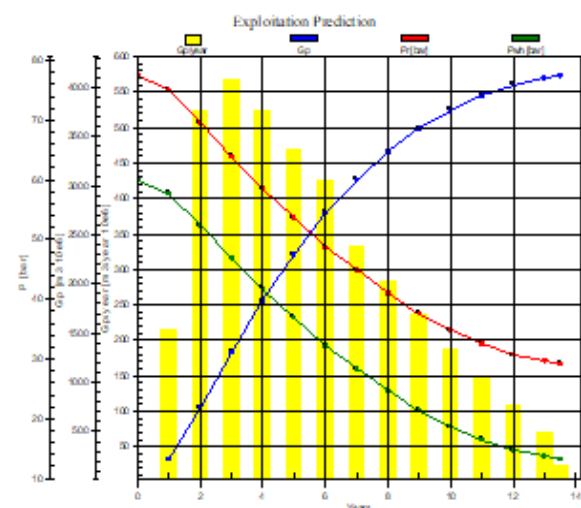
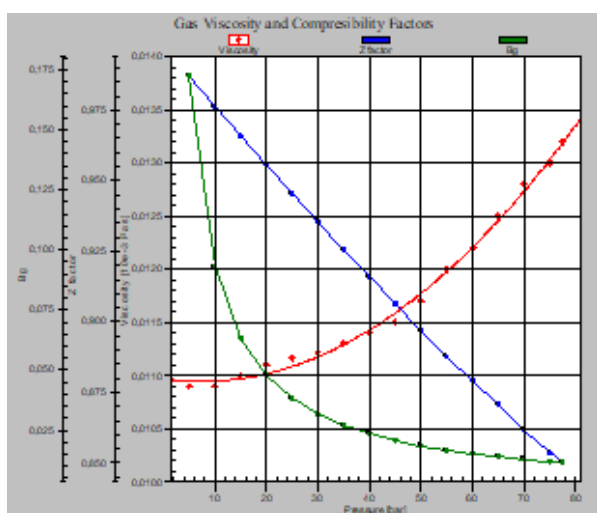
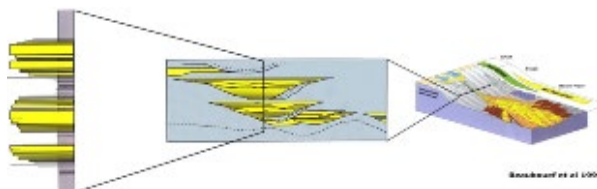
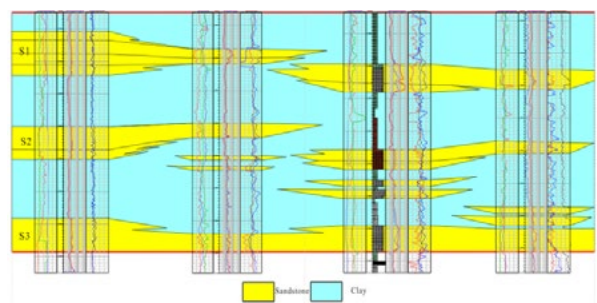
SERVICES: 3D Static Modelling, 3D Dynamic Modelling, Material Balance and Monte Carlo Calculations

COMMENCEMENT: Sep 2007

COMPLETION: January 2008

SERVICES AND FACILITIES INCLUDED:

- 1) Interpretation of data used in geological modeling
- 2) 3D geological modeling
 - Structural modeling
 - Petrophysical modeling
 - 3D geological model up-scaling
- 3) Volumetric calculations
- 4) Reservoir simulation model construction
- 5) Model calibration (history matching)
- 6) Well Integrity of existing wells
- 7) Forecast cases
 - Polymer injection
 - Hot water injection
- 8) The best cases recommendations



PROJECT:

SARIBULAK GAS FIELD DEVELOPMENT SCENARIOS (MATERIAL BALANCE CALCULATIONS)

CLIENT: TarbagatayMunay, East Kazakhstan

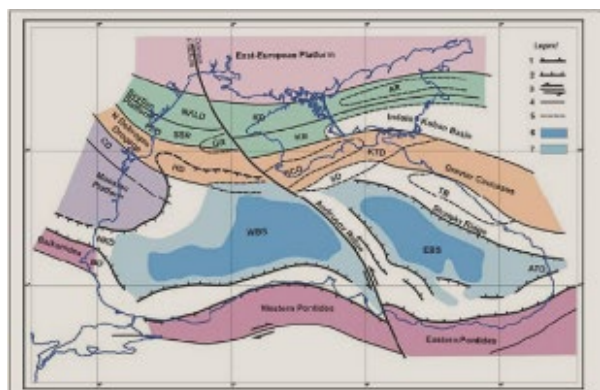
SERVICES: Geological Characterization, Reservoir Rock and Fluid Properties, Development Scenarios by material Balance

COMMENCEMENT: November 2007

COMPLETION: December 2007

SERVICES INCLUDED:

- 1) The main geological features definition
- 2) General well data consideration
- 3) Petrophysical characterization of the reservoir rocks
- 4) Reservoir fluid characterization
- 5) Production characteristics of the wells (well deliverability)
- 6) Material balance calculations
 - Gas drive
 - Water drive
- 7) The main uncertainties definition
- 8) The best development scenario recommendation



PROJECT:

GAS AND OIL PROSPECTS IN UKRAINE (KARCHENSK SHELF AT BLACK SEE, PRIDOROZNA PLOSHA, ZAGORYANSKA PLOSHA, MONASTIRECKA PLOSHA)

CLIENT: PM Lucas LTD, Cyprus

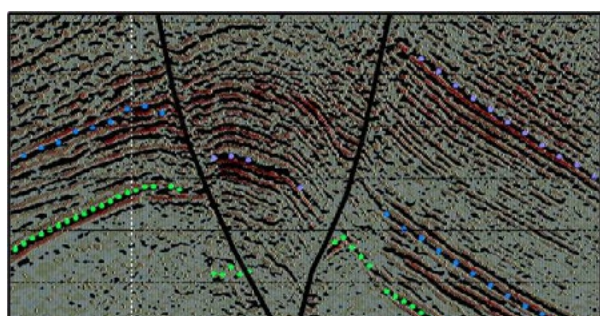
SERVICES: Geological Evaluations of The Oil and Gas Fields

COMMENCEMENT: July 2007

COMPLETION: July 2007

SERVICES INCLUDED:

- 1) Data overview
- 2) Summary geological report



PROJECT:

3D SEISMIC SURVEY ASSESSMENT REPORT FOR KEMERKOL AREA

CLIENT: Victoria Oil & Gas

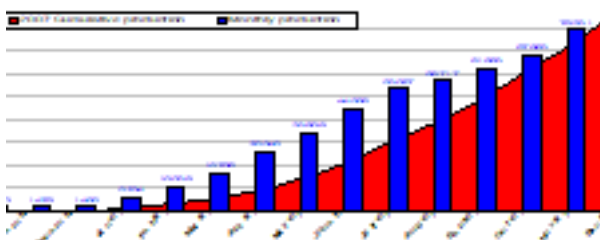
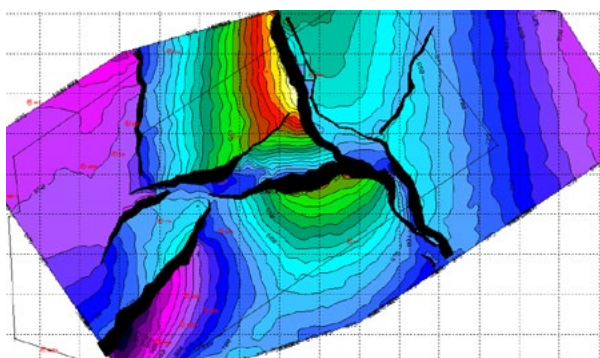
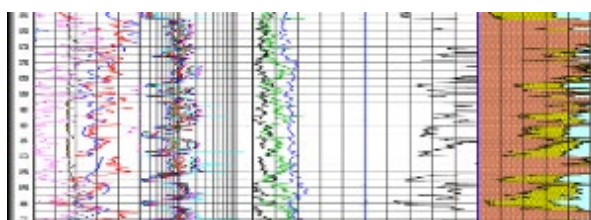
SERVICES: 3D Seismic Data Acquisition, Seismic Data Processing and Seismic Data Interpretation Reports Overview

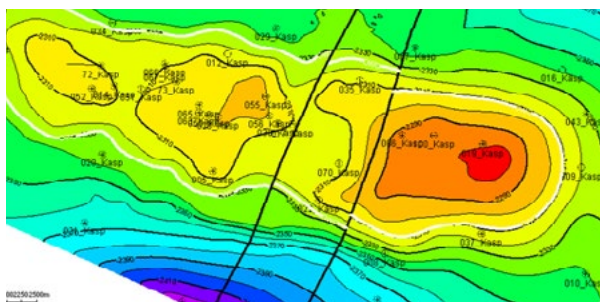
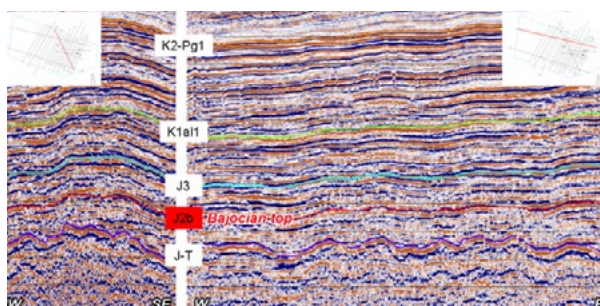
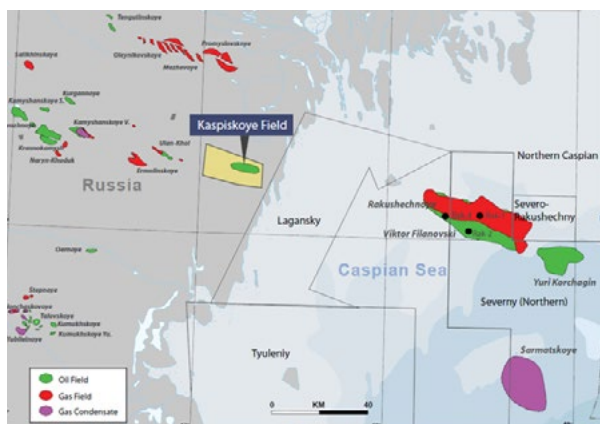
COMMENCEMENT: November 2007

COMPLETION: December 2007

SERVICES INCLUDED:

- 1) North Caspian petroleum system data collection and analysis
- 2) Kemerkol area geological targets
- 3) 3D seismic data acquisition report overview
- 4) 3D seismic data processing report overview with recommendations
- 5) 3D seismic data interpretation report overview with recommendations
- 6) Interpretation problems analysis
- 7) Recommendations for work exploration continuation





PROJECT:
**KASPISKOE OIL FIELD PRODUCTION OPERATIONS
AND PETROLEUM ENGINEERING SUPPORT**

CLIENT: Kalmistern, Kalmikiya , RF

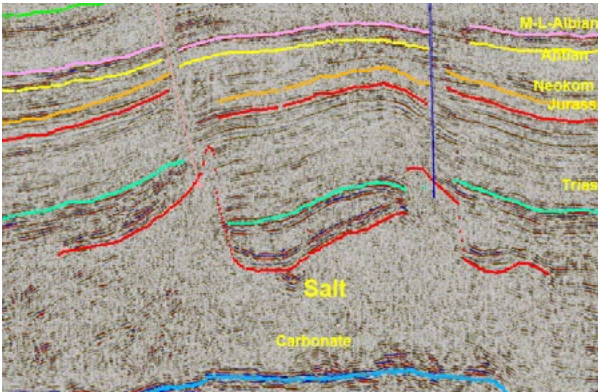
SERVICES: Monitoring, Analysis and Production Optimization of
the Kaspiskoe Oil Field

COMMENCEMENT: September 2006

COMPLETION: December 2006

SERVICES INCLUDED:

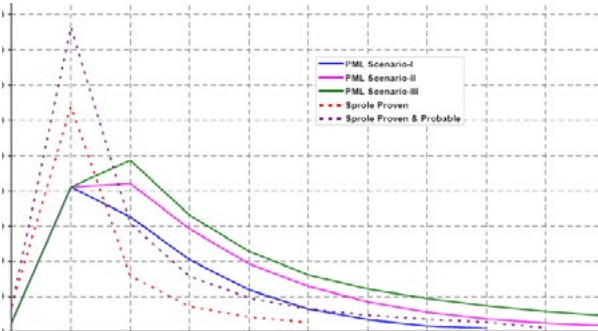
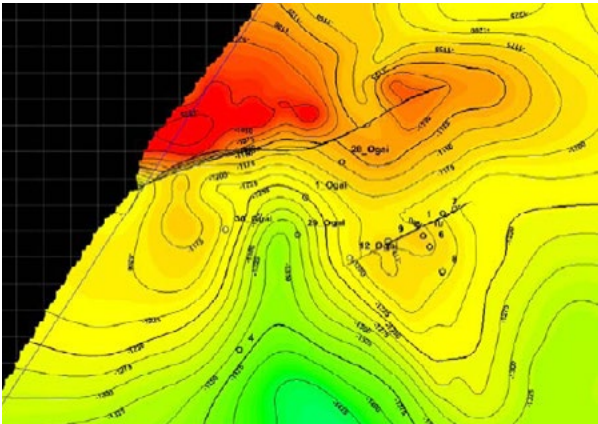
- 1) Daily production wells performance analysis
- 2) Reservoirs and well evaluations
- 3) Well test supervising
- 4) Daily production and operations reporting
- 5) Well servicing planning
- 6) Pressure transient analysis
- 7) Well problem & well integrity analysis and diagnosis
- 8) Artificial lift system selection, design, monitoring, analysis and optimization
- 9) WO planning and design
- 10) WO well end reporting



MORSKOE OIL FIELD									
ERA	PERIOD	AGE	Pool A	Pool B	Area 1	Area 2	Area 3	Area 4	Area 5
PHANEROZOIC	CRETACEOUS	Senonian	PS 1a	PS 1a	PS	PS	PS	PS	PS
		Albian	PS 1b	PS 1b	PS	PS	PS	PS	PS
		Lower (L1)	PS 2	PS 2	PS	PS	PS	PS	PS
		Aprian	PS 2	PS 2	PS	PS	PS	PS	PS
		Neocom	PS	PS	PS	PS	PS	PS	PS
	JURASSIC	Upper	PS	PS	PS	PS	PS	PS	PS
		Midle	PS	PS	PS	PS	PS	PS	PS
		Lower (L1)	PS	PS	PS	PS	PS	PS	PS
	TRIASSIC	T3(Late)	PS	PS	PS	PS	PS	PS	PS
		T2(Middle)	PS	PS	PS	PS	PS	PS	PS
PALEOZOIC	PERMIAN	T1(Scy)	PS	PS	PS	PS	PS	PS	PS
		KT1	PS	PS	PS	PS	PS	PS	PS

Legend :

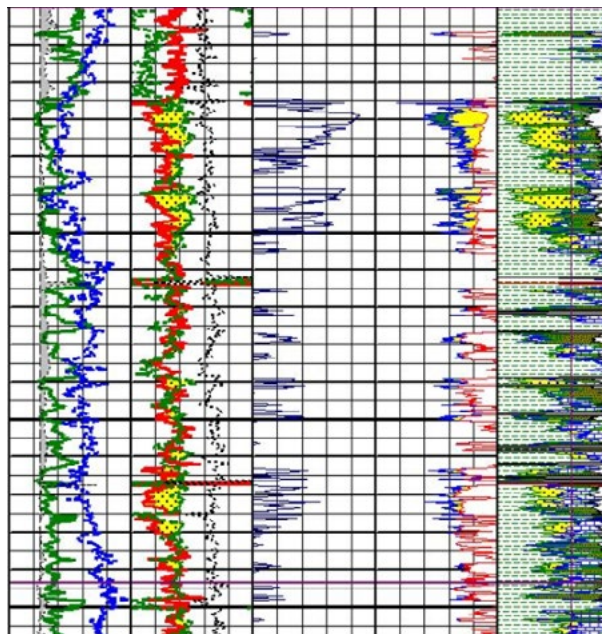
- Oil reservoir
- Group of Oil Reservoirs
- Exploration Target
- Probable Discovery
- Possible Discovery



PROJECT:
MORSKOE OIL FIELD, TECHNICAL EVALUATION SUMMARY

CLIENT: Big Sky LLP, Kazakhstan
SERVICES: Production Performance Analysis of The Reservoirs, OOIP Estimation and Production Forecasting, Exploration and Development Plan
COMMENCEMENT: November 2006
COMPLETION: December 2006

- SERVICES AND FACILITIES INCLUDED:
- 1) Geological data overview
 - 2) OOIP estimation
 - 3) Exploration and development history
 - 4) Well problem & well integrity analysis
 - 5) Production data analysis
 - 6) Recovery factor (RF) and recoverable reserves estimation
 - 7) Forecast production scenarios evaluations
 - 8) Upside potential (exploration opportunities) assessment
 - 9) Main risk in production and exploration phase definition



PROJECT:
SOUTH ROVNAYA GAS FIELD – WELL TESTING OPERATIONS

CLIENT: **OMV-TOC**

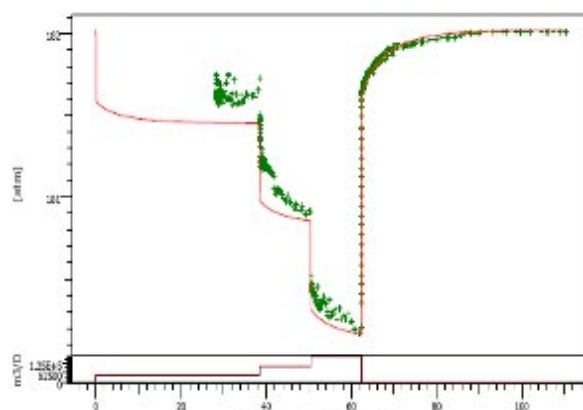
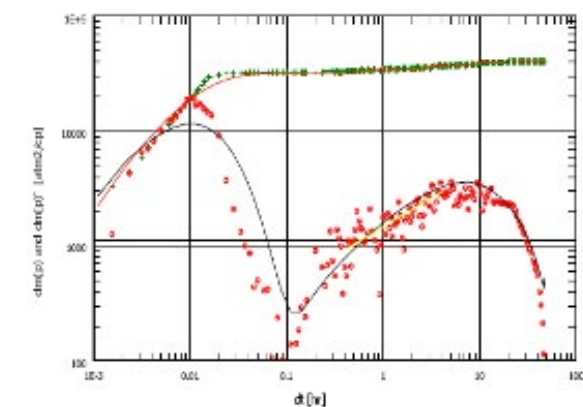
SERVICES: **Planning, Design, Management and Realization of Welltesting Activates**

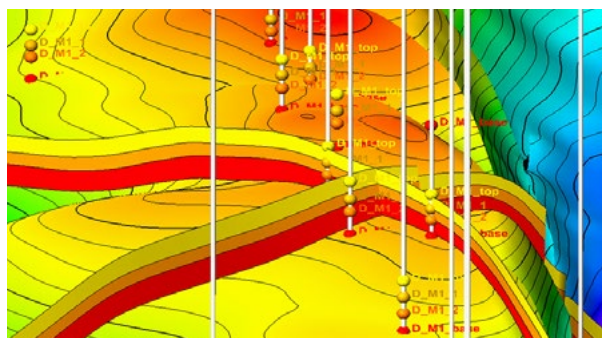
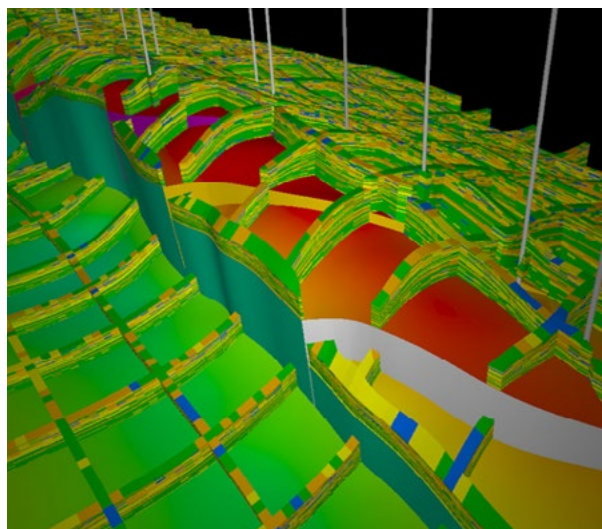
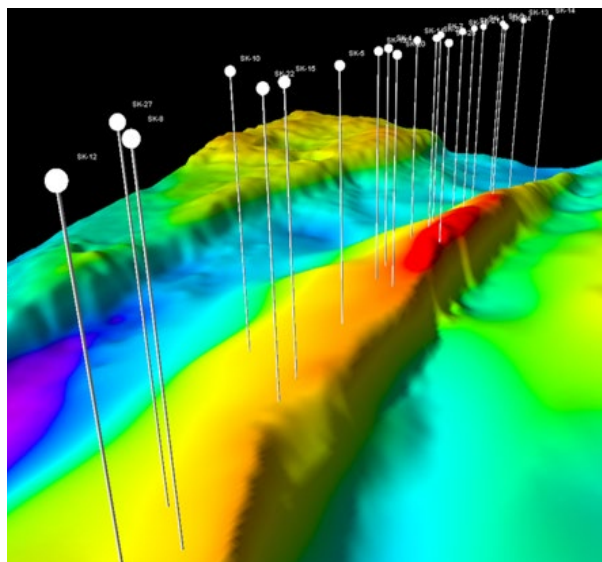
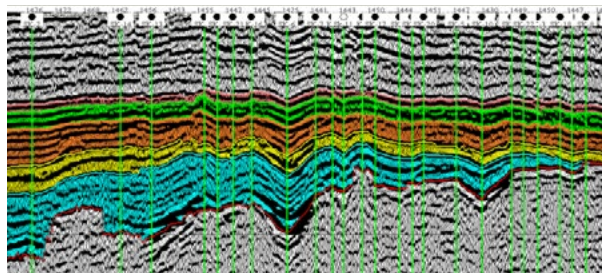
COMMENCEMENT: **June 2006**

COMPLETION: **September 2007**

SERVICES AND FACILITIES INCLUDED:

- 1) Geological data overview
- 2) Well log data interpretation
- 3) Well test planning
- 4) Well test design
- 5) Well test supervising
- 6) Well test data interpretation
- 7) Geological model analysis
- 8) Recommendations for further activities





PROJECT:
SOUTH KUMKOL G & G STUDY

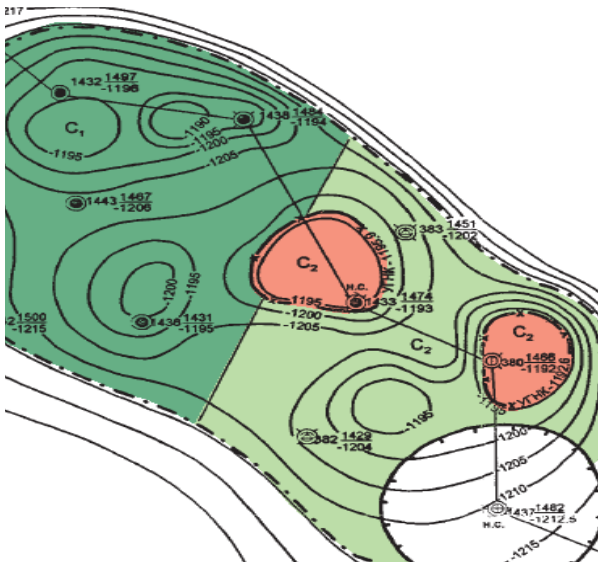
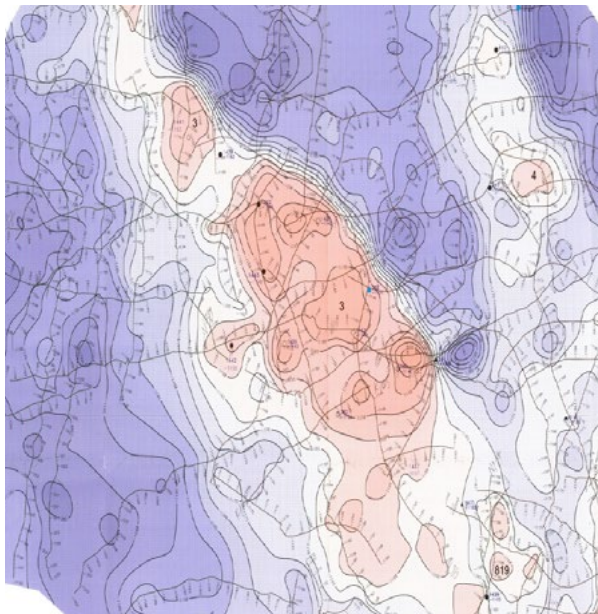
CLIENT: PetroKazakhstan Kumkol Resources LLP, Kazakhstan
SERVICES: 3D Geological Modelling, Reservoir Engineering and Production Engineering Evaluations

COMMENCEMENT: September 2005

COMPLETION: February 2006

SERVICES AND FACILITIES INCLUDED:

- 1) 3D seismic data analysis and acoustic impedance
- 2) 3D Geological modelling:
 - Structural modelling:
 - a. Well log correlation
 - b. Seismic data interpretation
 - c. Structural style and geodynamic evaluation of the structure
 - d. Structural model building
 - Building facies modelling
 - Petrophysical modelling:
 - a. Well log interpretation
 - b. Porosity modelling
 - c. Net/Gross modelling
 - Volumetrics
- 3) Reservoir engineering calculations:
 - PVT data processing/calculation
 - Well testing and pressure transient analysis
 - Material balance calculations (OOIP)
- 4) Production engineering calculations:
 - Fluid production analysis
 - Decline analysis
 - Well flow performance analysis



PROJECT:

KARSOVAYSKOYE OIL FIELD, DEVELOPMENT OPPORTUNITIES

CLIENT: PM Lucas, RF

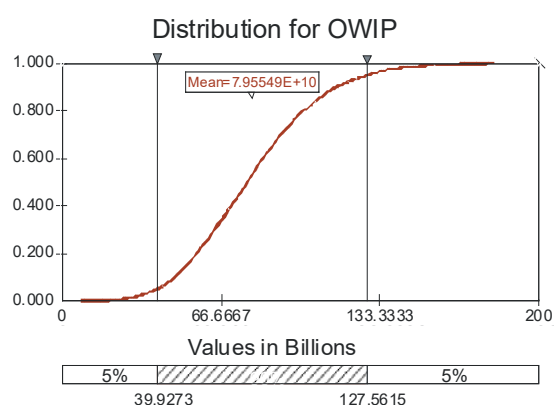
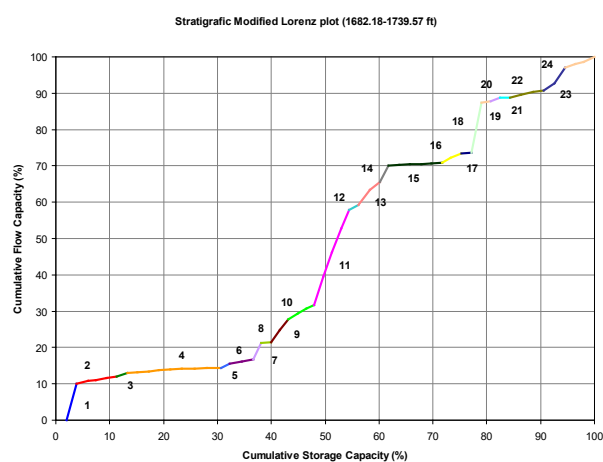
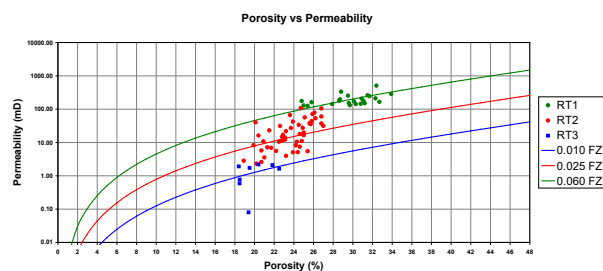
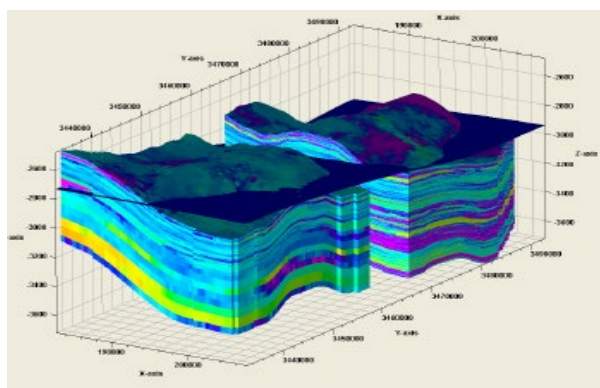
SERVICES: Data Collection, Data QC and Analysis and Development Opportunity Proposal

COMMENCEMENT: September 2005

COMPLETION: November 2005

SERVICES INCLUDED:

- 1) Exploration and appraisal history
- 2) Geological data overview
- 3) Reservoir property overview
- 4) Reservoir fluid characteristics
- 5) OOIP and reserves overview
- 6) Well production data-well deliverability
- 7) Field development plan
- 8) Field development budget
- 9) Field economics



PROJECT:

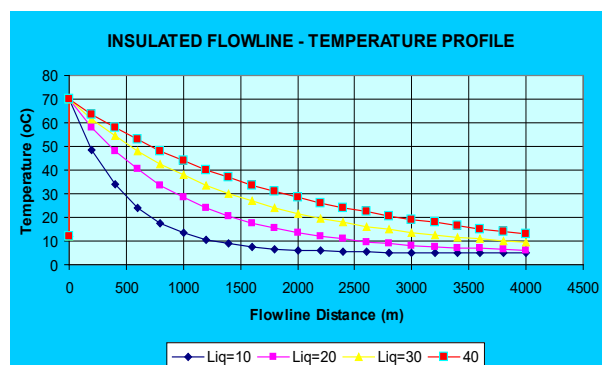
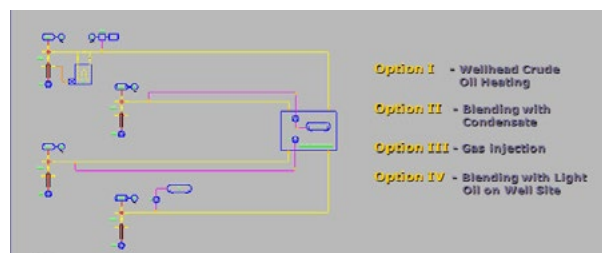
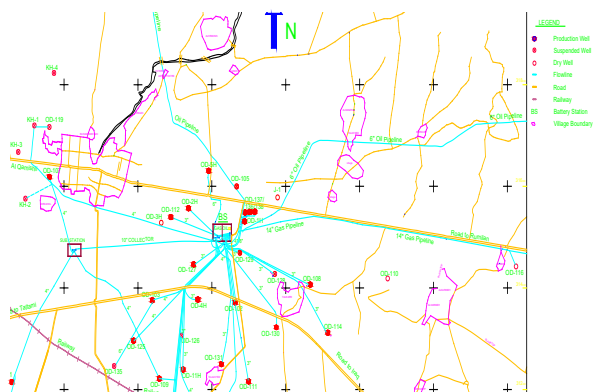
AQUIFER (SOURCE WATER) OWIP EVALUATION, AUGILA OIL FIELD

CLIENT: Veba-HOL, Libya

SERVICES: Petrophysical Interpretation, Reservoir and Production Engineering Analysis and Evaluations

SERVICES INCLUDED:

- 1) PVT analysis for water
- 2) Pressure test analysis:
 - Initial reservoir pressure
 - RFT data
- 3) Transient pressure analysis
- 4) Well Flow Performance:
 - Well Inflow Performance
 - Vertical Lifting Performance
- 5) Production Performance Analysis:
 - Production Data Analysis
 - Production Decline Analysis
- 6) Well Log Interpretation
- 7) Core Analysis:
 - Rock Typing
 - Flow Units
- 8) Aquifer Description (OWIP):
 - OWIP by Material Balance
 - OWIP by Monte Carlo Simulation



PROJECT:
OUDEH OIL FIELD OPERATION PRACTICE REVIEW AND OPTIMIZATION

CLIENT: **Dublin International, Syria**

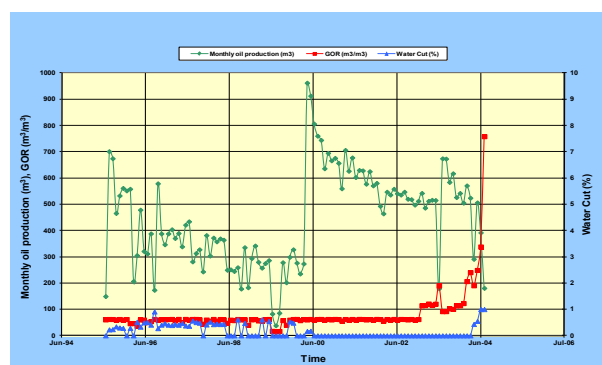
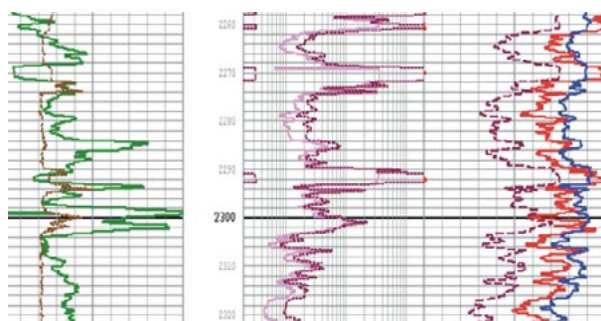
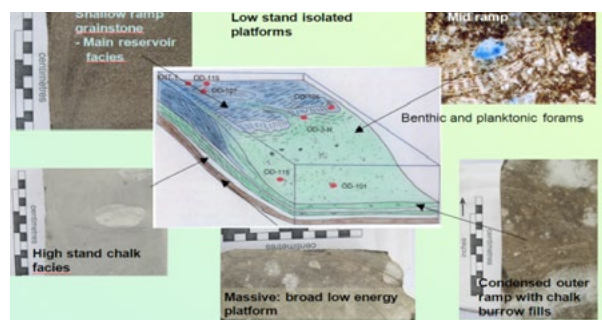
SERVICES: **Wells and Facilities Operation Practice Review and Improvements Proposal**

COMMENCEMENT: **November 2004**

COMPLETION: **December 2004**

SERVICES INCLUDED:

- 1) Review of existing surface facilities
- 2) Actual problem definitions
- 3) Heavy oil handling
- 4) Optimal method(s) definition for crude oil viscosity decreasing
- 5) Identification options for facility improvements and modifications
- 6) Basic ideas for detail engineering design
- 7) Technical program definition



PROJECT:
**OUDEH OIL FIELD RE-DEVELOPMENT REVIEW
AND PLANNING**

CLIENT: Dublin International, Syria

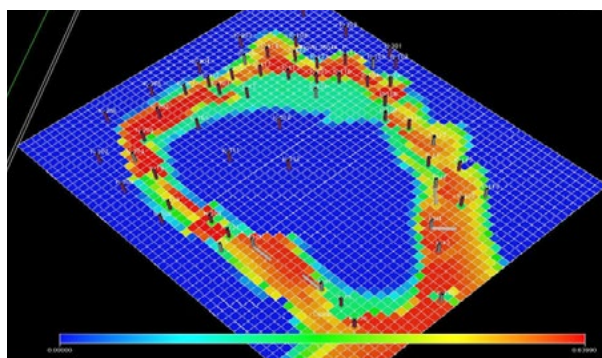
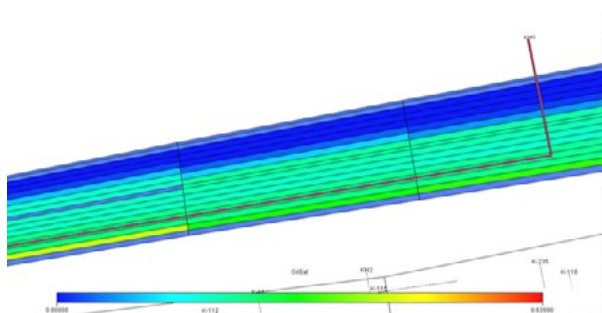
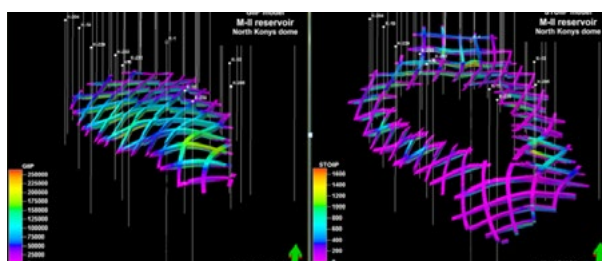
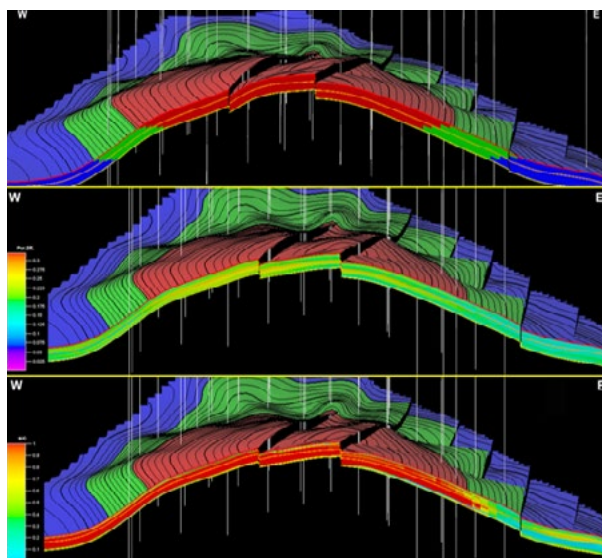
SERVICES: Production History Analysis, Reservoir and Well Evaluation,
Workover Planning and Production Optimization Proposals

COMMENCEMENT: November 2004

COMPLETION: March 2005

SERVICES INCLUDED:

- 1) Well production performance
- 2) Well flow performance analysis
- 3) Well integrity
- 4) Reservoir production performance
- 5) Well log interpretation
- 6) Well workover history
- 7) Well production history analysis
- 8) Production decline analysis
- 9) Well evaluations
- 10) ALS analysis and optimization
- 11) Well problem analysis
- 12) Workover and re-entry planning
- 13) Recommendations for wells' problem solution



PROJECT:

KONYS OIL FIELD DEVELOPMENT, RESERVOIR STUDY

CLIENT: Kuatamlon Munai LLP, Kazakhstan

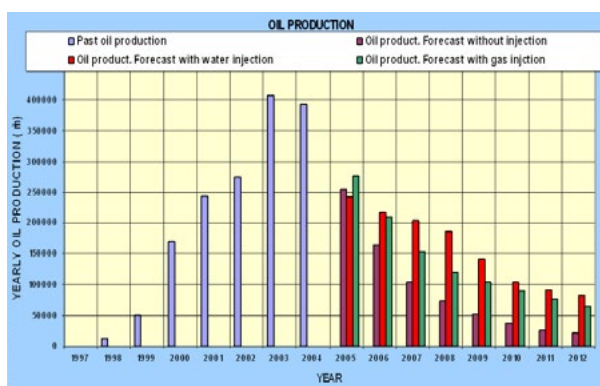
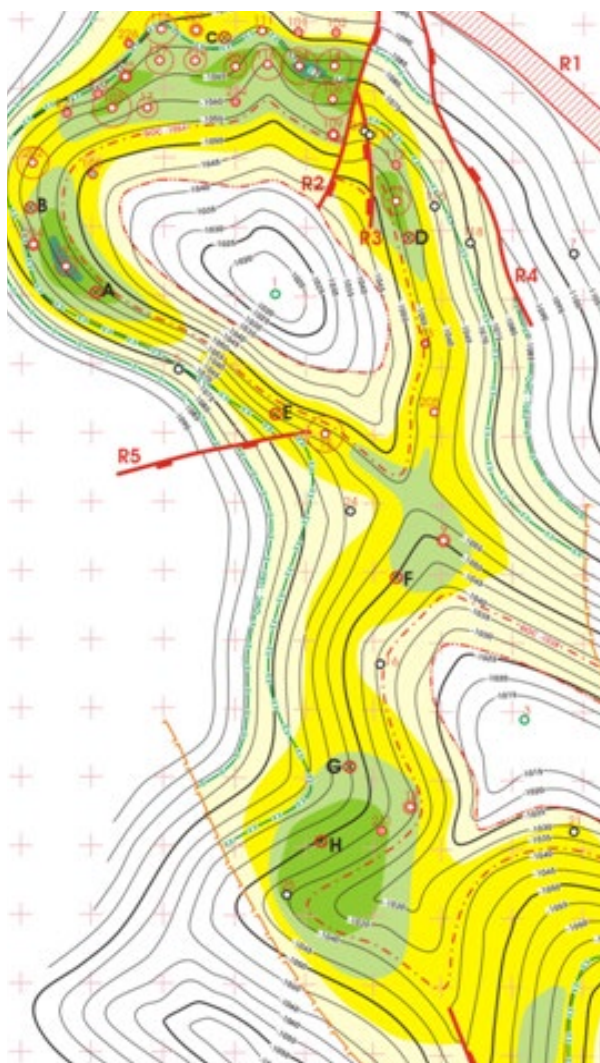
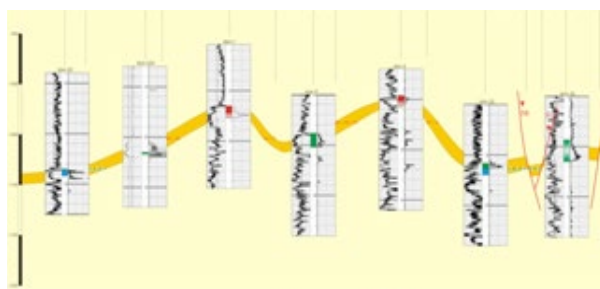
SERVICES: 3D Reservoir Modelling (3D Geostatic Model Building and 3D Dynamic Modelling of The North Dome)

COMMENCEMENT: March 2005

COMPLETION: July 2005

SERVICES INCLUDED:

- 1) 3D geological modeling of the north dome
- 2) 3D Seismic interpretation
- 3) 3D Structural modelling
- 4) 3D Petrophysical modelling
 - 3D Porosity model
 - 3D Water Saturation model
 - 3D Shale volume
 - 3D Net/gross model
- 5) Volumetrics
- 6) Reservoir engineering calculations:
 - Material balance calculations
 - Fractional flow curve definition
 - Displacement efficiency calculations
 - Flooding order estimations
- 7) 3D Dynamic model building
- 8) History matching
- 9) Possible development scenarios:
 - Edge water flooding
 - Gas flooding injection in gas cap
 - Combination, gas and water flooding
 - Vertical and hells



PROJECT:
KONYS FIELD DEVELOPMENT PLAN

CLIENT: Kuatamlon Munai LLP, Kazakhstan

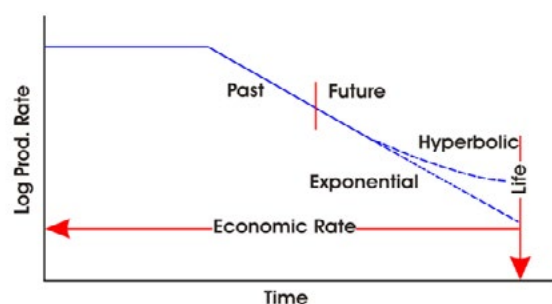
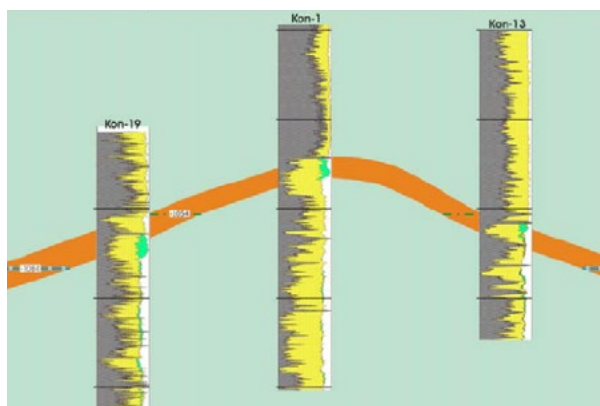
SERVICES: Reservoir and Well Evaluations, OOIP Calculations and Production Forecasting

COMMENCEMENT: August 2005

COMPLETION: September 2005

SERVICES INCLUDED:

- 1) Reservoir and well evaluations
- 2) OOIP by volumetric and MB calculations
- 3) Well performance analysis
- 4) Well problem analysis
- 5) Well test design and interpretation
- 6) Well test supervision
- 7) Well log interpretation
- 8) Workover and well services planning
- 9) Workover design
- 10) Artificial lift system selection, design, monitoring, analysis and optimization
- 11) WO Well end reports



PROJECT:
BEKTAS FIELD DEVELOPMENT PLAN

CLIENT: Kuatamlon Munai LLP, Kazakhstan

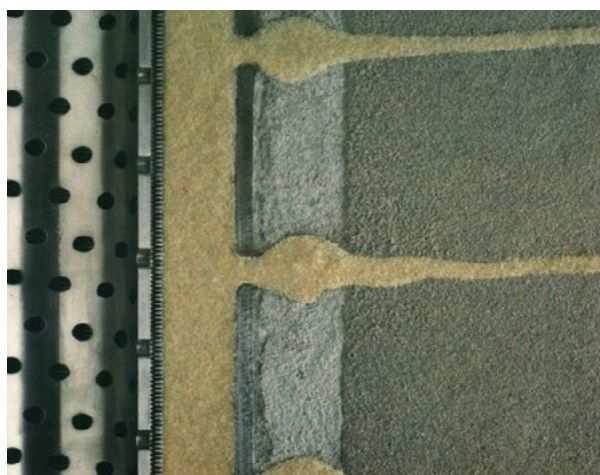
SERVICES: Reservoir and Well Evaluations, OOIP Calculations and Production Forecasting, Water Conning

COMMENCEMENT: August 2005

COMPLETION: September 2005

SERVICES INCLUDED:

- 1) Reservoir and well evaluations
- 2) OOIP by volumetric and MB calculations
- 3) Well Performance Analysis
- 4) Well problem analysis
- 5) Well test design and interpretation
- 6) Well testing supervision
- 7) Well log interpretation
- 8) Workover and well services planning
- 9) Workover design
- 10) Artificial lift system selection, design, monitoring
- 11) Analysis and optimization
- 12) WO well end reports



PROJECT:
AKZHAR OIL FIELD, FIELD DEVELOPMENT

CLIENT: Altius LLP, Kazakhstan

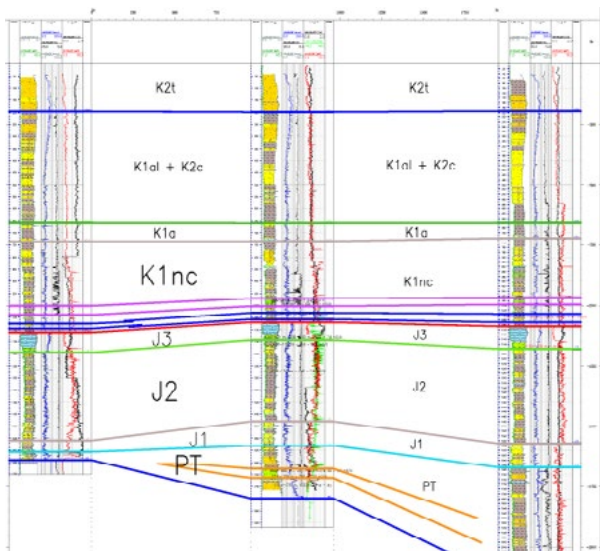
SERVICES: Conceptual Well Design (Well Design, Well Completion, Sand Control Completion)

COMMENCEMENT: August 2004

COMPLETION: September 2004

SERVICES INCLUDED:

- 1) Detail drilling and completion program
- 2) Sand problem definition
- 3) Gravel pack design



PROJECT:
"KOZHA-SOUTH" GEOLOGICAL AND ENGINEERING OVERVIEW

CLIENT: Eko-Geo-Njefegaz, Kazakhstan

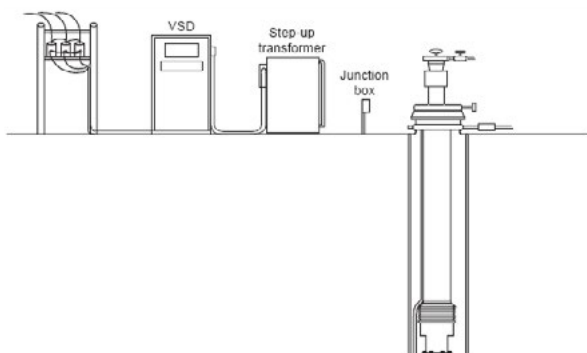
SERVICES: Geological and Engineering Overview Report on Field OOIIP and Field Development Opportunities

COMMENCEMENT: June 2003

COMPLETION: July 2003

SERVICES INCLUDED:

- 1) Data Collection and field visiting
- 2) Geological characteristics of the reservoirs
- 3) The main rock properties
- 4) Discovered reservoirs
- 5) Wells deliverability's
- 6) Reservoir fluid characteristics
- 7) Recoverable reserves and production forecast



PROJECT:
ARTIFICIAL LIFT (ESP) DESIGN FOR (KUMKOL OIL FIELD)

CLIENT: Kumkol Resources LLP

SERVICES: Lift System Selection, Design and Start-Up

COMMENCEMENT: August 2002

COMPLETION: September 2002

SERVICES INCLUDED:

- 1) Data collection
- 2) Single well production performance analysis
- 3) Single well test data review (Interpretation / re-interpretation - optionally)
- 4) Single well system (NODAL) analyses - well flow performance:
 - Current IPRs
 - Future IPRs
 - ALS target production definition
- 5) Single well ALS design
- 6) Procurement support
- 7) ESP Installation
- 8) Start-up