NIS FUTURE AT WORK

SCIENCE AND TECHNOLOGY CENTRE

DIRECTOR'S ADDRESS

Dear colleagues and associates,

The Science and Technology Centre NIS - Naftagas was founded in 2012 with the aim of developing innovations, providing scientific and technical support to the ambitious plans of NIS to increase reserves, and improve efficiency of production and processing of oil and gas. Today, we operate as the regional centre for scientific monitoring of hydrocarbon exploration, production, and refining projects. We both support the activities of NIS, a company of the Gazprom Neft Group, and successfully cooperate with third-party clients.

Our main line of business is research and development, geological exploration, design and supervision of geophysical works, processing and interpretation of geological and well data, geological modelling, calculation of reserves, monitoring and testing of new technologies, analytical work during production monitoring, design and supervision of wells, application of chemicals in production processes, laboratory and consulting services.

We employ a number of highly qualified and experienced professional and use state-of-the-art software. Doing business in any sector, especially in today's vibrant energy market, requires a lot of innovation, expertise and knowledge, as well as modern equipment. The Science and Technology Centre of NIS has all the necessary resources to respond to all challenges of modern business.

I am convinced that we will establish a successful cooperation to our mutual satisfaction.

Leonid Stulov

Leonid Stulov,
Director of STC NIS Naftagas

CONTENTS

Science and Technology Centre of NIS

The Science and Technology Centre NIS-Naftagas is a fully owned subsidiary of NIS j.s.c. Novi Sad. It started operating as a standalone entity in July 2012. The STC was established to provide scientific and process support to NIS activities and to drive innovation. NTC cooperates with Serbian educational institutions, such as the Chemistry Faculty and the Mining and Geology Faculty of the Belgrade University.. We also cooperate with large international companies such as Schlumberger, Halliburton, and Paradigm. Our most important asset is the team of over 300 experienced professionals. Over the last several years we hired over 100 new team members and have invested over EUR 10 million in the development of information technologies at the STC.

1

GEOLOGICAL AND EXPLORATION ACTIVITIES

Research projects related to multivariate reservoir modelling to continuously support the drilling of the sedimentary structure. More than 40 wells per year, in the field of petrophysics and logging interpretation, seismic interpretation, 3D geological modelling, analysis of reservoir development, 3D hydrodynamic modelling, operational support of reservoir development, and estimates of the application of tertiary development methods.

Geophysics

KEY ACTIVITIES

DESIGNING THE GEOPHYSICAL TESTS

SUPERVISION OVER GEO-PHYSICAL TESTS

GEOPHYSICAL DATA PROCESSING

COMPLEX ANALYSIS AND INTERPRETATION OF GEOPHYSICAL DATA

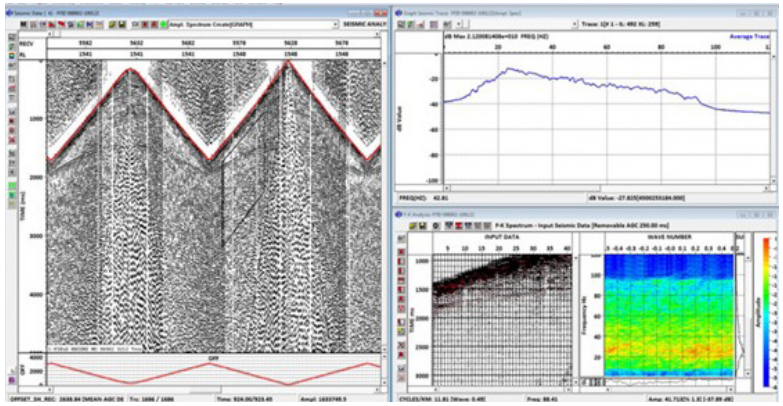
EXAMINATION OF THE CONDITION OF UNDERGROUND PIPELINES

CREATION AND IMPLEMENTATION OF PROJECT FOR THE USE OF GEOPHYSICAL METHOD IN THE AREA OF ENVIRONMENTAL PROTECTION

SCIENTIFIC RESEARCH PROJECTS

REFERENCES

- Several dozens of 2D/3D seismic survey projects in Serbia, Bosnia and Herzegovina, Romania
- More than 40,000 km of 2D and more than 9,000 km of processed 3D seismic data
- Seismic data processing: western Siberia, Romania, Montenegro, Bosnia and Herzegovina, Macedonia, Algeria, Iraq, UAE, Tanzania
- Geoelectric survey in the area of Pančevo Refinery, Novi Sad Refinery and petrol stations for detection of petroleum contamination in soil and groundwater and planning of remediation measures
- Several dozens of reports on the state of underground projects



Supervision of recorded seismic data, amplitude spectre analysis frequency analysis - wave number.

Exploration geology

KEY ACTIVITIES

FORMATION OF THE DATABASE OF WELLBORE, GEOPHYSICAL AND GEOLOGICAL DATA OF OIL AND GAS RESERVOIRS

COMPLEX ANALYSIS AND INTERPRETATION OF THE GEOLOGICAL COMPOSITION OF EXPLORATION AND PRODUCTION SITES

PREPARATION OF THE GEOLOGICAL BASIS FOR RESERVOIR DEVELOPMENT STUDIES, MAJOR MINING PROJECTS AND FEASIBILITY STUDIES

FOLLOW-UP OF DEEP CONTOUR-EXPLORATORY AND DEVELOPMENT DRILLING FOR THE PURPOSE OF UPDATING EXISTING GEOLOGICAL MODELS OF OIL AND GAS RESERVOIRS

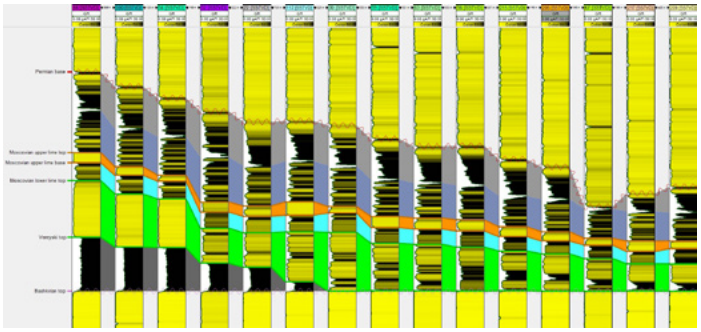
CORRELATION OF WELLBORE, LABORATORY, GEOPHYSICAL AND PRODUCTION DATA

SEISMIC AND GEOLOGICAL INTERPRETATION OF 2D/3D SEISMIC DATA

SCIENTIFIC RESEARCH WORK

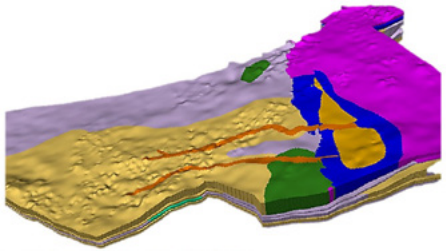
3D GEOLOGICAL MODELLING OF OIL AND GAS RESERVOIRS

ASSESSMENT OF GEOLOGICAL RESERVES OF OIL AND GAS IN RESERVOIRS

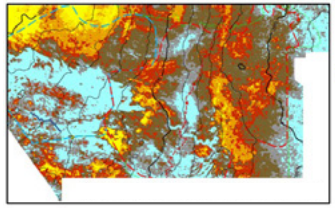


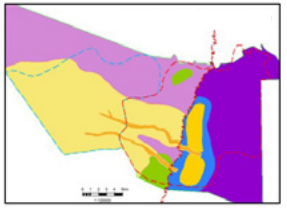
Lithostratigraphic correlation between wells

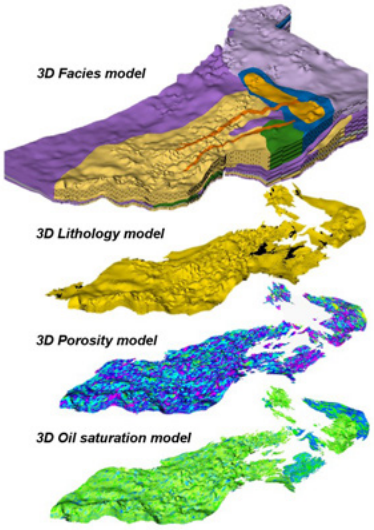
KEY ACTIVITIES



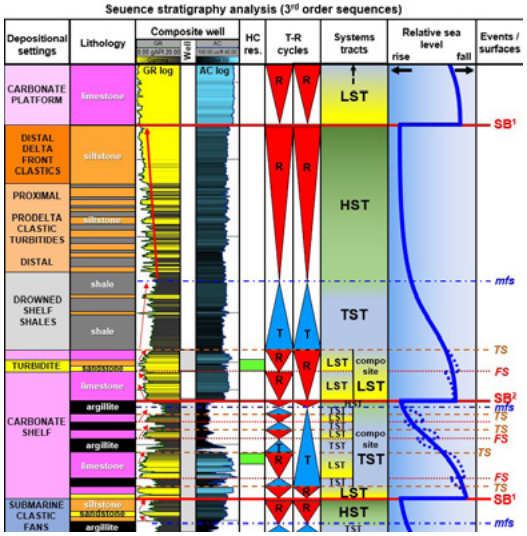
3D lithofacial model created on the basis of seismic attributes







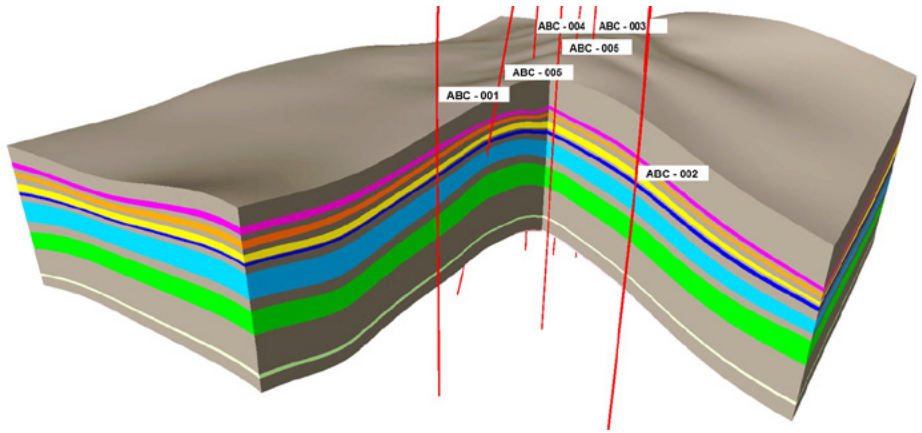
Complex 3D geological model of oil deposits



Sequence stratigraphic analysis in the well

REFERENCES

- The study of regional geological model and the assessment of the perspective of the Pannonian Oil and Gas Basin
- Detailed 3D modelling of NIS exploration and production sites and verification of the models within the Study of regional geological model and the assessment of the perspective of Pannonian Basin oil and gas
- Project of the assessment of hydrocarbon potential of Eastern Herzegovina
- Project for the development of petroleum-geological research in the foothills of the Neogene complex of the Pannonian Basin and the Carpatho-Balkanides and Dinarides of Serbia and Republika Srpska
- Project for the assessment of the regional hydrothermal potential of Vojvodina
- Project of detailed geological investigations of hydrocarbons in the territory of Republika Srpska
- Study on the geothermal resources of Serbia
- Classification of amplitude anomalies in the interval of the seismic display that corresponds to the Pont-Pliocene sedimentary complex, in order to develop criteria for the exploration of gas reservoirs, and in order to increase the efficiency of geological exploration
- Actualization of the regional model of the Achimov strata of Western Siberia
- Project for the development of petroleum-geological research in the foundation and Neogene complex of the Szeged and Tomnatek depressions



3D structural model of reservoir horizons

Development geology

KEY ACTIVITIES

ESTABLISHING DATABASES COMPRISING BOREHOLE, GEOPHYSICAL AND GEOLOGICAL DATA

CORRELATION OF BOREHOLE, LABORATORY, GEOPHYSICAL AND PRODUCTION DATA

GEOLOGICAL INTERPRETATION OF 2D/3D SEISMIC DATA

ESTIMATION OF IN PLACE OIL AND GAS VOLUMES IN RESERVOIR

3D GEOLOGICAL MODELLING OF OIL AND GAS RESERVOIRS

SCIENTIFIC RESEARCH WORK.

PREPARATION OF STUDIES ON OIL AND GAS RESERVES IN ACCORDANCE WITH THE LEGISLATION OF THE REPUBLIC OF SERBIA

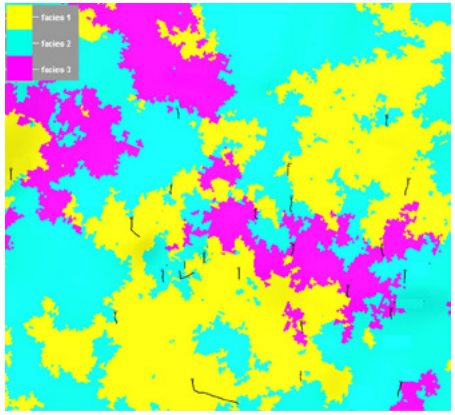
WORKING OUT GEOLOGICAL FOUNDATIONS FOR VARIOUS STUDIES SUCH AS RESERVOIR DEVELOPMENT STUDIES, RESERVOIR PRODUCTION STUDIES AND FEASIBILITY STUDIES

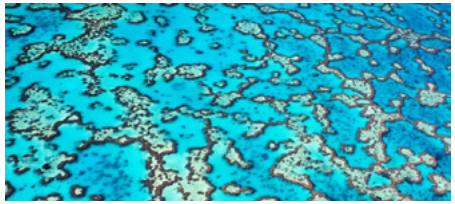
UPDATING EXISTING GEOLOGICAL MODELS OF OIL AND GAS RESERVOIRS BASED ON THE RESULTS OF APPRAISAL AND DEVELOPMENT DRILLING CAMPAIGNS

COMPLEX ANALYSES AND INTERPRETATION OF GEOLOGICAL ARCHITECTURE OF AN EXPLORATION AREA WITHIN WHICH OIL AND GAS RESERVOIRS OF INTEREST ARE FOUND

REFERENCES

- Studies on oil and gas reserves in accordance with the official legislature of all oil and gas reservoirs on the territory of the Republic of Serbia
- Deep dive studies and 3D geological models of the most significant oil and gas fields in Serbia (Velebit, Kikinda, Mokrin, Turija, etc)
- 2D and 3D geological models of reservoirs in Romania, the Pannonian basin, Ex-2, Ex-3, Ex-7, Ex-8, Ex-12 license blocks
- Geological interpretations and 3D geological modelling of many Russian reservoirs in the West Syberian basin
- Expertize of 3D geological models of Angola off-shore reservoirs Palanca, Pacassa and Buffalo





Use of modern analogues in conceptual and virtual 3D lithofacial modelling

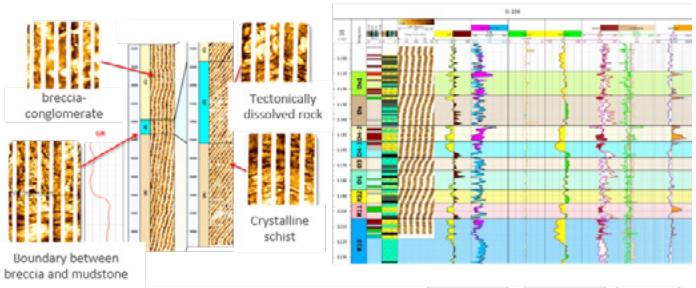
Petrophysics

KEY ACTIVITIES

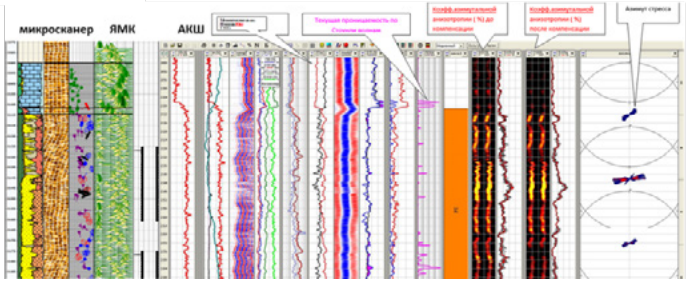
- CREATION OF PETROPHYSICAL MODELS IN ACCORDANCE WITH LOGGING MEASUREMENTS, LABORATORY ANALYSES ON CORED MATERIAL AND OTHER WELL DATA
- QUALITATIVE AND QUANTITATIVE PETROPHYSICAL INTERPRETATION OF CONVENTIONAL AND SPECIAL METHODS OF GEOPHYSICAL LOGGING IN CLASTIC, CARBONATE AND FRACTURED FORMATIONS
- ASSESSMENT OF GEOLOGICAL AND PETROPHYSICAL PROPERTIES OF THIN-LAYERED FORMATIONS
- ASSESSMENT OF THE QUALITY OF THE CEMENT LINING OF THE CASING
- ANALYSIS AND INTERPRETATION OF GEOPHYSICAL LOGGING MEASURED IN VERTICAL AND HORIZONTAL BOREHOLES
- PLANNING THE OPTIMAL PROGRAM OF BASIC AND SPECIAL LABORATORY ANALYSES ON CORED SAMPLES
- ANALYSIS AND INTERPRETATION OF LOGGING METHODS FOR PRODUCTION AND FLOW ANALYSIS IN UNCASED WELLS
- PLANNING THE OPTIMAL PROGRAM OF GEOMECHANICAL LABORATORY ANALYSES
- MONITORING AND ANALYSIS OF THE RESULTS OF THE LABORATORY TESTING OF CORES
- LOCATING AND EVALUATING PETROPHYSICAL PROPERTIES OF FRACTURED ZONES
- GEOMECHANICAL ANALYSIS OF WELL STABILITY, MODELLING AND THE PROPOSAL OF HYDRAULIC FRACTURING PLAN

KEY ACTIVITIES

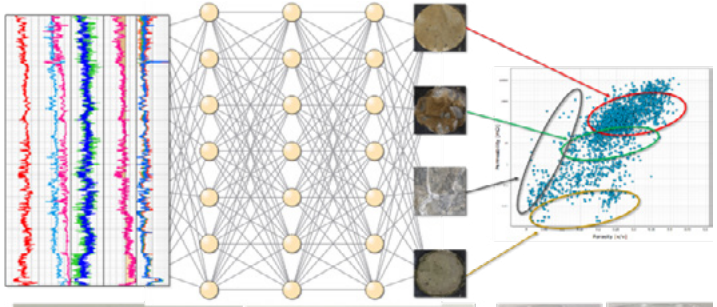
1. operational interpretation



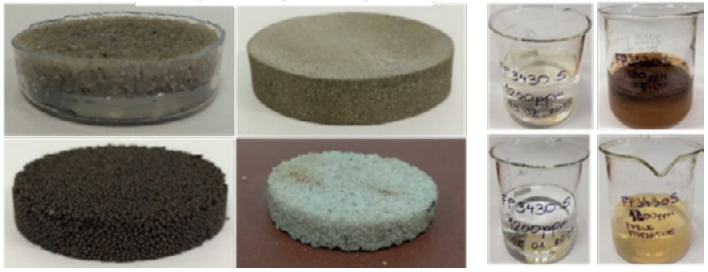
3. interpretation of logging



4. digital projects in petrophysics



2. conducting laboratory measurements



REFERENCES

- Elaboration of studies on oil and gas reserves of the NIS company in Serbia
- Preparation of development studies on oil and gas field of NIS company in: Serbia, Bosnia and Herzegovina, Romania and Hungary. More than 30 papers for the period 2014-2022
- Support for the interpretation of geological-geophysical data on the territory of Serbia, Romania and Hungary.
- Implementation of external projects done by: GPN company in Western Siberia, NIS Company in Angola, etc.

2

RESERVOIR DEVELOPMENT

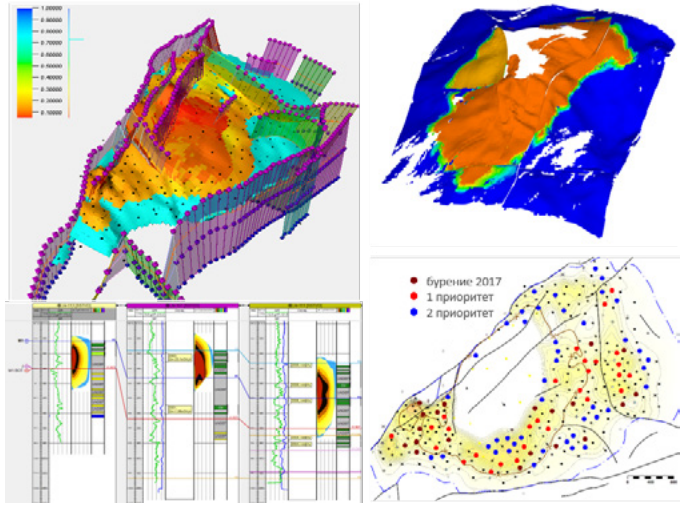
Reservoir development includes activities such as the determination of geological and recoverable oil and gas reserves, reservoir simulation, production analysis, well testing analysis, modelling of fluid inflow into the well channel, planning of future activities on wells and reservoirs, and economic assessment.

Reservoir engineering

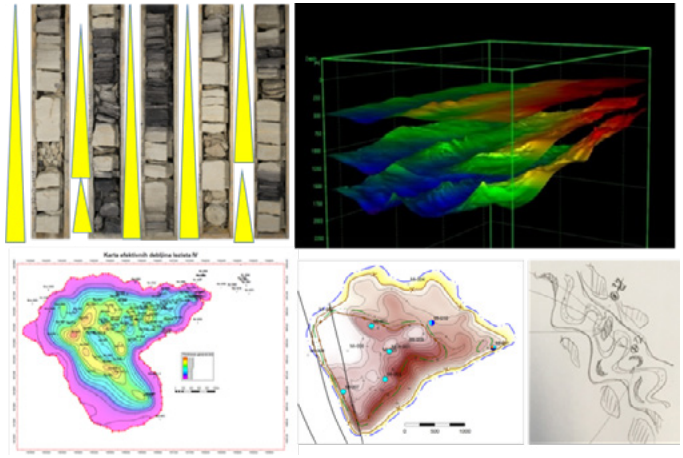
KEY ACTIVITIES

- Calculation of initial and recoverable hydrocarbon reserves, using modern tools and software
- Development analysis using modern analytical tools in order to examine the possibility of increasing the utilization of hydrocarbon deposits
- Detailed analysis of reservoir development with the focus on proposals for new well locations, as well as optimization of the operation of already existing wells
- Participating in fluid sampling, laboratory PVT analysis and fluid characterisation and modelling
- Determine production forecast variants using the probabilistic method R10, R50, R90
- Application of a suite of modern software tools for creating, updating and analysing 3D hydrodynamic models in order to reliably forecast production, estimate reserves and assess unreliability in field development
- Screening and development of projects for underground storage and utilization of CO2 in Serbia
- Development of projects for the increase of ultimate oil and gas recovery using modern technologies and knowledge
- Participation of the field development project technical documentation studies on oil and gas reserves, reservoir development studies, feasibility studies and major mining projects
- Creation and updating of the production profile in accordance with the geological-technical activities in the field

KEY ACTIVITIES



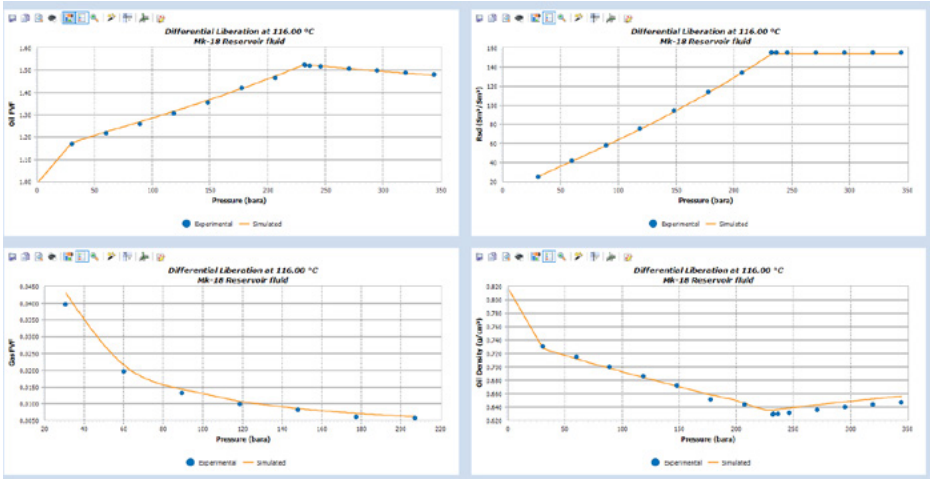
Support for always active reservoir models



3D reservoir modelling

REFERENCES

- Reports on oil and gas reserves of all reservoirs on the territory of the Republic of Serbia;
- Reservoir analysis projects of oil and gas fields in Serbia;
- 3D simulation studies of oil and gas reservoirs in Serbia and in certain fields in Russia;
- Feasibility studies and major mining projects.



3

PRODUCTION

"Well flow performance" analysis, equipment design for mechanical methods of exploitation (ESP, DP, PCP), integrated modelling of wells and complete oil field, testing of new technologies for mechanical oil and gas production, development of algorithms for well optimization and OPEX reduction, digital projects development.

Production

KEY ACTIVITIES

INTEGRATED MODELLING OF PRODUCTION PROCESSES

DESIGN AND OPTIMIZATION OF THE ARTIFICIAL LIFT SYSTEM

CHEMICAL SUPPORT AND ENGINEERING

TREATMENT OF THE AREA IN THE WELL ZONE DURING WORKOVER OPERATIONS

POLYMER AND ASP EOR

4

THE WELL DRILLING DESIGN

Design of wells of various constructions, including deep wells and wells with high-temperature conditions.

Drilling design team

FOR THE SERBIAN AND FOREIGN MARKETS

KEY ACTIVITIES

- DESIGNING OF EXPLORATION AND PRODUCTION, DIRECTIONAL WELLS AND THE WELLS WITH HIGH PRESSURE AND TEMPERATURE
- WELLS FOR WATER SUPPLY TO MAINTAIN FORMATION PRESSURE
- ARTESIAN WELLS FOR DRINKING AND TECHNICAL WATER SUPPLY
- GEOTHERMAL WELLS
- PROJECTS FOR RE-ENTRY CHANNEL DRILLING ON OLD WELLS
- PRODUCTION OF SLIM HOLE WELLS WITH MOBILE DRILLING RIGS
- PREPARATION OF DRILLING PROGRAMS FOR THE NEEDS OF FOREIGN OIL COMPANIES
- PROVIDING TECHNICAL SUPPORT TO CLIENTS DURING THE PREPARATION OF TENDER DOCUMENTATION AND SELECTION OF SERVICE COMPANIES
- MAKING COMMENTS DURING WELL DRILLING
- PROVIDING THE NECESSARY ENGINEERING RECOMMENDATIONS
- ANALYSIS OF PROBLEMS DURING DRILLING
- MAKING RECOMMENDATIONS FOR PREVENTING ACCIDENTS
- ENTERING THE NECESSARY CORRECTIONS IN THE PROJECT DOCUMENTATION BASED ON THE EXPERIENCE OF DRILLING WELLS WITH SIMILAR CONDITIONS

Well completion and testing design team

KEY ACTIVITIES

DESIGNS WELL COMPLETION USING METHODS THAT ENABLE EFFICIENT AND SAFE PRODUCTION OF RESERVOIR FLUIDS

SELECTS THE EQUIPMENT THAT ENSURES OPTIMAL COMMUNICATION BETWEEN THE RESERVOIR AND THE WELL

SELECTS THE PRODUCTION TUBING THAT IS IN DIRECT DEPENDENCE WITH THE DESIGNED EXPLOITATION STRING

WHEN DESIGNING, IT STRIVES FOR MAXIMUM PRODUCTION VALUES, WHILE REDUCING PRICES DURING THE ENTIRE LIFE OF WELLS' EXPLOITATION

IN ITS WORK, IT COMBINES SEVERAL SCIENTIFIC DISCIPLINES SUCH AS PHYSICS, CHEMISTRY, MATHEMATICS, ENGINEERING, GEOLOGY, HYDRAULICS, TECHNOLOGY OF MATERIALS, WHICH UNIFY THE PRACTICAL FIELD EXPERIENCE AND THE KNOW-HOW

REFERENCES

- Work experience in the Balkan region and the EU countries
- The preparation of more than 60 project documents for well construction per year
- Provision of design supervision and professional support
- Experience in developing projects for drilling in complex geological conditions (Temperature > 200°C, Pressure > 650atm, depth > 4,000 meters)

5

THE INFRASTRUCTURE DESIGN

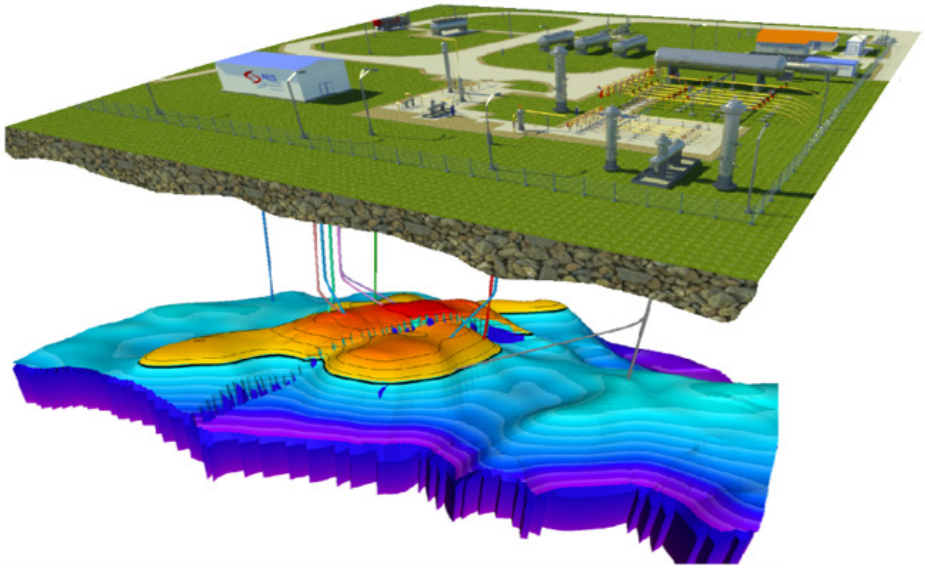
Preparation of all types of design and technical documentation, as per clients' requests and standards (feasibility studies, preliminary design, detailed design) and design and field supervision in all stages of projects: engineering, hazard and operability studies – HAZOP, construction, equipment installation, testing and commissioning, trial operation, normal operation.

Infrastructure design

KEY ACTIVITIES

- PREPARATION OF TECHNICAL DOCUMENTATION ACCORDING TO THE LAW ON MINING AND GEOLOGICAL SURVEYS
- PREPARATION OF STUDIES, TECHNO-ECONOMIC AND OTHER ANALYSES
- APPLICATION OF 3D TECHNOLOGY IN THE PRODUCTION OF TECHNICAL DOCUMENTATION
- PERFORMING ALL TYPES OF GEODETIC WORKS AND MAKING GEODETIC SURVEY MAPS
- SURVEYING THE FACILITIES USING TERRESTRIAL LASER SCANNER (3D SCANNER) WITH DATA PROCESSING AND CREATION OF SURVEY MAPS
- PRINTING, MULTIPLYING, DISTRIBUTION AND ARCHIVING OF TECHNICAL DOCUMENTATION
- MANAGEMENT AND DEVELOPMENT OF COMPLEX CONCEPTUAL PROJECTS AND REENGINEERING PROJECTS IN THE FIELD OF OIL AND GAS EXPLORATION AND PRODUCTION
- EXPERTISE OF TECHNICAL PROJECT ASSIGNMENTS AND TECHNICAL DOCUMENTATION (PROJECTS, REPORTS, STUDIES, PROGRAMS AND ANALYSES)
- PREPARATION OF TECHNICAL DOCUMENTATION ACCORDING TO THE LAW ON PLANNING AND CONSTRUCTION
- MANAGEMENT OF THE PREPARATION OF TECHNICAL AND OTHER DOCUMENTATION
- CREATION OF FEED DOCUMENTATION
- DESIGN AND TECHNICAL SUPERVISION
- PREPARATION OF STUDIES ON ENERGY EFFICIENCY
- CONSULTING SERVICES
- SURVEYING THE TERRAIN AND FACILITIES WITH AN UNMANNED AERIAL VEHICLE WITH DATA PROCESSING AND THE CREATION OF SURVEY MAPS

KEY ACTIVITIES



REFERENCES

EXPLORATION DESIGN PROJECTS
Ostrovo, Banatsko Miloševo, Kasidol, Iđoš, Lokve (Serbia)

OPERATION DESIGN PROJECTS
Velebit, Turija, Kikinda, Ermenovci, Itebej, Elemir, Srbobran, Mokrin (Serbia)

OIL GATHERING STATIONS
Velebit, Boka, Elemir, Kikinda field I, II, III and IV, Kikinda, Kikinda town I and II, Kikinda upper, Janosik, Kelebija I and II, Mokrin West, Mokrin South I and II, Banatsko Karađorđevo, Velika Greda South, Turia North, Rusanda, Itebej, Iđoš, Sirakovo, Kasidol (Serbia)

GAS GATHERING STATIONS
Ostrovo, Banatsko Miloševo, Martonoš-zapad, Mokrin sever, Kikinda Gornje, Gornji breg, Srpska Crnja, Banatski Dvor, Itebej, Majdan (Serbia)

UNDERGROUND GAS STORAGE BANATSKI DVOR – PHASE I (Serbia)

GAS PIPELINES AND OIL PIPELINES
Horgoš-Senta, Senta-Gospođinci-Batajnica, Batajnica-Beli Potok-Velika Plana and 39 more gas pipelines with a total length of 1,710 km (Serbia), Bosanski Brod-Novi Sad (JUNA), Novi Sad-Pančevo (JUNA) and three oil pipelines with a total length of 196 km (Serbia)

COMPRESSOR STATIONS
Elemir 1,100,000 Nm3/day, Velebit 400,000 Nm3/day, Kikinda 800,000 Nm3/day, Mokrin-sever 1,100,000 Nm3/day, Batajnica 2,500,000 Nm3/day, Elemir 500,000 Nm3/day, Mokrin-south 1,700,000 Nm3/day, Ada 560,000 Nm3/day (Serbia)

PUMP STATIONS
Pančevo (PK11, PS4, PS11), Novi Sad (Serbia)

MAIN METERING AND REGULATING STATIONS (MMRS)
Novi Sad, New Belgrade, Subotica, Kragujevac, Novi Bečej, Sombor, Apatin and 36 other GMRS (Serbia)

PIPELINE RIVER CROSSINGS
The Danube: Beška (HDD method), Smederevo, Batajnica, Novi Sad, Sotin (Serbia), The Tisa: Senta, Titel, Elemir (Serbia), The Sava: Šabac, Bosanski Brod, Belgrade (Serbia and B-H), The Western Morava: Kraljevo, Čačak (Serbia), The Velika Morava: Svetozarevo (Serbia)

UNLOADING / LOADING PONTOONS
Novi Sad oil refinery, JUGOPETROL depot Pristina, JUGOPETROL depot Niš, JUGOPETROL depot Bor, pontoon Canal DTD Novi Sad, pontoon Canal DTD Novi Sad (Serbia)

PETROLEUM PRODUCT STORAGE
Petroleum product warehouses in: Belgrade, Elemir, Valjevo, Sombor and five more warehouses (Serbia), Base oil warehouse in Belgrade (Serbia), Crude oil storage in Novi Sad (Serbia)

INSTALLATIONS FOR LPG
Belgrade 3,000 m^3, Novi Sad 9,000 m^3, Elemir 17,600 m^3, three storages / filling plants (Serbia)

FIREFIGHTING INSTALLATIONS
Novi Sad and Pančevo oil refineries (Serbia, JUGOPETROL's warehouse: Belgrade, Niš, Pristina, Smederevo and Prahovo (Serbia), LPG tanks in Novi Sad and Elemir (Serbia), Collecting oil and gas stations (Serbia)

OTHER FACILITIES
Lubricants Factory Kruševac (Serbia), Factory of insulating materials Kanjiža (Serbia), Plant for the production of polyalphaolefin oils - Nizhnekamsk, (Russian Federation)

6

LABORATORIES

Upstream:

240 documented methods of testing rock, oil, natural gas, formation water, groundwater, surface water, thermal mineral water, and wastewater.

Downstream:

In 4 laboratories in Serbia, 555 methods for testing the characteristics of oil and petroleum products are being performed. Certification of petroleum products (quality control, issue of manufacturers declaration, certificate of conformity of imported products for placement on the market of the Republic of Serbia).

Upstream laboratory

- *The Upstream Laboratory has been in market for more than 60 years*
- *Accredited to study rock, oil and natural gas as well as formation, underground, surface, thermal, mineral and waste water*
- *Over 200 test methods available*
- *SRPS ISO/IEC 17025:2017 accreditation*
- *Highly qualified staff, whose competence is gained by continuous training and confirmed by the Accreditation Body of Serbia supervisory visits*
- *More than 430 units of laboratory equipment*
- *A library of over 30 km of core samples*

KEY ACTIVITIES

ROCK ANALYSIS

PREPARATION OF ROCK MATERIAL AND ANALYSIS

FLUID ANALYSIS

WATER ANALYSIS AND ENVIRONMENTAL MONITORING

PROJECTS AND SCIENTIFIC RESEARCH WORK

- Examination of the increase in the coefficient of oil recovery by polymer injection (for NIS)
- Examination of the coefficient of change in the effective permeability to oil and water of core samples after treatment with organic solvents, acid composition and insulating gel (for NIS)
- Pilot project of application of phase modifier to changes in petrophysical characteristics before and after injection of inhibitor (for NIS)
- Routine and special rock analyses of the Shakal field (project implemented for the needs of Gazpromneft Middle-East, Iraq)
- Corrosion and scale inhibitor testing Gazpromneft Zapolyare, Russian Federation

Downstream laboratory

The laboratory was founded in 1969 in order to test the quality of oil and petroleum products in the production processes of NIS.

Since 2009, the laboratory has been transformed into a commercial laboratory that offers testing services for crude, oil, gas, intermediates and commercial petroleum products to the customer. It fulfils its essential tasks by ensuring comprehensive and reliable testing services, which are fit fir purposes and meet the customer requirements.

The main Laboratory activity is testing and analysing petroleum products, lubricants and chemical products in accordance with standard test methods prescribed by national and international standards, specifications and technical regulations.

The Laboratory is committed to perform tests and analyses as an impartial laboratory for any customer.

The quality of laboratory services, primarily reflected in accuracy and precision of test and analysis results, is achieved by quality assurance in all areas of laboratory work. Furthermore, for satisfying the needs of laboratory's internal and external customers requiring recognition of the laboratory's competence for performing activities of testing in the field of petroleum products including fuels, lubricants and solvents, and in the field of chemical products, the Laboratory Downstream also obtained accreditation granted by the Serbian Accreditation Body of Serbia (ATS). The Laboratory operates in compliance with the standard EN ISO/IEC 17025, it has adopted all technical and safety requirements and is well equipped with modern test equipment complying with specifications relevant to the tests.

KEY ACTIVITIES

OIL AND PETROLEUM PRODUCT SAMPLING

PETROLEUM PRODUCT LABORATORY TESTING

PETROLEUM PRODUCT CERTIFICATION

LABORATORY TESTING OF OILS, LUBRICANTS AND RELATED PRODUCTS

SCOPE OF TESTING – COMMERCIAL PRODUCTS

SCOPE OF TESTING – FEEDSTOCK AND INTERMEDIATES TESTING

COMPETENCES – CERTIFICATES

- Accredited under SRPS ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories, accreditation number 01-372.
- Certified quality and environmental management systems under ISO 9001 and ISO 14001 protocols and the CE marking for road and polymer modified bitumen. The certification and audits are carried out by certification body JUQS.
- Conforms to EI/ JIG 1530 requirements – quality assurance requirements for aviation fuel production, storage and distribution, in relation to lab practices and established quality control system for aviation fuel. The certification and audits are carried out by certification body SGS
- Is an APPOINTED BODY by the Ministry of Mining and Energy of the Republic of Serbia for assessing the conformity of liquid petroleum products and gaseous fuels to standard and national regulations
- The work on the adoption of Serbian standards is carried out in the national technical committees, which are formed according to the International and European technical committees
- Leader in the testing of oil and oil products (LPG, gasoline, diesel, JET A1, gas oils, biofuels, oils and lubricants, bitumen)
- Equipped with approximately 550 units of laboratory equipment for more than 400 different tests.

Tests are conducted 24/7 at four locations:

PANČEVO
Testing of gasoline, diesel, jet fuel, aviation gasoline, LPG, gas oil, fuel oil, bitumen, petroleum coke, crude oil, petrochemical products, biocomponents B100, biodiesel, waste and industrial water, chemicals and additives;

NOVI SAD
testing of gasoline, diesel, gas oils, LPG, heating oil, crude oil, oils, lubricants and related products, additives, antifreeze, brake fluids, waste and industrial waters;

BELGRADE
testing of jet fuels, aviation gasoline, gasoline, diesel, gas oils;

NIŠ
testing of jet fuels, aviation gasoline, gasoline, diesel, gas oils;

7

DIGITIZATION

The application of machine learning algorithms leads to an increase in operational efficiency and the identification of new business opportunities.

Digitization

KEY ACTIVITIES

RESEARCH & DEVELOPMENT (R&D)

DIGITAL SYSTEMS AND BUSINESS INTELLIGENCE

DATA SCIENCE AND MACHINE LEARNING

• Advanced petrophysics is an umbrella project that integrates machine learning algorithms for automatic lithology prediction for a well, analytics, and prediction of the probability of interval fracturing using cluster algorithm. Advanced tools are incorporated into standard petrophysics software through the petrophysicist's toolbox, where they use its logic to automate routine operations of varying complexity that a petrophysics engineer performs every day.

• Cognitive technologies in seismic represent an umbrella project within which algorithms for the restoration of seismic recordings, automatic separation of faults and spatial integration of heterogeneous data were developed by connecting the seismic cube with geophysical logging data.

• Advanced analysis of reservoir development, as an umbrella project as well, includes algorithms for well connectivity research, oil and fluid production forecasting, oil recovery coefficient forecasting, reservoir complexity index coefficient forecasting and an algorithm for automatic candidate search for GTA, overhaul works and acid treatments.

• Virtual measurement of flow in wells enables obtaining information regarding the production in a well, based on indirect measuring parameters, when we do not have real measurements of production. This project presented a classic challenge for multivariable regression, with a large imbalance in the frequency of input data, arriving in real time.

• Predictive maintenance of pumps is a project aimed at uncovering hidden links in the deviation of the drilling mode, in order to prevent the maintenance, prevention of faults or timely detection of the same. The direct effects achieved through the project are an increase in the overhaul period for the ECJ, as well as timely planning for the implementation of drilling measures equipped with these pumps.

• Digital Supervisor of geological and exploratory works: Model for automatic terrain reconnaissance and the recognition of geographical facilities using a drone. Developed for the detection of seismic sensors, control of their number and correct location. It enables monitoring the depth of traces from the vibration source after the passage of vibrating equipment, as well as monitoring compliance with HSE requirements.

DIGITAL SYSTEMS AND BUSINESS INTELLIGENCE

• The digital platform for sand control - DiSCO - represents the creation of a digital platform for managing the sand control process in a well. The platform allows speeding up and simplifying work on well designing, monitoring and control with gravel pack, i.e., the systematization of all data into a single information system.

• Software for assessing the profitability of wells - enables a higher degree of the automation of reporting and the visualization of well profitability indicators, as well as timely planning of certain measures and operations on the wells themselves.

The project involves the development of a business application that will enable the integration of data with existing information systems, more efficient qualitative and quantitative analysis of operational data, timely making of operational decisions, reduction of manual input, and the increase of the level of reporting automation.

• Software for choosing the optimal method of well exploitation - enables the optimization of the well fund, proposals for the optimization of the well fund up to 90%.

The project involves the creation of an application for the automated selection of the optimal exploitation method in the PL/SQL and APEX Oracle environment, with verified calculation algorithms.

• Petroleum engineer toolbox - enables the reduction of the time spent on performing routine calculations related to reservoir development and production. The application enables semi-automatic solving of complex equations.

• Oil Production Control Centre - Power BI Dashboards - enables monitoring, analysis and graphic display of production parameters of NIS and its concessions on a daily, monthly and annual level.

The project involves connecting information systems and a BI platform, through whose interface the user has insight, in real time, about the current state of production, activities and statuses of each well.

8

NEW TECHNOLOGIES

Improvement of business processes in the field of geological and exploration works, development of reservoirs, and oil and gas production with the application of digital technologies.

EOR projects

OPERATION	ACTIVITIES
THE EXPLORATION AND APPLICATION OF CHEMICAL FLOODING TECHNOLOGIES IN OILFIELDS WITH THE AIM OF IMPROVING THE RECOVERY OF OIL RESERVES	EOR METHOD SCREENING
	FORMATION OF A PROGRAM OF EXPLORATION OF OIL AND GAS RESERVOIRS
THE EXPLORATION AND APPLICATION OF GAS INJECTION TECHNOLOGIES IN OILFIELDS, WITH THE AIM OF IMPROVING THE RECOVERY OF HYDROCARBON RESERVES	CREATION OF A PLAN AND IMPLEMENTING THE PROGRAM OF LABORATORY TESTING OF CORE, OIL, GAS, CHEMICALS
	MODELLING THE PROCESS OF EOR PROJECTS IMPLEMENTATION
THE EXPLORATION AND APPLICATION OF THERMAL METHODS TO INCREASE THE INDEX OF THE RECOVERY OF OIL DEPOSITS	FORMATION OF A CONCEPTUAL PROJECT FOR THE EOR PROJECT IMPLEMENTATION, THE RESEARCH OF TECHNOLOGIES AND EQUIPMENT

Digital transformation

OPERATION	ACTIVITIES
IMPROVEMENT OF BUSINESS PROCESSES IN THE FIELD OF GEOLOGICAL RESEARCH, RESERVOIR DEVELOPMENT, OIL AND GAS PRODUCTION, WITH THE APPLICATION OF DIGITAL TECHNOLOGIES	ANALYSIS OF EXISTING BUSINESS PROCESSES AND THE FORMATION OF PROPOSALS FOR INCREASING THE EFFICIENCY OF BUSINESS TASK IMPLEMENTATION, WITH THE APPLICATION OF DIGITAL TECHNOLOGIES
DEVELOPMENT OF DATA SCIENCE PROJECTS IN THE AREA OF GEOLOGY, DEVELOPMENT AND PRODUCTION OF OIL AND GAS	MANAGEMENT OF DIGITAL BUSINESS INITIATIVES
	IMPLEMENTATION OF DIGITAL PROGRAMS AT THE LEVEL OF EXPLORATION; AND PRODUCTION BLOCK
MANAGEMENT OF DIGITAL PROJECTS IN THE DOMAIN OF GEOLOGICAL-EXPLORATORY WORKS, RESERVOIR DEVELOPMENT, OIL AND GAS PRODUCTION, WITH THE APPLICATION OF DIGITAL TECHNOLOGIES	DIGITAL PROJECT MANAGEMENT.

Underground storages of CO2

OPERATION

GEOLOGICAL ANALYSIS AND THE EXPLORATION OF POTENTIAL CO2 STORAGE FACILITIES

ELABORATION OF THE ENTIRE PROJECT OF THE CONSTRUCTION OF THE UNDERGROUND CO2 STORAGE (CCUS)

CREATION OF THE CO2 UNDERGROUND STORAGE MONITORING PROGRAM (CCUS)

CREATION OF A PROGRAM FOR PREVENTING AND REDUCING THE IMPACT OF CO2 LEAKAGE (CO2 LEAKAGE MITIGATION AND REMEDIATION)

CREATION OF THE DEVELOPMENT STRATEGY FOR CO2 (CCUS) UNDERGROUND STORAGE

ANALYSIS OF LEGAL REGULATIONS OF SERBIA, THE EU AND OTHER COUNTRIES RELATED TO THE REDUCTION OF CO2 AND OTHER GREENHOUSE GAS EMISSIONS, THE FORMATION AND MAINTENANCE OF UNDERGROUND STORAGE FACILITIES, ETC.

ANALYSIS, RESEARCH AND DEVELOPMENT OF TECHNOLOGIES RELATED TO THE CAPTURE, TRANSPORT, INJECTION AND CONTROL OF CO2 IN ALL PROCESSES OF THE CCUS PROJECTS IMPLEMENTATION

ACTIVITIES

CREATION OF THE PROGRAM OF GEOLOGICAL EXPLORATORY WORKS TO FIND THE OPTIMAL RESERVOIRS FOR CO2 STORAGE

CREATION OF A PLAN AND IMPLEMENTING THE PROGRAM OF LABORATORY TESTING OF CORE, OIL, GAS, CHEMICALS

DEVELOPMENT OF GEOLOGICAL, GEOMECHANICAL AND HYDRODYNAMIC MODELS OF UNDERGROUND CO2 STORAGE

MODELLING THE PROCESSES OF CO2 INJECTION AND STORAGE

ANALYSIS OF THE APPLICATION OF CO2 INJECTION WITH THE AIM OF INCREASING THE UTILIZATION OF OIL DEPOSITS (CO2 EOR PROJECTS)

Scientific research works

OPERATION	ACTIVITIES
VERIFICATION OF NEW SCIENTIFIC CONCEPTS AND TECHNOLOGIES IN THE FIELDS OF EXPLORATION GEOLOGY AND DEPOSIT DEVELOPMENT GEOLOGY	ANALYSIS OF NEW SPECIALIST SOFTWARE AND TECHNOLOGIES
DEVELOPMENT OF ADVANCED TECHNOLOGIES FOR PROCESSING, INTERPRETATION AND APPLICATION OF GEOLOGICAL DATA	APPLICATION OF ADVANCED TECHNOLOGIES IN SEISMIC

Testing of new technologies - implementation of OPI

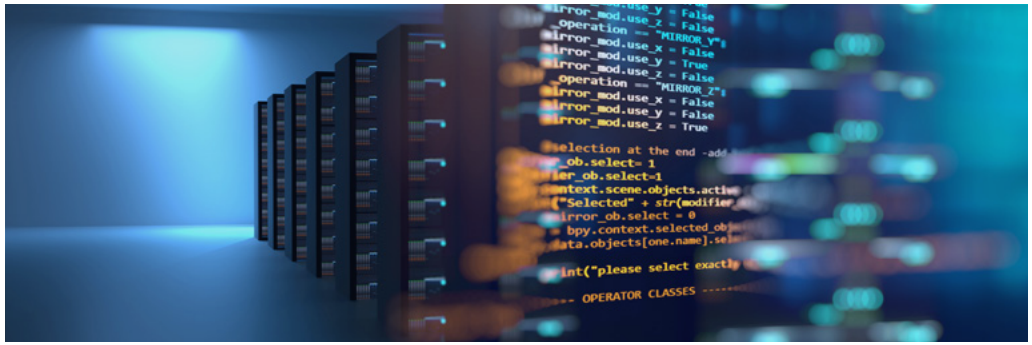
OPERATION	ACTIVITIES
RESEARCH OF NEW TECHNOLOGIES	ANALYSIS OF NEW TECHNOLOGIES AND WORLD PRACTICES IN ACCORDANCE WITH CURRENT ISSUES
IMPLEMENTATION OF NEW TECHNOLOGIES	ANALYSIS AND SELECTION OF BOREHOLES FOR THE INSTALLATION OF TECHNOLOGIES, MONITORING OF THE OPERATION OF TECHNOLOGIES AND THEIR INTRODUCTION INTO REGULAR OPERATION

9

DATABASES

The Database Centre provides technical and user support for the development of geological and technological databases, digital repositories and knowledge-sharing platforms in the company and actively participates in the creation and implementation of user application solutions for data review, entry, and verification.

Databases



KEY ACTIVITIES

DATA DIGITALIZATION

DATABASE DEVELOPMENT SUPPORT

ADMINISTRATION OF SPECIALIZED SOFTWARE

DEVELOPMENT AND IMPLEMENTATION OF USER APPLICATIONS

ORGANIZATION AND IMPLEMENTATION OF TECHNICAL AND PROFESSIONAL TRAININGS

10

IT ADMINISTRATION SUPPORT

For five years, more than 950 million were invested in IT technologies in NTC. There are over 60 software packages, more than 300 virtual stations, 900 processors, and a supercomputer for seismic data processing, all for the purpose of flexibility, mobility, data storage, and security.

IT administration support

KEY ACTIVITIES

SUPPORT AND MAINTENANCE OF THE SEISMIC DATA PROCESSING SYSTEM HOSTED ON THE STC'S HIGH-PERFORMANCE COMPUTER

FIRST AND SECOND LEVEL OF USER SUPPORT (SOFTWARE AND END USER WORKPLACE SUPPORT)

SERVER AND STORAGE INFRASTRUCTURE MANAGEMENT FOR THE DATA CENTER

IMPLEMENTATION AND MAINTENANCE OF THE VIRTUALIZATION PLATFORM VMWARE VSPHERE И CITRIX XEN APP&DESKTOP

PROCUREMENT, INSTALLATION, AND MAINTENANCE OF EUW EQUIPMENT, AND SPECIALIZED ELECTRICAL, CONSTRUCTION, GEOLOGICAL, GEOPHYSICAL, PETROPHYSICAL AND OTHER SOFTWARE SOLUTIONS ACCORDING TO THE BUSINESS NEEDS

MONITORING OF SOFTWARE AND HARDWARE AVAILABILITY AND SERVICE OPTIMIZATION AND IMPROVEMENT

11

PROFESSIONAL TRAINING

NTC has the status of a Publicly Recognized Organizer of Adult Education Activities (PROAEA), as the first of the NIS subsidiaries registered for this activity in Serbia. This enabled the organization of various training activities for oil industry workers within the centre.

Professional trainings

KEY ACTIVITIES

- BASICS OF GEOPHYSICAL INTERPRETATION
- OILFIELD DEVELOPMENT
- PETROLEUM INDUSTRY FOR OUTSIDERS
- WELL TREATMENT – ACID TREATMENTS
- FLOW STUDY, IMPLEMENTATION AND INTERPRETATION
- DEVELOPMENT OF GAS AND CONDENSATE FIELDS
- WELL KILLING
- ERA MEKHFOND
- BASICS OF FIELD DEVELOPMENT
- MONITORING, ANALYSIS, AND MANAGEMENT OF OIL AND GAS FIELD DEVELOPMENT
- SHAKHMATKA AND TR
- SELECTION OF A SUCKER ROD SETUP
- SUCKER ROD PUMP PERFORMANCE MONITORING AND ANALYSIS


ntc-nis.rs
NIS FUTURE AT WORK