

# NATURAL RESOURCES

Russia – Limestone

Russia – Natural gas

Germany – Lignite, naturel gas

Nigeria – Crude oil

Vietnam – Crude oil

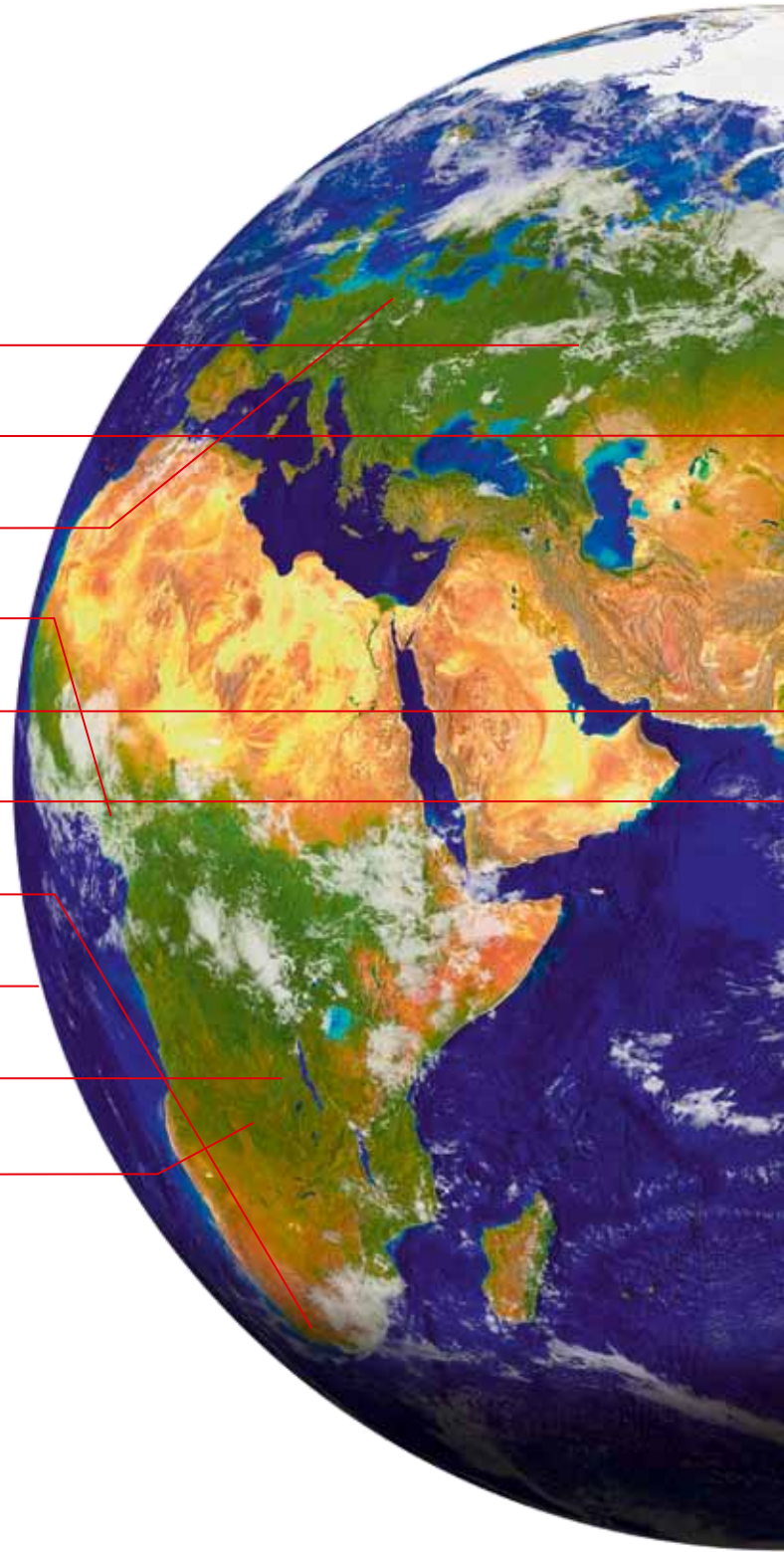
Cambodia – Crude oil

South Africa – Lignite

Brazil – Gypsum

Namibia – Gold deposits

Botswana – Gold deposits



## Natural resources

The worldwide demand for raw materials affects all business sectors of HPC HARRESS PICKEL CONSULT AG, and particularly exploration, development and due diligence with value and resource estimates and environmental impact assessment. It all started in 1948 with the investigation and exploration of potable water supplies and lignite deposits in Germany. Now HPC's experts handle all kinds of natural resources as high global demand for raw materials brings continuous growth of this business division.

As our world grows together, the market for engineering services is changing. While legal requirements vary considerably from country to country, multinational companies tend to require full services from one consultant, no matter where they do business. This competent partner with an in-depth knowledge of the local situation, could be an international consultant such as HPC acting in a worldwide consulting network: Inogen. Inogen sets the pace. Today it has 180 offices with more than 3,000 professionals and is still growing. Inogen partners have made high-quality consulting their business and provide expertise in all relevant fields.

A partner of





### Tasks

- ◆ Exploration assessment
- ◆ Reserve determination
- ◆ Geological, hydrogeological and geotechnical investigation
- ◆ Health and safety management
- ◆ Precaution programs
- ◆ Coordination with authorities
- ◆ Investigation supervision
- ◆ Documentation and reporting

### Your benefit

- ◆ Complex «one-stop» planning services from experienced specialists
- ◆ Optimized reserve evaluation and reliable cost estimates
- ◆ Organisation of all required licensing with high acceptance by authorities

### Our services

- ◆ Assessment of local and regional conditions
- ◆ Design of investigation programs for reserve evaluation and geotechnical calculations
- ◆ Planning of hydrogeological investigation measures
- ◆ Development of investigation programs to suit international and local standards



## PLANNING

### Planning exploration programs

For a potential deposit, this requires an appropriate investigation program which makes allowance for local conditions, the type of resource and deposit parameters.

In most cases a basic desktop study comes first. This looks at geological and historical factors and the geographical context and includes earlier investigation results. With this information, an optimal exploration program is designed which may vary significantly depending on available data and the investigation stage.

Initial investigations usually start with a general geophysical test program to get an overview of overall deposit conditions. HPC proposes such suitable sophisticated methods as 3D seismic, borehole logging or horizontal drilling. Each HPC investigation program is carried out under permanent expert supervision to meet all technical, professional and legal demands. If necessary, it will be adjusted accordingly.

A major aim of investigation is to collect reliable data about the deposit volume while at the same time seeking geotechnical and engineering information on potential mining methods and deposit exploitation (e.g. underground or opencast mining).

Sound health, safety and environmental management and accident prevention is of great importance, as are liability and precautions against potential property damage from mining activities. HPC's investigation programs therefore include specific geotechnical tests, e.g. for the assessment of slope and rock stabilities.

These interdisciplinary and multi-purpose programs save time and money for clients and allow the operation of mines under safe conditions and in a cost-effective way.



# EXPLORATION

## Exploration of deposits



Resource exploration is a major aspect in determining the value of deposits. A reliable deposit assessment will support the decision for converting resources into reserves.

Exploration is more than drilling boreholes, extracting cores and making chemical and petrophysical tests. In many cases these are the last steps of an investigation. Under the agreed investigation program, all modern methods of geophysical investigation will be used including surface, off-shore and aerial.

In many cases HPC combines different investigation techniques to be on the safe side. Seismic methods (2D, 3D, 4D) go hand in hand with electromagnetic techniques such as the Transient Electromagnetic Method (TEM). Since drilling is expensive it will normally be used only after careful interpretation of geophysical exploration results.

From small-scale, mobile drilling systems for limestone or mineral deposits to large-size rigs for depths of thousands of meters, all types of equipment will be used to guarantee best, task-specific results.

Drilling may be combined with diverse borehole logging methods. Borehole tests can also be performed. All exploration results will be compiled by our experts, and studied, evaluated and interpreted. The final result is a report with all the information about a deposit and its reserves and conditions. As a basis for further action, it will help make decisions on future investment.



#### Tasks

- ◆ Exploration of deposits and conditions
- ◆ Investigation of resources

#### Our services

- ◆ Execution of drilling projects
- ◆ Extraction of cores and samples with diverse state-of-the-art methods
- ◆ Geochemical and geophysical laboratory tests
- ◆ Aquifer pumping tests
- ◆ Geophysical land, off-shore and aerial exploration (i. e. seismic, electromagnetic, geothermic, gravimetric, ground penetrating radar, radiometric)
- ◆ Borehole logging and borehole tests
- ◆ Recording, processing and interpretation of geophysical data
- ◆ Evaluation and interpretation of exploration results, reporting

#### Your benefit

- ◆ Complex «one-stop» exploration services from experienced specialists résultats de prospection fiables
- ◆ Reliable exploration results
- ◆ Organisation of all required licensing with high acceptance by authorities



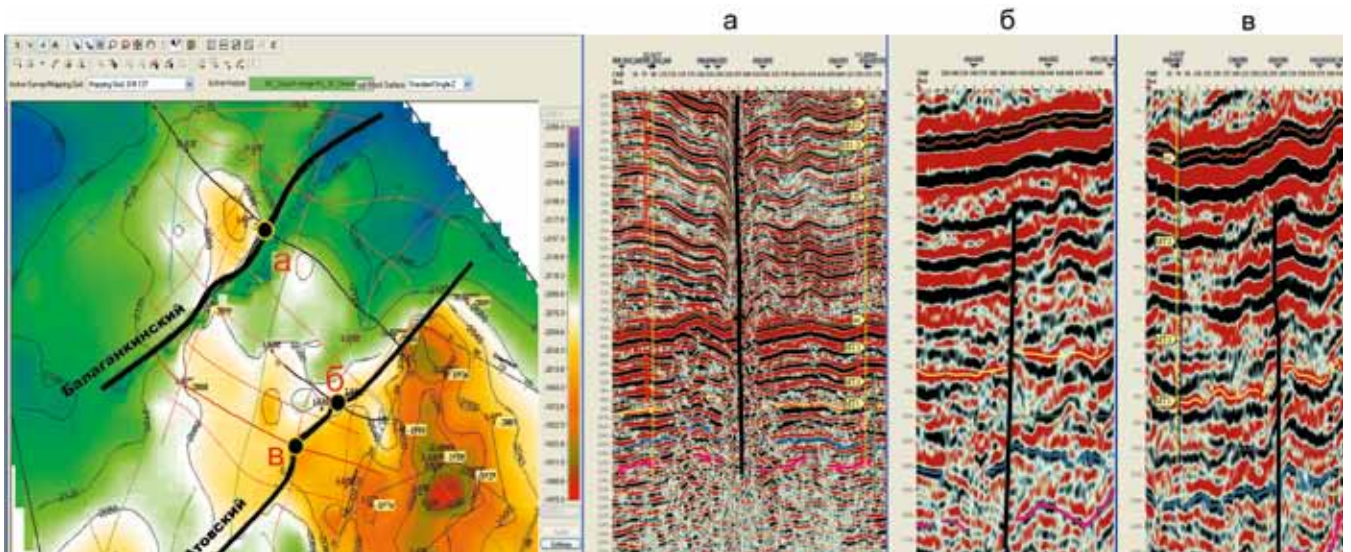
# EVALUATING

## Evaluating deposits

What is the value of a deposit? Our experts know the answer. They will carefully check all available data, including historical documents, aerial photographs, regional information and of course all exploration data and reports. Based on international standards, reserves will be estimated, calculated and allocated to different categories (proven, possible, probable, potential).

Our experts use all kinds of modern software for value estimation. HPC has quick access to extensive databases for calculating the costs of exploiting a deposit which could affect the deposit value. All relevant parameters – infrastructure, logistics, exploration/operating/investment costs, deposit engineering, field developing costs and raw material prices – will be taken into account.

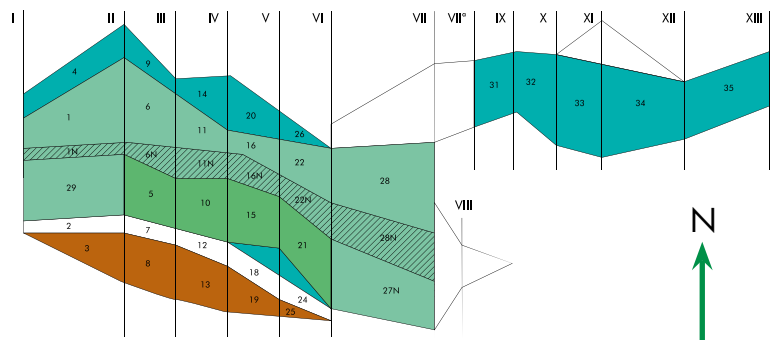
**Fragments of time sections along profiles crossing disjunctive faults**

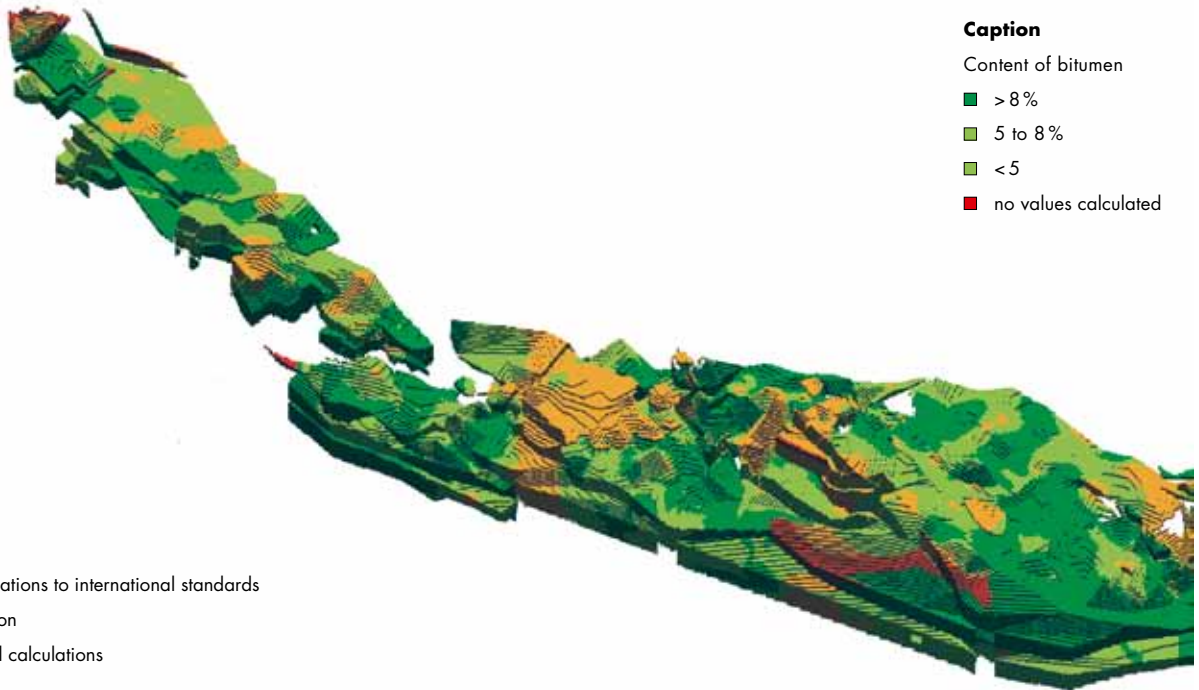


Our due diligence reports, apart from providing a reserve calculation for clients, also give preliminary information on deposit development, engineering aspects, and first financial data like CAPEX, OPEX, NPV, IRR. This will be the basis for further investment and financial decisions.

**Caption**

- Limestone category A
- Limestone category B
- ▨ Limestone category B new
- Limestone category C
- Limestone noncommercial reserves
- Mudstone category C
- ▨ Blocks n°
- ▭ Cross sections





**Caption**

Content of bitumen

- > 8%
- 5 to 8%
- < 5
- no values calculated

**Tasks**

- ◆ Reserve calculations to international standards
- ◆ Value estimation
- ◆ Basic financial calculations

**Our services**

- ◆ Reserve estimation
- ◆ Valuation to international standards
- ◆ Preliminary field development
- ◆ Operational forecast
- ◆ Financial forecast

**Your benefit**

- ◆ Reserve evaluation to local and international (world bank) standards
- ◆ Reliable cost estimates
- ◆ Reliability regarding to financing institutes and third parties



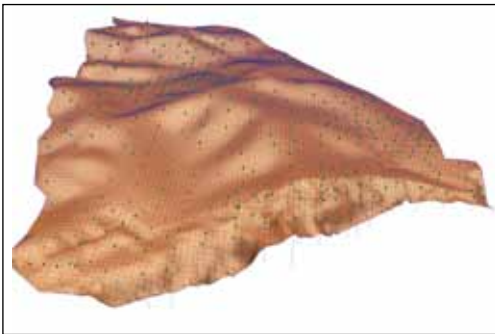
# MINING DESIGN AND PLANNING

## Design and operation of deposits



The basis for successfully operating a deposit is careful design and planning. HPC has a wealth of experience with deposits worldwide, from the underground and opencast mining of minerals and ore mining to off-shore oilfields. From a 3D model of the deposit using sophisticated computer software and feasibility studies to detailed planning, all steps of mining design and planning will be executed.

### Terrain model faces



Various alternatives will be examined, compared and calculated for the best possible recommendation based upon technical and financial evaluation. This includes the mining process itself, but also the investigation and calculation of rock and soil stabilities, storm and groundwater drainage and transport and infrastructure planning such as water and power supply and waste disposal, as well as recommendations for appropriate tools and equipment. The same services will be provided for all types of mining facilities, ranging from the design of steel mills and treatment facilities for gold extraction, to crude oil refineries. All design steps are possible. If required, HPC can supervise the entire project during construction and operation.

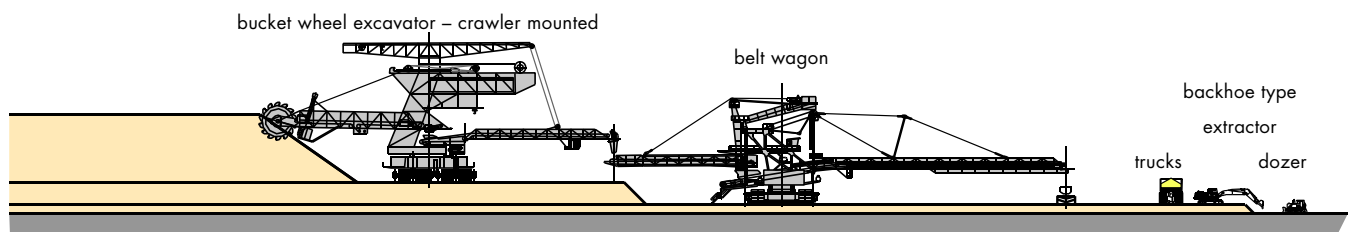
The planning, design and operation of mines and facilities will be supported by conventional international mining programs.

During the operation stage, our consultants will continuously give recommendations for improving mining activities, and for most cost effective operation.

Detailed planning work allows accurate financial forecasts, i.e. CAPEX, OPEX, NPV and IRR to get safer financial data.

IRR dans la perspective d'une plus grande sécurité financière.

### Overburden removal - Variant I





### Tasks

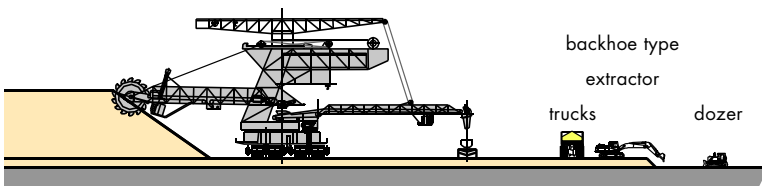
- ◆ Detailed planning of mining activities
- ◆ Guarantee of mining safety
- ◆ Safekeeping of mine workings
- ◆ Mine operating

### Our Services

- ◆ 3D models of the deposit
- ◆ Feasibility study and detailed mining plan
- ◆ Operation plans for the establishment, management and discontinuation of mines
- ◆ Licensing procedures
- ◆ Drainage planning
- ◆ Calculation and investigation of soil stabilities for foundation
- ◆ Conceptual designs of mine engineering, forecasts of caves to the surface and lowerings
- ◆ Flooding and safekeeping concepts,
- ◆ Mining information systems

### Overburden removal - Variant II

bucket wheel excavator – crawler mounted



### Your benefit

- ◆ Complex planning services from one source – our experienced staff
- ◆ Optimum raw materials production
- ◆ Reliable cost estimates
- ◆ Reliability with regard to licensing (high acceptance by authorities)

# PROCESSING

## Design of plants for the processing of raw materials



Once you get your raw materials from your deposit, you want to process it. HPC has a wealth of experience with all kind of raw material processing. Is it clay and limestone for cement production, iron ore for steel production or has crude oil to be refined, HPC experts can design and plan all necessary steps of processing and operating.

Starting with feasibility studies for a process unit and production plant till detailed design studies various alternatives will be examined, compared and calculated for the best possible recommendation based upon technical and financial evaluation. This includes treatment process itself, but also civil engineering, transport by pipeline, infrastructure planning such as water and power supply and waste disposal, as well as recommendations for appropriate tools and equipment. The same services will be provided for all types of process facilities, ranging from the design of steel mills and treatment facilities for gold extraction, to crude oil refineries. All design steps are possible. If required, HPC can supervise the entire project during construction and operation.

The planning, design and operation of processing plants, pipelines and facilities will be supported by conventional international programs.

During the operation stage, our consultants will continuously give recommendations for improving mining activities, and for most cost effective operation.

Detailed planning work also for processing and production allows accurate financial forecasts, i.e. CAPEX, OPEX, NPV and IRR to get safer financial data.



### Tasks

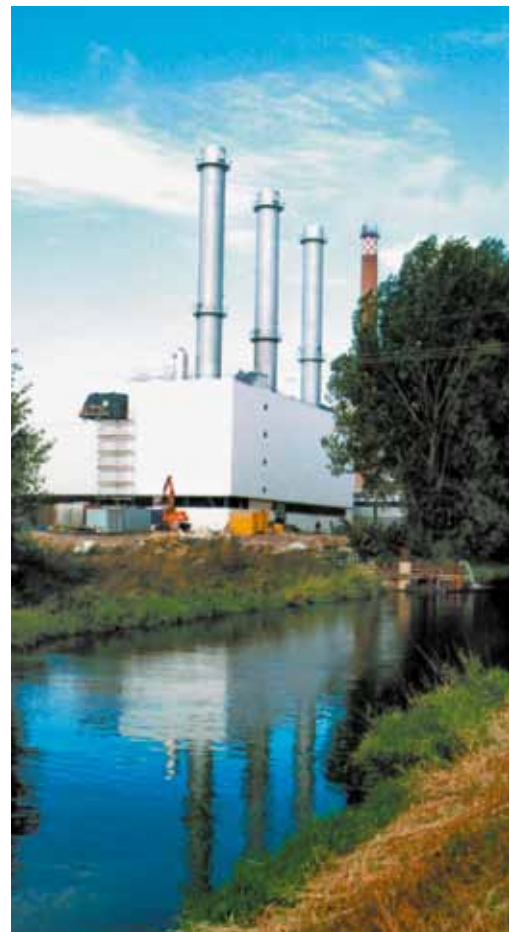
- ◆ Detailed designing and planning of processing activities
- ◆ Guarantee of processing safety
- ◆ Safekeeping of processing workings
- ◆ Civil engineering
- ◆ Pipeline planning
- ◆ Operating

### Our Services

- ◆ Feasibility study and detailed processing plan
- ◆ Operation plans for the establishment, management and discontinuation of production
- ◆ Licensing procedures
- ◆ Civil engineering
- ◆ Calculation and investigation of soil stabilities for foundation
- ◆ Conceptual designs of process engineering
- ◆ Flooding and safekeeping concepts

### Your benefit

- ◆ Complex planning services from one source – our experienced staff
- ◆ Optimum production
- ◆ Reliable cost estimates
- ◆ Reliability with regard to licensing (high acceptance by authorities)



# ENVIRONMENT

## Environmental impact assessment, decommissioning and re-cultivation programs



Operating licences for mining activities require an environmental impact assessment (EIA) to ensure that operation is in compliance with national and international regulations and the law. HPC's experts do site surveys, take samples, measure emissions, and perform tests to allow for all site conditions. If necessary, they make recommendations to prevent environmental impact from mining operation. An EIA is also vital for international financing and required by the world bank and most international financing institutes.

Once mining is finished and all natural resources have been excavated or recovered, equipment needs to be decommissioned. To lower these costs, our consultants will draft a project to guarantee that dismantling is in compliance with environmental regulations. Under properly planned decommissioning, parts or the entire equipment will be sold or waste be separated from materials that can be sold.

Very often mining brings landscape change, moonscapes or galleries and tunnels. The surface is devastated. For recultivation, studies need to propose reforestation and renaturation of the landscape. Usually this project will precede mining to make sure that the area can be used when abandoned and is very often necessary to get mining licences from the authority.





### Tasks

- ◆ Environmental Impact Assessment
- ◆ Safe and successful decommissioning
- ◆ Provisions for the re-utilisation of surfaces

### Our Services

- ◆ Site survey, sampling, ecological tests
- ◆ Evaluations, recommendations and reporting of potential impacts.
- ◆ Investigation of contaminated land (soil, air, groundwater)
- ◆ Deconstruction planning and supervision
- ◆ Separating of waste and materials that can be re-used
- ◆ Developing of Re-cultivation programs
- ◆ Execution and supervision of renaturation

### Your benefit

- ◆ Complete environmental-related planning services from one source – our experienced staff
- ◆ Optimum deconstruction of the mining and treatment equipment
- ◆ Acceptance by authorities



# PORTFOLIO

## Consulting Services



### Site recycling

- Contaminated site investigation and remediation
- Toxicological risk assessment
- Demolition
- Deposits
- General contractor

### Infrastructure Planning

- Landscape planning
- Urban development planning
- Geotechnical consulting
- Waste management
- Water management

### Environmental Consulting

- Environmental impact assessment
- Corporate environmental protection
- Due diligence
- Environmental real estate assessment
- Information systems



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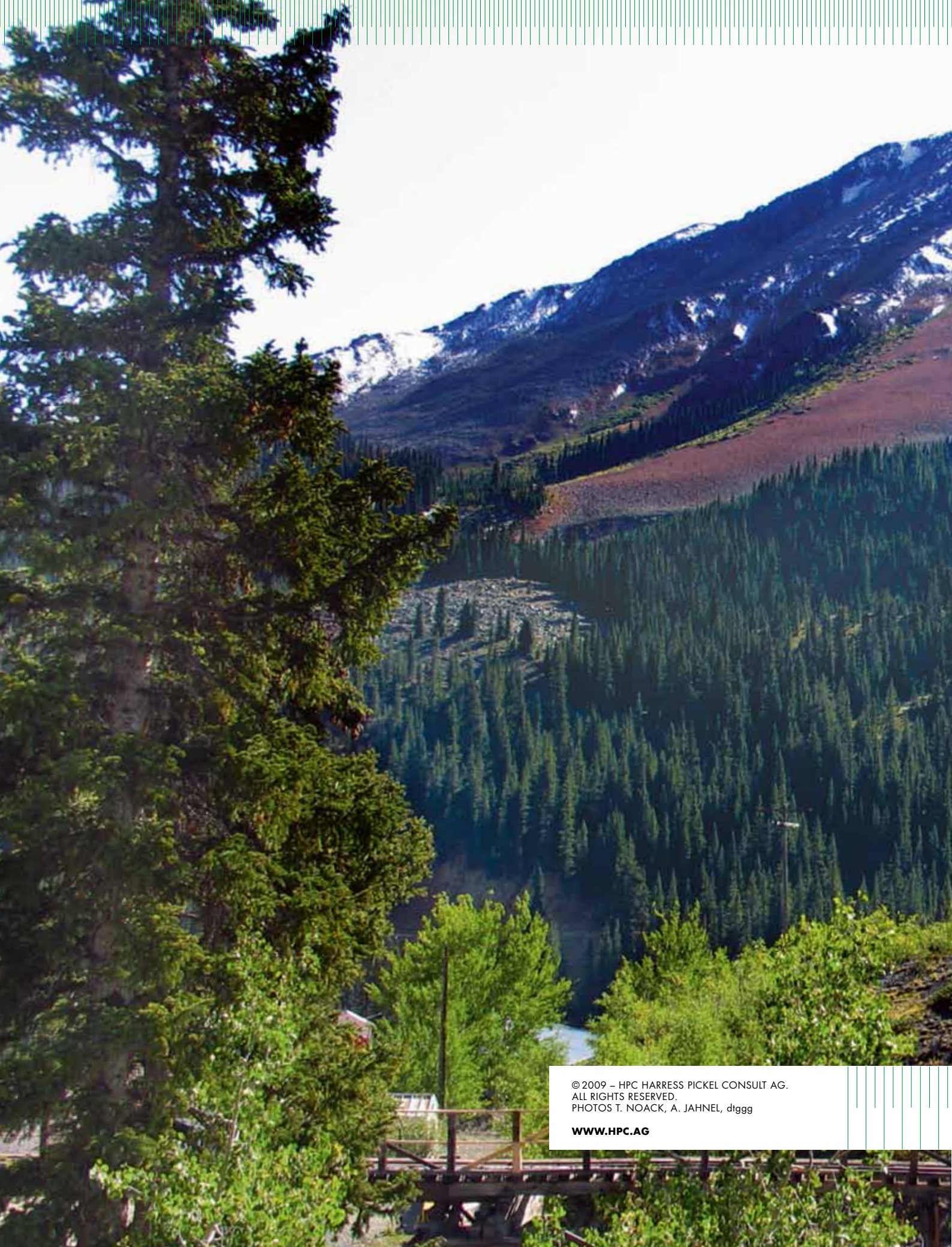
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