

MINERAL EXPLORATION AND MINING CONSULTANCY SERVICES

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CONTENTS

1	THE COMPANY	1
2	COMPETENCIES	1
3	EXPERTISE AND SERVICES	1
3.1	Exploration Services	1
3.2	Resource and Mining Appraisal	2
3.3	Design Services.....	2
4	COMMODITY EXPERIENCE	3
4.1	Gold, Silver and Platinum Group Metals.....	3
4.2	Iron Ore, Copper, Manganese, Zinc and Lead.....	3
4.3	Fluorspar and Baryte	4
4.4	Coal.....	4
4.5	Coal Bed Methane and Coal Mine Methane.....	4
4.6	Shale Gas	4
4.7	Underground Coal Gasification	5
4.8	Potash.....	5
4.9	Evaporites.....	5
4.10	Phosphate	5
4.11	Geothermal Services	5
5	APPROACH TO DELIVERY	6
5.1	Management Systems.....	6
5.2	Programme and Cost Management.....	6
5.3	Risk Management and Cost Savings	6
6	THE FWS TEAM.....	6

MINERAL EXPLORATION AND MINING CONSULTANCY SERVICES

1 THE COMPANY

FWS Consultants Ltd (FWS) is an established, internationally recognised, independent consultancy, founded in 1977 and incorporated in 2000, providing applied geological, mineral resource evaluation, geotechnical and environmental services to the mining industry and for investment due diligence.

Our mining and resource experience has developed from UK and international work in iron ore, gold, silver, copper, manganese, zinc, lead, phosphate, coal, coal bed methane, shale gas, potash, fluorspar and salt for underground gas storage.

The Company prides itself on the quality of its services and in the personalised approach and commitment to meeting clients' expectations in a timely and cost effective manner. By closely liaising with our clients, we help them to manage their commercial risks, environmental liabilities and to maintain good environmental management practice.

2 COMPETENCIES

Our specialist technical professional staff and associates have considerable practical experience in mineral resource evaluation, mine planning, environmental assessment and waste management; and include senior experienced geologists who are "competent persons" recognised by the main stock exchanges.

As a multi-disciplinary geological, mine engineering, geotechnical, hydrogeological and environmental consultancy, we are skilled in providing the breadth of specialist services required for the mining industry and for due diligence appraisals, on mineral and energy resources. Our geologists and engineers are professionals in their individual disciplines and are recognised experts with a high professional profile.

We have developed close associations with specialist sub-consultants and contractors to supplement the range of in-house services that we can provide to meet project specific requirements. Thus we are also able to undertake and coordinate such aspects as seismic reprocessing and 3D modelling, detailed volumetric analysis by computer modelling of resource quantities, mine planning and mechanisation, specification of coal and ore processing systems and equipment, and laboratory analysis.

3 EXPERTISE AND SERVICES

Our work encompasses a broad range of applied geological services from exploration to resource and mining appraisals, through to detailed mine design.

3.1 Exploration Services

Our exploration geologists have considerable practical experience in the design, contract management and supervision of mineral and coal exploration programmes. Significant expertise has been developed from working on exploration programmes across the world, utilising a range

of drilling, geochemical, geophysical and exploration and testing techniques. The exploration services offered include:-

- Geological mapping and interpretation of regional and local structural trends and controls on mineralisation.
- Design of exploration drilling, geological logging, seismic surveys and testing programmes, meeting the requirements of NI 43-101, and JORC codes.
- Regulatory liaison and preparing supporting documentation for Environmental Impact Assessments, Environmental Permits and Mining Permits for drilling programmes.
- Preparation of contract documentation, specifications and tendering of exploration drilling and testing programmes.
- Providing geological supervision and logging services for deep and shallow boreholes, and for directional drilling programmes (e.g. in-seam CBM wells).
- Coordinating, scheduling and data management of laboratory assay and geotechnical testing and the establishment of exploration QA/QC protocols.
- Environmental monitoring for hydrogeological and soil/rock conditions.

3.2 Resource and Mining Appraisal

One of our key specialist services is providing independent reviews and evaluations on a wide variety of opencast and deep mining projects, and potential prospects, for identification of mining investment opportunities. This work includes:-

- Geological and resource modelling.
- Feasibility studies.
- Competent person reports.
- Code compliant resource and reserve statements in accordance with NI 43-101, and JORC codes.
- Due diligence reviews for financial institutions.
- Design reviews.
- Environmental and hydrogeological appraisals.

3.3 Design Services

Our design services for mining, infrastructure and environmental engineering are provided through experienced geologists, geotechnical and environmental engineers, with contribution from specialist sub-consultants and contractors, where necessary. This service covers the

principal disciplines of mining, geotechnical and environmental engineering, process and plant management and waste management.

The specialist design services offered include:-

- Design submissions in support of Planning Applications including Environmental Impact Assessments and associated baseline surveys, scoping studies and hydrogeological risk assessments.
- Mine design for conventional underground, opencast and solution mining.
- Planning for steep and shallow dipping coal and ore extraction.
- Coal and ore processing plant and systems.
- Geotechnical design of slopes, earthworks, haul roads, spoil heaps and lagoons for surface mines, and of mine layout and roof support for deep mines.
- Waste management including preparation of Extractive Materials Management Statements, Working Plans, Environmental Permits and Site Condition Reports.

4 COMMODITY EXPERIENCE

FWS has experience providing services from exploration targeting to feasibility and mine planning for a range of commodities. Further details of our services and recent work are included on our website at www.fwsconsultants.com

4.1 Gold, Silver and Platinum Group Metals

FWS has carried out conceptual studies, prospect generation, exploration, environmental auditing and JORC compliant resource reporting on projects in the UK, Colombia, Tajikistan and Turkey.

Our consultants have experience in carrying out mineral exploration activities, including geological mapping, geochemical and geophysical surveys, structural interpretation and diamond and RC drilling for a range of gold-silver deposit types including narrow-vein black shale hosted gold; epithermal gold-silver (low, intermediate and high sulphidation types) and 'orogenic' (shear zone) hosted gold. Their geographic experience covers Latin America, West Africa, Kenya, Indonesia, New Caledonia and the United Kingdom.

4.2 Iron Ore, Copper, Manganese, Zinc and Lead

Iron ore projects have been evaluated in Bolivia and Colombia; high grade manganese in Central Colombia; and tin in Bolivia. Base metal projects include small, high-grade mine prospects in the UK and Colombia.

Our consultants and associates have experience in metalliferous mining, exploration and due diligence activities covering many styles of iron and base metal mineralisation including Archaean and Proterozoic banded iron formations, iron oxide copper gold (IOGC), mineral sands, iron

skarns, volcanogenic massive sulphide (VMS) and porphyry copper deposits in locations such as Greenland, Chile, Peru and Bolivia.

4.3 Fluorspar and Baryte

Fluorspar and baryte projects in the UK and Tunisia build upon a strong background in the UK fluorspar industry. Fluorspar mineral exploration licences and options were held for three years in the 2000s across much of the North Pennines, while efforts were put into identifying and costing exploration opportunities, and raising funds to resurrect the local mining industry.

4.4 Coal

FWS has 35 years of experience in geological and resource evaluation, and mine planning, for new or expanding underground and surface coal mines in the UK, the EU, India, Colombia, Venezuela, Costa Rica, Tajikistan, Mexico and Appalachia. Services have included geological desk studies, exploration targeting and resource evaluation, feasibility assessments, Due Diligence and design reviews, utilising geological and mine abandonment plans, legacy borehole and geophysical data.

We design coal exploration programmes for opencast and underground schemes, including preparation of contract specifications, followed by supervision and coordination of the coal exploration, geotechnical and environmental investigations. Our team of geologists has designed and co-ordinated mineral exploration programmes in remote and extreme mountainous locations to altitudes of up to 4,000 m, including openhole and cored drilling programmes in Colombia, Tajikistan and northern Turkey. Our geologists supervise openhole and core drilling, utilising standard and wireline techniques, and will design and schedule coal quality and geotechnical analysis. We also undertake interpretation of down-hole geological logging and gas and groundwater instrumentation and monitoring.

The Company has produced NI 43-101 and JORC Code compliant Competent Persons Reports, resource and reserve statements, advising on mine planning, rationalisation of current operations, closure plans and geotechnical, hydrogeological, waste management and environmental design.

4.5 Coal Bed Methane and Coal Mine Methane

FWS has 19 years' experience in the provision of coal bed methane resource (CBM) evaluations, preparing desk studies, independent assessments and feasibility studies for concessions within the UK and overseas. The Company has also provided geological services to exploration drilling programmes for exploration and production CBM and CMM wells in Scotland, Cheshire and Nottinghamshire.

4.6 Shale Gas

FWS is currently providing geological services on UK shale gas plays; including geological modelling and preliminary assessment of shale gas resources for licence block applications within the ongoing 14th Landward Licensing Round. FWS has also gained shale gas experience providing resource evaluations in the Appalachians.

4.7 Underground Coal Gasification

FWS has utilised its expertise in coal geology to evaluate coal resource prospectivity of onshore and offshore licence areas for underground coal gasification (UCG). Services include exploration targeting, geological appraisals, evaluation of resource potential, suitability for *in situ* seam coal gasification and potential geohazard identification.

4.8 Potash

The Company has more than 10 years' experience in potash exploration and has developed an extensive understanding of the genesis, mineralogy and chemistry of potash deposits, with experience in geological modelling, resource evaluations and mine design for deposits in the UK, Eastern Europe, Colombia, USA, Israel, Egypt and Ethiopia.

As the principal geological consultant on Sirius Minerals' York Potash Project, we are currently engaged in Planning Application and mine development, with recent work covering the mining feasibility study, as well as the geotechnical, hydrogeological and Environmental Impact Assessment at the project sites. We have also provided specialist geological, hydrogeological and solution mining services for a Due Diligence Appraisal of a potash project in Ethiopia.

Geological services for potash include site selection, conceptual modelling, design of exploration, and coordination of geological, geotechnical and hydrogeological drilling programmes, including the supervision of deep boreholes. We can also provide coordination for seismic surveys and assay analysis. Our geologists have prepared JORC compliant reports for Exploration Targets and Exploration Results.

4.9 Evaporites

Our significant experience in salt geology and mining has been developed from work in the UK. This has included providing geological services for solution mining, storage caverns and resource evaluation of salt deposits. FWS has developed a network contacts on solution mining and storage caverns and work closely with BC&T Consultants Ltd and Sabine Storage & Operations Inc. on related projects. Proposals have been made for work in Colombia at the Nemocon and Zipaquira salt cathedrals.

4.10 Phosphate

The Company has provided geological and mining services for the evaluation of resources and licensing opportunities of sedimentary phosphatic deposits in Colombia. This entailed preparing feasibility studies to identify specific opportunities, liaison and negotiation with existing mining and licence holders, preparing licence applications and the development and an acquisition programme.

4.11 Geothermal Services

After working with the Lafarge Consortium on a deep exploration well in Weardale, FWS is now working with Cluff Geothermal to provide geological services for the evaluation of prospective deep geothermal drilling opportunities in the UK and overseas. This has included advising on

proposed drilling locations in Northumberland, UK, and geological appraisals for geothermal licence opportunities in Ethiopia.

5 APPROACH TO DELIVERY

5.1 Management Systems

FWS employs Quality Management and Health and Safety Systems, to maintain the accuracy, quality and reliability of all our work processes and to embed safety in design and CDM 2007 in all our outputs.

5.2 Programme and Cost Management

Project delivery and control reporting is managed to enable early and effective communication of changes or impacts on project programme. The Company adopts structured financial reporting to maintain the successful management of budgets and expenditure. These systems enable an auditable record of changes in workload, budget estimates, fees and programme.

5.3 Risk Management and Cost Savings

FWS works closely with our Clients to identify and quantify risks, develop action plans to manage and control them and to allocate risks to those best placed to deliver and manage effective solutions. We utilise our experience and capability to maximise cost savings and to adopt Best Practice.

6 THE FWS TEAM

FWS has the capability to provide multi-disciplinary design teams, tailored to meet our clients' specific requirements. Key personnel for each project are carefully selected from the various in-house disciplines, to provide the technical input necessary to complete the projects in a competent and professional manner. Profiles of our key staff are provided below:-

Rick Smith

Rick Smith is the Managing Director of FWS and a Chartered Engineer and Fellow of the Institute of Materials, Minerals and Mining, with over 35 years' experience as a mining and exploration consultant. Rick has extensive experience of evaporite and coal geology, and mining. Recent UK coal projects include mining projects in South Wales, Tower Opencast at Hirwaun, opencast exploration in Northumberland, and coal bed methane projects. He has worked on coal prospects and mines in Colombia since 2002, developing significant expertise in evaluating Andean style complex geology; and currently in Tajikistan advising on geological and mining considerations in areas of severe coal seam gradient and complex faulting issues. He is currently Principal Consultant to the York Potash (Sirius) Exploration Project in North Yorkshire; and advises on the potash resource and solution mining of a potash project in Ethiopia. Rick has extensive experience in preparing resource reports compliant with the JORC Code of Practice and is a recognised "competent person" in accordance with stock exchange requirements. He has significant expertise in working with multi-disciplined teams in successfully preparing and guiding major mining projects through feasibility to production stages.

Richard Izatt-Lowry

Richard Izatt-Lowry is a Director of FWS and a Chartered Engineer and Chartered Geologist with over 25 years' experience in engineering geology, consultancy and construction. Richard has provided mining services on resource evaluations for coal and phosphate projects in Colombia, coal prospects in Tanzania, and geological appraisals of existing coal mines in India and Poland. He has advised on geotechnical and environmental matters for the reclamation of deep and opencast mines in the UK. Richard has advised on coal resources for offshore UCG projects in the UK and is currently advising on shale gas prospectivity for onshore targets in the UK. He has a wide range of technical experience related to construction projects and is currently acting as a Geotechnical Advisor on the York Potash mine in Yorkshire, with specific input to earthworks, foundations, rock mechanics, waste management, environmental permitting, and pipeline construction. Richard is experienced in preparing resource reports and contributes towards Competent Person reports. He has a track record of managing multi-disciplinary professionals and portfolios of large projects and ensuring that the Client's objectives are satisfied in terms of quality, budget and timescale.

Iain Henrys

Iain Henrys is Principal Exploration Consultant at FWS and has over 13 years' of mineral exploration and project management experience in regions such as Colombia, Indonesia, Perú, Chile, Venezuela, West Africa, New Caledonia and the United Kingdom. He has experience in the exploration of coal deposits (coking and thermal coals); narrow vein black shale-hosted mesothermal gold deposits; orogenic, shear-zone-hosted gold; and, epithermal (high and low sulphidation) gold mineralisation. He has also explored for volcanogenic massive sulphide (VMS) deposits and has exposure to the assessment of various other mineral deposit types including porphyry coppers, IOCG, laterite nickel and iron (BIF, sands and skarn magnetite).

In addition to the planning and management of early to intermediate stage exploration programmes, Iain has extensive experience in the creation of computerised geological models using a range of general, mining, database and Geographical Information Systems software together with experience in the processing and interpretation of remotely sensed imagery. He has also prepared preliminary resource estimations for coal and gold deposits completed reports to Pre-Feasibility Study level.

Charlotte Bell

Charlotte Bell is a Consulting Geologist at FWS, who has over 10 years' experience in site investigation, compiling geological mineral seam appraisals for shallow and deep ore and coal mining projects. Charlie is one of the key geological consultants on the ongoing potash project in North Yorkshire; interpretation of legacy borehole data and geophysical logs, rig site detailed core logging from deep onshore boreholes (>1.7 km), supervision of core extraction, handling and wireline logging, mineral rights acquisition, exploration borehole site location selection, managing seismic interpretation including legacy and new acquisition 2D seismic, and incorporation into geological model, computer modelling (MINEX) of deposits, involvement in production of JORC compliant Exploration Target and Exploration Results and in supplying base data, and verifying data for JORC compliant Resource Estimate (2010 – ongoing). She is also

involved in desk study appraisals of potash-bearing provinces of the World and in the evaluation of shale gas prospects in the UK.

Catherine Miller

Catherine Miller is a Consulting Geologist at FWS, who has over 10 years' experience in site investigation, compiling geological mineral seam appraisals for shallow and deep ore and coal mining projects. She has extensive experience in coal exploration drilling, sampling, geological logging and the interpretation of wireline logs from exploration projects across the UK, and has supervised our UK Coal plc exploration contracts. Catherine is one of the key geological consultants on the ongoing potash project in North Yorkshire; scheduling and interpretation of geotechnical testing, rig site detailed core logging from deep onshore boreholes (>1.7 km), supervision of core extraction, handling and wireline logging, involvement in production of the geotechnical report for the shaft pilot boreholes, and geotechnical investigations of the minehead and plant sites. She is also principal geologist for the on-site geological logging team on the Dart Energy CBM deep exploration drilling programme, including 1.5 km horizontal in-seam deflections.

Peter Norton

Peter Norton is an Associate Geotechnical and Mining Consultant at FWS with over 45 years' mining experience. Peter originally worked for the National Coal Board/British Coal for 23 years in the production department, and subsequently ran his own consultancy in mineral exploration, mine design, environmental restoration, risk assessment, due diligence, expert witness relating to underground mining for coal, gold and copper and surface mining and quarrying on a worldwide basis. Peter specialises in groundwater control, open pit design and in slope stability appraisals. Peter has experience in preparing resource reports compliant with the JORC Code of Practice and is a recognised "competent person" in accordance with stock exchange requirements.

Mike Smith

Mike Smith is an Associate Economic Geologist at FWS with over 40 years' economic geological experience for the coal, petroleum, and minerals industry. He provides independent expert advice, as a Competent Person, to investors, and financial institutions including for the World Bank and overseas governments. Mike has extensive experience in preparing JORC compliant coal resource reports. He has provided economic geological opinion on a wide range of mineral resource and reserves including coal, oil, gas, gold, platinum, iron ore, diamond resources in the UK, Ireland, USA, Africa, Russia, Finland, Afghanistan and Brazil.

Peter Bevils

Peter Bevils is an Associate Open Pit Mine Engineering Consultant at FWS with over 40 years' mining experience. Through Peter's previous mine engineering roles for Shand Mining, Wimpey Mining and for the Barcom Group, he developed extensive expertise in surface mining operations, plant, earthworks, materials handling and production management.

Neil Holloway

Neil Holloway is an Associate Minerals Processing Consultant at FWS with over 35 years' minerals processing experience of the coal and minerals industry. Through Neil's previous roles at Shell South Africa and subsequently as an independent minerals industry consultant, he developed extensive expertise in minerals processing aspects of coal, iron ore, gold, silver, copper, manganese, zinc, lead, nickel, manganese and phosphate. Neil has specific experience of working in Africa including coal mines in South Africa, Botswana and Zimbabwe; copper and cobalt projects in Zambia; gold mines in Ghana and South Africa. Neil's mineral processing services provided through FWS Consultants Ltd have included advising on coal processing for mining projects in Colombia and Poland, risk assessments for copper and gold mines in Indonesia, and phosphate mineral processing for a mine in Jordan.

Paul Wood

Paul Wood is an Associate Geophysicist Consultant at FWS Consultants Ltd, with over 35 years' of seismic interpretation experience for the petroleum, coal and minerals industry throughout the world. Through Paul's previous Chief Geophysicist role at Shell Petroleum, he developed extensive expertise in seismic data acquisition, processing, and interpretation of 2D and 3D seismic for both onshore and offshore exploration projects. Paul's geophysical services provided at FWS have included 2D and 3D interpretation for deep potash mining in North Yorkshire, for coal mining projects in Colombia and shale gas resource evaluations in the UK.