

Mineral Industry Research Organisation

Presentation to the
Society of Mining Professors

June 2005



Presentation overview

- MIRO organisation and activities
- Membership Benefits
- MIRO Research Strategy
- Current R&D projects
- Proposals under development
- Future plans
- Summary

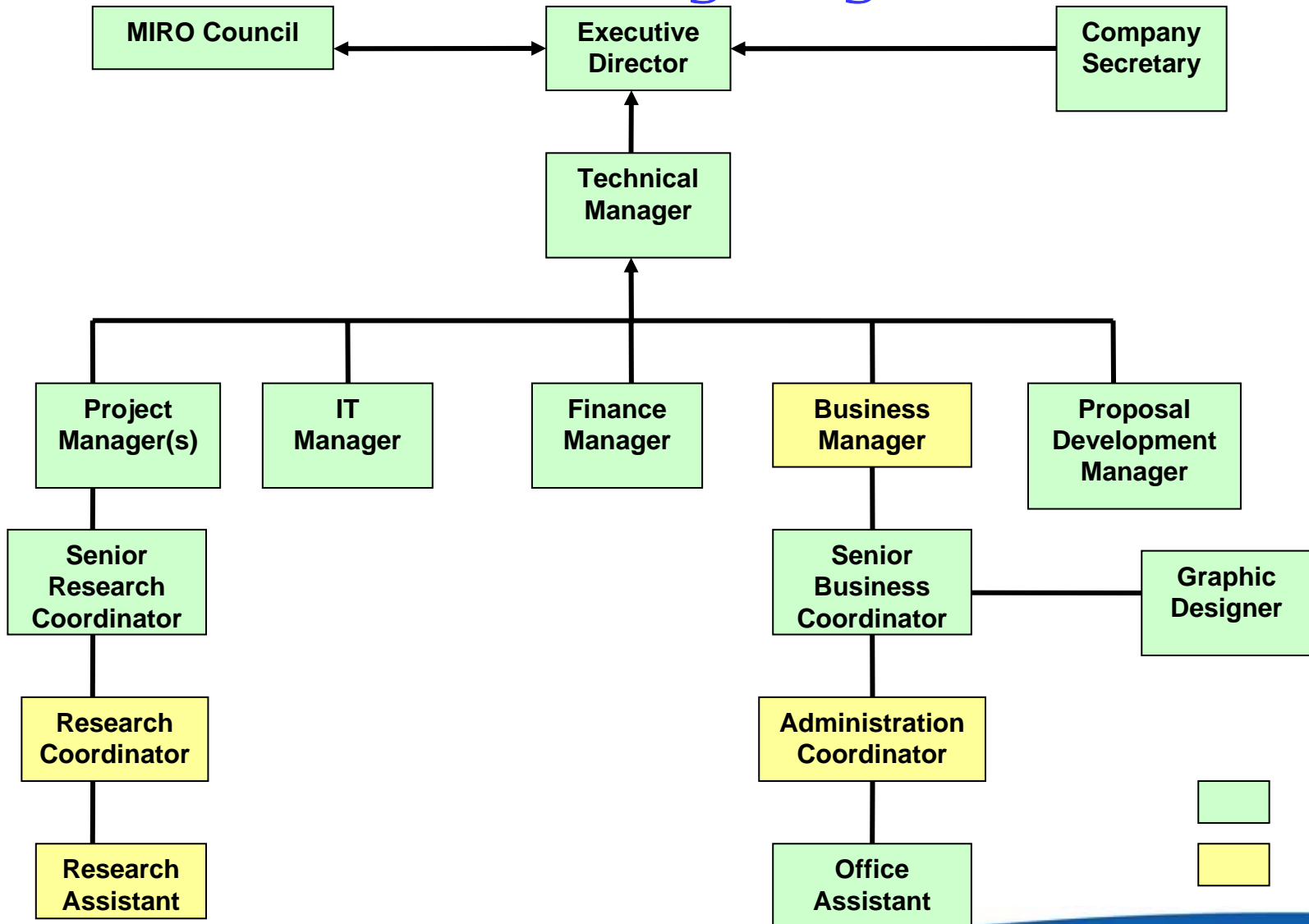
MIRO: the organisation

- Established 1974 by four major UK based mineral companies
- Develop and manage pre-competitive collaborative R&D
- Membership organisation established on 'not-for-profit' basis: not consultants
- Independent
- Minerals focused RTD service provider

Financial Structure

- 'Not for profit' company limited by guarantee
- Membership organisation – owned by its members
- Membership structure
 - **UK – 50%**
 - **Europe – 30%**
 - **Global – 20%**
- Current research portfolio value - £20M
- Flexible resource base
- Annual accounts published
- Strategic development by Council elected from members

MIRO Organogram



Principal activities

- Research Management
 - Working with industry to identify research priorities/opportunities
 - Identification of funding opportunities
 - Preparation of RTD proposals
 - Collaborative project management
- Information management & advisory services
- Technical publications
- Member representation
- Network and policy development
- Research Advisory Panels & Workshops

Current Research Management

- Managing c. £20m of RTD funding
- Approx. 20 proposals under development
- All projects co-funded
- Managing several R&D networks
- Managing websites: including MiMeMiP, MinMetNet, FTI, ODPM, MIST,
- Information dissemination, technical reviews
- Formulating RTD policy in the EU
- International Project Management team

Member Benefits

- Benefits Summary
 - Low risk – high return, collaborative RTD: typically 10 - 20% contribution from industry
 - Knowledge management databases
 - Mineral industry RTD access
 - Case studies
 - Project management services
 - EU networking opportunities
 - Regular technical publications
 - Annual RTD Workshops

MIRO Members

- AGGREGATE INDUSTRIES UK (Holcim)
- AMPLATS MANAGEMENT SERVICES LIMITED
- ANGLO AMERICAN PLC
- BARRICK GOLD CORPORATION
- BHP BILLITON LIMITED
- BOLIDEN MINERAL AB
- BRITANNIA REFINED METALS LIMITED (MIM)
- BRITANNIA ZINC LIMITED
- BRITISH AGGREGATES ASSOCIATION
- BRITISH GEOLOGICAL SURVEY
- BRITISH NUCLEAR FUELS PLC (BNFL)
- BUREAU DE RECHERCHES GÉOLOGIQUES ET MINIERES (BRGM)
- CASTLE CEMENT LIMITED (Heidelberg)
- CLEVELAND POTASH LIMITED
- COGNIS DEUTSCHLAND GMBH
- CORUS
- CRT - CENTRE DE RECHERCHE DE TRAPPES
- EMC GROUP LIMITED
- GLEBE MINES LIMITED
- HUNTSMAN TIOXIDE EUROPE LIMITED
- IMERYS MINERALS LIMITED
- INSTITUTE OF GEOLOGY AND MINERAL EXPLORATION (IGME)
- INSTYTUT METALI NIEZELAZNYCHIVERNIA WEST PLC
- JOHNSON MATTHEY PLC
- KVAERNER ENGINEERING AND CONSTRUCTION UK LIMITED
- LODESTONE TECHNOLOGY LTD
- LONDON & SCANDINAVIAN METALLURGICAL CO LTD
- MIM HUTTENWERKE DUISBURG GmbHMEED SA
- METAL MINING AGENCY OF JAPAN (MMAJ)
- METSEP SA LIMITED
- MICON INTERNATIONAL CO LIMITED
- NATIONAL COAL MINING MUSEUM FOR ENGLAND
- NATIONAL PHYSICAL LABORATORY (NPL)
- OUTOKUMPU OY
- OUTOKUMPU TARA MINES LIMITED
- PILKINGTON TECHNOLOGY CENTRE
- RIO TINTO TECHNOLOGY DEVELOPMENT LIMITED
- ROCKTRON LIMITED
- SERCO (formally AEA TECHNOLOGY PLC)
- SHANKS
- SINGLETON BIRCH LTD
- SRK CONSULTING (UK) LIMITED
- TVX HELLAS
- TECHNICAL RESEARCH CENTRE OF FINLAND (VTT)
- UMICOR (formally UNION MINIÉRE)
- UNITED KINGDOM QUALITY ASH ASSOCIATION
- WRACE TECHNOLOGY LIMITED
- WBB MINERALS
- YANNIDIS BROTHERS SA
- GEOLOGICAL SURVEY OF IRELAND
- LURGI METALLURGIE GMBH

Industrial research priorities

- Mineral waste management
- Energy demand reduction
- Sustainable water management
- Recycled/secondary materials & markets
- Post extraction development
- Community participation
- Risk minimisation
- Health & safety
- Material transportation

UK Minerals industry research areas

- Mineral extraction
- Reclamation & closure
- Products
- Distribution & processing
- Aggregates Levy Sustainability Fund (ALSF)
 - MIST Programme
 - SAMP Programme
 - Other Distributing Bodies
 - MIRO Programme Management



European Research & Development

- Historical relationship with Euromines, IMA
- Development of European Technology Platform
- RTD facilitator – not a lobbying organisation
- Formulating ETP for inclusion in FP7 EU funding programme
- European coordinator for RTD

Current and recent projects

- RC181 SUSTAINABLE LAND WON AND MARINE DREDGED AGGREGATES MINERALS PROGRAMME
- RC160 TAILS SAFE
- RC159 MINMETNET-METALS & MINERALS NETWORK
- RC180 MIST
- RC157 INTEGRATED WATER MANAGEMENT IN FORMER COAL MINING REGIONS
- RC156 PREDICTIVE MODELLING OF AQUEOUS CHEMICAL PROCESSES
- RC155 VORTEX GRINDER FOR GLASS CULLET GRINDING APPLICATIONS
- RC154 PHASE EQUILIBRIA DATA FOR OXIDE SYSTEMS
- RC153 THERMODYNAMIC DATA FOR PROCESSING COMPLEX MATERIALS
- RC151 NOVEL COMPOSITE LANDFILL LINERS
- RC 148 SOFTWARE FOR SIMULATION OF FILTRATION PROCESSES
- RC 147 EUROIM II
- RC146 TURNING WASTE DUST INTO PROFIT
- RC 144 INTEGRATED TECHNOLOGIES FOR EXPLORATION AND ASSESSMENT OF FLUORITE-BARITE MINERALISATION
- RC140 BIOREMEDIATION OF AMD IN CONSTRUCTED WETLANDS
- RC139 LIMESTONE EXTRACTION AND WATER RESOURCES
- RC134 REDUCTION OF WASTE DISCHARGE BY UNDERGROUND DISPOSAL OF PROCESS RESIDUE
- RC178 O2E: QUARRY RESTORATION FOR SUSTAINABLE BIOMASS ENERGY PRODUCTION
- RC 185 CPD TRAINING MODULES FOR USE BY MINERAL PLANNERS REGULATORS, OPERATORS, AND CONSULTANTS IN THE AGGREGATES INDUSTRY

RC 134 reduction of waste discharge by underground disposal of process residue



- Boulby Mine, Cleveland Potash
- £4m demonstration programme to investigate potential for underground disposal of process waste
- Key issues
 - Handling of waste at surface – ability to adequately control material properties
 - Reduction of free water underground in highly soluble environment
 - Long transportation distances

RC139 Limestone extraction and water resources: a technical basis for sustainable development



- Predicted –v- actual impacts
- Improved technical basis for evaluating, managing & mitigating impact of limestone extraction
- Industry, regulator, local authority, government involvement
- Delivery of Best Practice guidance to be referenced in ODPM guidance

RC139 Limestone extraction and water resources: a technical basis for sustainable development

	HYDROLOGICAL ANALYSIS			IMPACT ASSESSMENT	IMPLICATIONS
	Unsaturated zone	Saturated zone	Surface impacts		
AREA OF RESEARCH	<ol style="list-style-type: none"> 1.Tree rings study 2.Epikarst drainage 	<ol style="list-style-type: none"> 1.Hydraulic conductivity variations 2.Flow mechanisms 3. Borehole behaviour 	<ol style="list-style-type: none"> 1. Ecological sensitivity 2.Surface water 	<ol style="list-style-type: none"> 1.Hydrograph recession 2. Wastewater discharge 3. Seasonal variation 	<ol style="list-style-type: none"> 1.Monitoring frequency analysis 2.Restoration/quarry lakes
FINDINGS	<ul style="list-style-type: none"> •observed impacts on unsaturated zone •epikarst/soil storage important •unsaturated zone storage not significant in many locations 	<ul style="list-style-type: none"> •Hydraulic conductivity scale dependent •Regional k-variations •Improved understanding of conduit/diffuse flow interaction •Improved test-pump design •Guidance on model application/accuracy •Improved guidance on use of hydrochemistry 	<ul style="list-style-type: none"> •Improved understanding of wetland response to quarry effluent •Improved understanding of effects of dewatering on wetland •Development of new predictive tools •No evidence of significant impacts on surface water courses 	<ul style="list-style-type: none"> •Storage relationships-degree of karstification •Improved understanding of dewatering impacts on monitoring design •Improved understanding of impacts of high pH effluents •Improved guidance on use of modelling tools 	<ul style="list-style-type: none"> •Better design of monitoring programmes •Implications for design of restoration programmes
GUIDANCE		<ul style="list-style-type: none"> •Pumping test analysis and guidance in heterogeneous environments •Groundwater model applications •Diffuse/conduit systems •Design of quarry lakes •Use of hydrochemical tools 	<ul style="list-style-type: none"> •Use of hydrochemistry •Ecological impact evaluation •Dewatering impact evaluation •Effluent discharge studies 	<ul style="list-style-type: none"> •Effluent disposal •Sump pumping test programme design •Model application 	

RC179 Metals & Minerals Network - MinMetNet

The aim is to create and consolidate a network for the Metals and Mineral Industrial Sector in collaboration with academia, government laboratories and research organisations in order to develop and access new research findings and respond jointly to new opportunities in the areas relating to sustainable development, clean technology, zero wastes & emissions, beneficial reuse of waste products, bio- and advanced materials processing, nano-technology and modelling relevant to the network. The main objectives are:

- Provide an interactive forum for representatives of Metals and Minerals sector.
- Exchange new ideas, highlight opportunities relating to technology, research and industrial development through meetings, seminars, newsletters and electronic media.
- Organise agreed programmes of feasibility studies and literature surveys for the joint benefit of the members.
- Secondment and work placement for academic staff and students in the industry.
- Use of the network as a launching pad for developing research programmes within the network

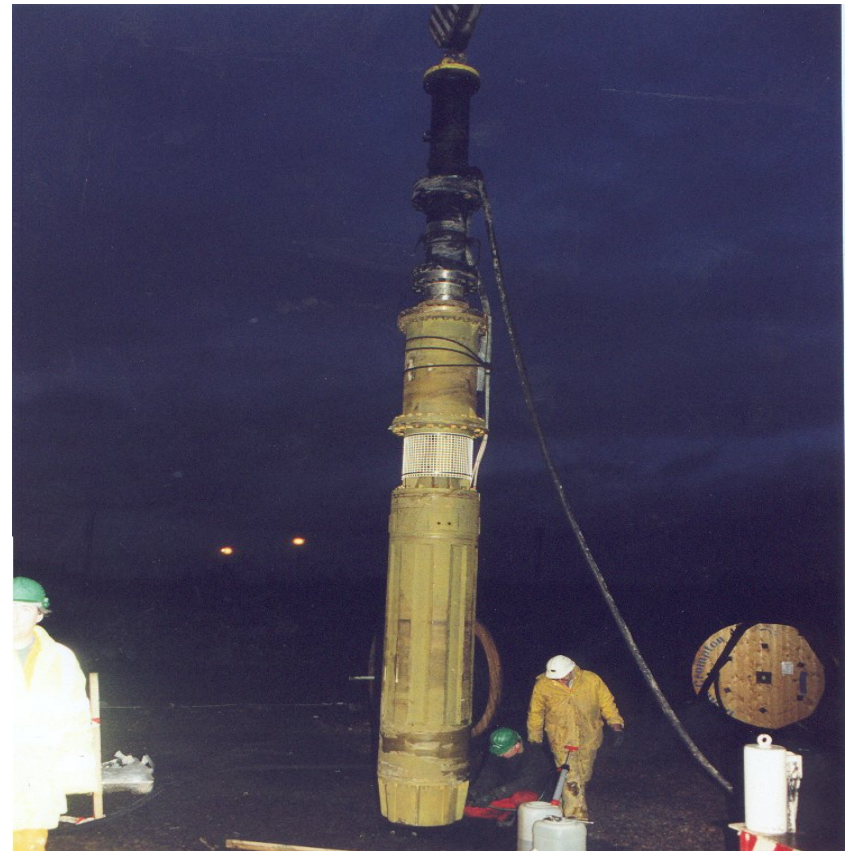
RC157 Integrated water management in former coal mining regions (INWATCO)

- €4M research & demonstration project
- Meeting objectives of Water Framework Directive
- Evaluate potential for real-time management of large coalfield drainage systems aimed at:
 - Reducing environmental risk
 - Increasing water resource value
 - Improving potential for river basin management planning



RC157 Integrated water management in former coal mining regions (INWATCO)

- Stage 1 – conceptual modelling
- Stage 2 – site instrumentation
- Stage 3 – catchment scale demonstration
- Stage 4 – European applicability study
- Stage 5 – public exhibition and EU Best Practice guide preparation



Project: RC151: Novel composite landfill liners



- Use of industrial by-products in the construction of landfill liners
- Successfully demonstrated construction of low-cost, low permeability liners from waste products
- Trial cell stage completed 2001
- Full site-scale trials completed in 2004
- Commercial adoption in 2005

Proposals currently under development or evaluation

- Polytrans: liquid transportation of aggregates
- Sand and Gravel Site Waste Minimisation Through IT Solutions: (SAVE-IT)
- Energy Efficiency, Emission Control and Waste Minimisation in the Manufacture of High Temperature Construction Products
- Wetland for treatment of high pH groundwater and leachates
- Opportunities for poverty reduction through sustainable environmental and economic development resulting from enhanced reclamation and after-use of mineral workings
- Eco-system functioning and sustainability under induced hydrological change (ECO-Anhydro)
- The Economic Conversion of Sewage Sludge Ash into a Valuable Multi-purpose Building Material
- Use of Bio-diesel as a Low Emission Fuel in Quarry and Mining Vehicles
- Social Glass – the use of aggregate waste to manufacture glass
- Removal of Heavy Metals from Solutions for Environmental Clean-up
- The Inclined Plane - A Practical Approach to Viscosity Measurement
- Cost-efficient In-situ Treatment of Arsenic Contaminated Freshwaters and Sites - CITAFS
- Mineral Industry Education Project

Future plans

- Development of ETP framework to define EU RTD
- RAP meeting on Aggregates & Industrial Minerals
- Creation of FTI Steering Committee
- Technical reviews & regular RTD communications
- Submission of EU FP6 & FP7 proposals for 50% co-funding
- Enhanced member benefits: interactive website, member workshops, technical reviews, case study database
- Key role in shaping and managing global mineral RTD

Summary

- Members owned organisation
- Not-for-profit
- Collaborative RTD facilitator
- Expertise in EU co-funding opportunities
- Project Management service provider
- Extensive network provider
- Develops and shapes mineral industry RTD

Summary

- Membership Benefits
 - Low risk – high return, collaborative RTD: typically 10 - 20% contribution from industry
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