# Süreli Yayınlar 1984

## Mining Magazine

12

18

27

46

53

### JULY 1984

#### Panorama

New nickel mine planned in Finland; Ok Tedi gold on schedule, copper delayed; U.K. fluidized bed coal combustion project; Major phosphate fertilizer operation planned for U.S.; Small copper-gold mine starts up in Peru.

#### World Highlights

Bullmoose Teck Corporation's new openpit coal mine in British Columbia has a hault-truck fleet unique in North America.

Nanisivik Mill

### Some years after start-up Nanisivik mill, built on frozen ground, showed signs of major subsidence. Successful remedial action is described.

### Classifiers In Part 1 of this feature the basic theory and operation of classifiers is summarized. Part 2 considers the major manufacturers.

#### Drilling tools

### Manufactured diamond products are becoming an interesting alternative to tungsten carbide or steel for drilling soft-medium rocks.

High-speed Centrifuges

The article in February's Mining Magazine on high-speed decanter centrifuges provoked some correspondence, presented here.

### **AUGUST 1984**

#### Panorama

Inauguration of the Guelbs iron ore project, Mauritania; Modernization of Hayden copper smelter; Machine mining of bauxite cap rock in Australia; Warren Spring laboratory, U.K. celebrates 25 years.

#### World Highlights

89

92

98

Dredging Gold in the Yukon Queenstake Resources Ltd. operates Canada's only bucketline dredge working for golda profitable and efficient mining machine which got off to a good start in the 1984 season.

ÇÎNKUR'SWaelz Plant Operational results- and problems at this Turkish zinc plant are highlighted.

Conveyors belts 106 Some trends in the design and manufacture of conveyor belting, together with equipment for joining and cleaning belts.

Environmental protection 118 Can a mining company benefit from exceeding the legal minimum environmental requirements? A method of discovering these benefits is offered.

51

## SEPTEMBER 1984

		22.	
Panorama Beryllium deposit at Thor Lake, Canada; Kamativi recovers tin from tin-iron residues; Australian CIP gold plants to use new tech- nology; Coping with water in Hungary's bauxite mines.	166	RPC's S-R-L process Canadian research promises enhanced metal recoveries.	225
World Highlights	174	Recovering gold A small plant in New South Wales recovers gold using thiourea.	237
Khetri Copper Complex Hindustan Copped Ltd.'s operations in In- dia's Rajasthan State: mines, concentrators, a smelter and refinery.	183	Electra Mining 85 Africa's important mining event in Johannes- burg.	245
Plant reagents In Part 1, the changing patterns in the supply and types of flotation reagents are described. Part 2 lists the major manufacturers.	202	China conference Mineral processing and extractive metallurgy, Kunming.	251

Rome conference

'Reagents in the Mineral Industry', Sept. 18-

223

## Mining Engineering

## JULY 1984

Look taken at Coal Mining Cost and Trends for the 1980s John P.Weir	715
Computerized Raise Boring Machines Cut Costs, Improve Productivity Lok Home and Anthony Peach	723
Asbestos Industry at the Crossroads: Current Position and Outlook Jean Dupere	727
Silicosis: An Ancient Malady in a Modern Setting R.C.Burtan	731
Urban Mining: Recycling Concrete and As- phalt Robert R.Munro	734

LRPCİ Report of the Membership Committee 737 Burt C. Mariacher, Donald D. Carr, W.L. Hurley and Joseph B.Smith

LRPC: Report of the Professional Status Committee 738 Martin C.Khun, Ted D.Haley, John D.Macfadyen, Truman H.Khun, and Robert W. Piekarz

LRPC: Report of the Professional Committee 1115 Ted D.Haley, Leslie C.Gates, . Kenneth P. Katen, and J.H.Mosgrove

## AUGUST 1984

Industrial Minerals: Prospects for the Coming	
Decade	1153
James J.Fallon	

US Coal Ash: Winning the War for Acceptance 1156 John J.Gillis

Respirable Dust Sources of Longwall Mining Examined 1158 Richard C.Olson and Wallace W.Roepke

History of Energy Sources and Their Uses in the US 1164 Paul L.Russell

Long-Range Planning Commission: Report of the Meetings Committee 1172 Nelson Severinghaus, Jr., Robert R.Dimock, Jr., Douglas F.Crickmer,TaM.Li,and Ronald J.Roman

Gaudin Lecture: Role of Surface Phenomena in the Beneficiation of Fine Particles 1177 P.Somasundaran

Successful Direct Vegetation of Acidic Deep Coal Mine Refuse 1186 J.C.Draper, R.E.Pepperman, and R.J.Houston

Operation of Mobile Crushing Plant at Fujiwara Quarry 1192 T.Nakao

Velocity-Clearance Curves for Mobile Mining Equipment 1196 G.T.Lineberry and L.Adler

Optimum Life of a Resource Depleting Project 1200 J.A.Corbyn

DISCUSSION: Estimate and Incorporation of Metallurgical Data in a Mineral ization Modeli 208 V.Miller

### SEPTEMBER 1984

Inclined-Hole Drilling With Large Blasthole Drills Can Sometimes Be Used 1295 Stuart R. Cotterill and Jack D.Nelmark

Engineering Fundamentals Series: Radial Tires Help Cut Diesel Fuel Costs 1299 L.Arbore Mining by Computer-Is it Really the Way of Future? 1302 Badiozamani Khosrow

Novel Comminution Process Uses Electric and Ultrasonic Energy to Liberate Minerals 1305 B.K.Parekh, H.E.Epstein, and W.M.Goldberger

University and Industry Partnerships-An Idea That Can Work in Mining 1310 Howard L.Hartman

Results Given on "Straw Vote" For Possible SME Name Change 1314

Long Range Planning Commission: Report of the Awards Comm ittee 1315 Maurice C.Fuerstenau, Frank F. Apian, Joseph P.Matoney, Haydn H.Murray, and William M.Shepard

Long Range Planning Commission: Report of the Publications Committee 1316 A.F.Alsobrook, W.Joseph Schlitt, Ta M.Li, Lee R.Rice, Robert C.Schenk, and Kenneth L.Clifford

Breadth and Fundamentals-The Prime Requisites for Training Geologists to Work in Industrial Minerals 1329 J.B.Patton

Analyzing Energy Costs in Open-Pit Mines 1331 W.J.Kennedy, Jr., and J.D.Gardner

Interactive Graphics for Semivariogram Modeling 1332 J.M. Rendu

Large Vibrating Screen Design-Manufacturing and Maintenance Considerations 1341 R. A. Irvine

Computer Aided Analysis of Mine DrainageSystems1346C.J.Bise and R.L.Van Scyoc

Computer Simulation of Draglines 1349 G.P.White and J.M.Jones

# **Industrial Minerals**

## JULY 1984

Dimension stone-a.rock steady market	19
Graphite-drawing on mixed sources	37
Korean industrial minerals-a brief summary	57
Estimation of barytes consumption during oil- well drilling	63
The 20th Forum-a report from Baltimore	67
Freights-Summer recess hits markets	69
AUGUST 1984	

Quarts crystal-currently sparkling

Japan's merchant elite-the sogo shosha

China-the magnesite giant

US and Canadian cement consumption forecast 55

63

Toronto-a report of the 6th IM Congress

Freights-sharp decline in freight rates as owners lose benefits gained earlier in the year 65

### SEPTEMBER 1984

69	Ceramic whiteware-an overview of raw mate- rials supply	31
	Olivine-exchanging new uses for old	65
19	Fluxes in iron and steel-becoming a refined process	81
27	Italian zeolites:2. Mineralogical and technical features of Campanian tuff	97
47	Quartz in Brazil	111

# Institution of Mining and Metallurgy

JUNE 1984	' 	Aqueous oxidation of lead sulphide concen- trate in hydrochloric acid Kunishiee Naito and Fathi Habashi	C69
Presidential address: The world of extraction metallurgy P.M. J.Gray	C49	Simultaneous estimation of selection and breakage functions from batch and con-	o i
Effect of heat treatment in air at 820-960°C on magnetic properties of wolframite S.Blackburn and T.J.Veasey	C55	tinious grinding data K.Rajamani and J.A.Herbst	C74
Structure of magnesium-containing zinc cal- cine E.H.Baker	C59	Growth of metallic nickel grains in the seg- regation process: 2-growth and aggregation of metallic nickel grains on silica particles Izabela Hudyma	C86
Palladium-oxygen system in the pressure range 0,25-600 atm E.H.Baker	C64	Microscopic observations on adsorption of metallic gold on activated carbon E.A. de Siegel and A.M.Soto	C90

Blinding of- screens by sub-sieve sized par- ticles C92 A.C.Apling	Barytes in barium chemicals J.Massonne
Evaluation of Leeds 'Autofloat' flotation cell C95 K.S.Liddell and R.CDunne	AUGUST 1984
Screening of reduction roasting behaviour of copper-nickel-iron sulphides by use of thermo- gravimetric analysis C99 A.R.Udupa, K.A.Smith and J.j.Moore	Statistical interpretation of element distribu- tion within distal volcanic exhalative minera- lization near Mount Chalmers, Queensland, Australia G.R.Taylor, C.C.Gwatkin and C.Y.Chork
JULY 1984	Application of various geophysical explora- tion techniques to Cu and Mo mineralization
Good ventilation A95 A.Harley	in Galway Granite, Ireland V.Talbot and M.D.Max
Strata deformation during construction of shaft insets in weak rock A105 P.D.Shelton and I.W.Farmer	Ore petrography and geochemistry of massive sulphide deposits within the Şemail ophiolite, Oman R.AJxer, T.Alabaster and J.A.Pearce
The future of aluminium A115 John F.Hawkins	Detection and general characteristics of strata-bound mineralization in the Dalradian
Barytes: report of the eighth annual com- modity meeting A123	of Scotland C.G.Smith <i>étal.</i>
The geological framework of barite re- sources D.A.Brobst	The Southern North Sea-new opportunities: report of March, 1984, IMM meeting
Barite deposits and potential of Scotland M.J.Gallegher	Geology and reserves J.T.Berry and D.C.Wilson
The Strontian barytes project-a case study P.W.Mason and J.E.Mason	Overview of development of operations in the United Kingdom Southern North Sea B.R.Carnes
Barytes in Ireland: review and prospects for future discoveries P.McArdle <i>etal.</i>	Economic, financial and fiscal aspects C.M.K.Wheeler
Beneficiation of barite P.S.Heap	Overview of future markets and the energy role of the Southern North Sea H.R.D.Parsons
Comminution and classification of barytes W.Hilton	Role of ore microscopy in identification of gold-containing minerals P.R.Simpson and J.Hurdley
Barytes and alternative weighting agents in oil-well drilling fluids G.KJones	Mahd adh Dhahab deposit, Saudi Arabia: report of discussion at March, 1984, ordinary general meeting
Worldwide barite for use in drilling fluids -now and the future P.C.Wells and É.R.Gamble	RETRACTION: Tin mineralization in Agbaja sedimentary iron ore, Nigeria

## **Mineral Processing**

AUGUST 1984		-rolymer-stabilized emulsions and fine-particle recovery, <b>I.</b> The calcite-quartz system –J.Ralston, W.Kent and G.Newcombe	167
The optimisation of flotation networks J.C.A.Green	83	Oolite liberation of oolitic iron ore, Wadi Fatima, Saudi Arabia	187
The flotation of chrysocolla by mercaptan F.F.Aplan	105	A.A.Manieh	
Residence time distributions and mass trans- port in the froth phase of the flotation process M.H.Moys	117	Stability of ethylxanthate ion in neutral and . weakly acidic media. Part 1 : Influence of pH M.Maillot, J.L.Cecile and R.Bloise	193
A comparison of linear and nonlinear models for open-circuit ball mill grinding D.J.Kinnebergand J.A.Herbst	143	Electroflotation of chalcopyrite fines with sodium diethyldithiocarbamates as collector G.Bhaskar Raju and P.R.Khangaokar	211
OCTOBER 1984		Evolution of the mineral liberation charac- teristics of an iron ore undergoing grinding M.A.Berube and J.C.Marchand	223

# Geophysics

## SEPTEMBER 1984

Velocity anisotropy of shales and depth es- timation in the North Sea basin N.CBanik	1411
Comparison of P- and S-wawe seismic data: A new method for detecting gas reservoirs R.A.Ensley	1420
Wawe-equation velocity analysis A.Gonzalez-Serrano and J.F.Claerbout	1432
The role and application of entropy terms for acoustic wave modeling by the finite- difference method M.A.Dablain	1457
Traveltime and wavefront curvature calcula- tions in three-dimensional inhomogeneous layered media with curved interfaces	1466

H.Gj^ystdal, J.E.Reinhardsen, and B.Ursin

Trasient representation of the Sommerfeld-Weyl integral with application to the point source response from a planar acoustic interface 1495 M.Tygel and P.Hubral

The use of summary representation for electromagnetic modeling 1506 C.Z.Tarlowski, A.P.Raiche, and M.Nabighian

Magnetotelluric responses of three-dimensional bodies in layered earths 1517 P.E.Wannamaker, G.W.Hohmann, and S.H. Ward

The behavior of the apparent resistivity phase spectrum in the case of a polarizable prism in an unpolarizable half-space 1534 H.Soininen

Inversion of borehole normal resistivity logs 1541 F.W.Yang and S.H.Ward

Euler's differential equation and the identifi- cation of the magnetic point-pole and point- dipole sources j .O.Barongo	1549	The relationship between acoustic properties and the pétrographie character of carbonate rocks F.Rafavich, C.H.St.C. Kendal I, and T.P.Todd
Corrections to Millett's table of electromag- netic coupling phase angles R.J.Brown	1554	Plane-wave reflection coefficients for gas sands at nonnormal angles if incidence W.J.Ostrander
DISCUSSIONS On: "Mineral discrimination and removal of inductive coupling with multifrequency IP" (W.H.Pelton, S.H.Ward, P.G.Hallof, W.R.SHI,		The effect of velocity variations on the beam- width of a seismic wave G.R.Sutton
and P.H.Nelson) H.Soininen with replay by W.H.Pelton	1556	Root-mean-squàre velocities and recovery of the acoustic impedance D.W.Oldenburg, S.Levy, and K.Stinson
On: "Homomorphic deconvolution" (D.J. Jin and J.R.Rogers) Mark Lane and Tad Urlych with reply by D. J.Jin	1559	Migration velocity analysis by wave-field ex- trapolation Ö.Yılmazand R.E.Chambers
On: "The normal vertical gradient of gravity" (J.H.Karl) C.J.Swain with relp by author	1562	Seismic approaches for structural studies of the Sudbury basin D.Messfin and W.Moon
On: "Wave propagation and sampling theory" (J.Morlet,G.Arens,E.Fourgeau,andD.Giard) J.D.Laski with reply by J.Morlet	1563	Seismic reciprocity field tests from the Italian Peninsula D.Fenati and F.Rocca
OCTOBER 1984		Underground oil-shale retort monitoring us- ing geotomography W.Daily
OCTOBER 1904		Two-dimensional resistivity inversion A.C.Tripp, G.W.Hohmann, and C.M.Swift, Jr.
Electrical modeling of the inhomogeneous invaded zone D.Drahos	1580	Three-dimensional terrain corrections for mise-a-la-masse and magnetometric resistivity surveys G.L.Oppliger
Diffraction of axisymmetric waves in a bore- hole by bed boundary discontinuities W.C.Chew, S.Barone, B.Anderson, and C.	1586	An interpretive analysis of magnetotelluric data

W.C.Chew, S.Barone, B.Anderson, and C. Hennessy

Solution of the fundamental problem in resistivity logging with a hybrid method 1596 L.Tsang, A.K.Chan, and S.Gianzero

Crustal structure of the continental shelf off northwest Britain from two-ship seismic ex-1605 periments E.J.W.Jones, R.S.White, V.J.Hughes, D.H. Matthews, and B.R.Clayton

Analysis of equivalence for the Schlumberger resistivity methods using the RHO-R and RHO-C curves in the resistivity transform domain 1749 Y.Murakami

R.P.Ranganayaki

Computation of Green's tensor integrals for three-dimensional electromagnetic problems using fast Hankel transforms 1754 W.L.Anderson

1622

1637

1649

1653

1664

1675

1690

1701

1708

1718

1730

The influence of pore geometry on the dielectric dispersion of clean sandstones 1-760 J.Korringa Field observations of electromagnetic pulse propagation in dielectric slabs 1763 S.A.Arcone A comparison of gravity prediction methods on actual and simulated data 1774 F.F.Morrison and B.C.Douglas An attempt to formulate well-posed questions in gravity: Application of linear inverse techniques to mining exploration V.Richard, R.Bayer, and M.Cuer Born inversion with a variable backgro velocitv D.J.Foster and P.M.Carrion Mosource-A novel simple seismic source M.H.Safar DISCUSSIONS On: "Magnetic anomalies of two-dimension bodies in a magnetic half-space" (E.E.S. S paio) L.Eskola with reply by author On: "Automated identification of rock bo daries: An application of the Walsh tra form to geophysical well-log analysis" (E Lanningand D.M.Johnson) D.S.K.Chan On: "Geothermal prospecting with Shallo Temp surveys" (L.A.LeSchack and J.E.Lev T.H.Larson and P.C.Heigold, with reply author On: "Dip limitations on migrated section a function of line length and recording ti (H.B.Lynn and S.Deregowski) S.A.Levin On: "Simulating true amplitude reflect by stacking shot records" (P.Hubral) 1806 Th.Krey with reply by author

On: "Effect of surface polarization on resistivity modeling" (D.Guptasarma) 1808 A.Apparao with reply by author

On: "Numerical integration of related Hankel transforms by quadrature and continued fraction expansion" (A.D.Chave) 1811 W.L.Anderson with reply by author

### NOVEMBER 1984

ound	1781	Array estimators and the use of microseisms for reconnaissance of sedimentary basins M.W.Asten and J.D.Henstridge	1828
ound	1794	A geophone subarray beam-steering process D.E.Biswell, L.F.Konty, and A.L.Liaw	1838
	1798	The ratio V $/\rm V_s$ as a discriminant of composition for siliceous limestones R.Wilkens, G.Simmons, and L.Caruso	1850
ional Sam-		Optimum seismic velocity estimators R.L.Kirlin, L.A.Dewey, and J.N.Bradley	1861
	1800	Signal/noise separation and velocity estima- tion W.S.Harlan, J.F.Claerbout, and F.Rocca	1869
oun- rans- E.N.	Î801	Multidimensional linearized inversion and seismic migration A.J.Berkhout	1881
o- ewis)	1803	A comparison of common-midpoint, single- shot, and plane-wave depth migration P.Temme	1896
y by	1005	Seismic parameters for transversely isotropic media B.S.Byun	1908
ns as time"	1804	Stable plane-wave decomposition and sphe- rical-wave reconstruction: Applications to converted S-mode separation and trace inter- polation J.J.Cabrera and S.Levy	1915
tions	1806	SH—wave propagation in heterogeneous me- dia: Velocity-stress finite-difference method	1933

J.Virieux

Simulation of induction logging by the finite- element method S.K.Chang and B.Anderson	1943	Magnetic-terrain anomalies from arroyos in an alluvial fan K.D.Mahrer, C.Bradley, and S.Newsom	2044
Synthetic electric sounding surveys over known oil fields N.R.Garg and G.V.Keller	1959	Comparison of the £j and S <sup>A</sup> norms applied to the one-at-a-time spike extraction from seismic traces I.Barrodale, C.A.Zala, and N.R.Chapman	
Extremal bias coupling in magnetotellurics L.B.Pedersen and M.Sevennekjaer	1968	The hidden-layer problem revisited I.J.Won and M.Bevis	2053
Effects of pipelines on spectral induced-pola- rization surveys J.O.Parra	1979	Efficient calculation of the electromagnetic fields of an extended source D.E.Boemer and G.F.West.	2057
Spectral induced-polarization parameters as determined through time-domain measure- ments I.M.Johnson		On modeling a well casing for resistivity and induced polarization j.R.Wait	2061
Important design considerations for inboard airborne magnetic gradiometers C.D.Hardwick	2004	Wave-equation datum ing before stack J.R.Berryhill	2064
The principle of complex frequency scaling- Applicability in inclined continuation of po- tential fields R.Nagendraand N.Laxminarayana	2019	DISCUSSIONS On: "The signature of an air-gun array: Com- putation from near-field measurements in- cluding interactions-Practical considerations" (G.Parkes, A.Ziolkowski, LHatton, and T.	
Non-oriented cesium sensors for airborne magnetometry and gradiometry C.D.Hardwick	2024	Haugland) M.H.Safar with reply by authors	2067
The influence of salt domes on paleotempe- rature distributions J.J.O'Brien and I.Lerche	2032	On: "Does draping aeromagnetic data reduce terrain-induced effects?" (V.J.S.Grauch and D.L. Campbell) R.O.Hansen with reply by authors	2070

# **Geophysical Prospecting**

OCTOBER 1984 On Vertical Seismic Profile Processing	775	Derivation of Layer Parameters of an Elastic Medium from Reflection Coefficient Matrices F.Aminzadeh	819
P.Tariel and D.Michon		Three-Term Taylor Series for t <sup>2</sup> -x <sup>2</sup> -Curves of P- and S-Waves over Layered Transversely Isotropic Ground H.Hake, K.Helbig and C.S.Mesdag	
Offset Source VSP Surveys and their Image Reconstruction P.B.Dillon and R.C.Thomson	790		828
Odd-Depth Structures for Deterministic De- convolution Seismogram Testing E.Szaraniec	812	Computer Modeling of Vertical Seismic Pro- filing T.K.Young, C.B.Monash and R.M.Turpening	851

On Errors of Fit and Accuracy in Matching Synthetic Seismograms and Seismic Traces A.T.Walden and R.E.White	871	High-Frequency Shallow Seismic Reflectior Mapping in Tin Mining Surendra Singh	1033
Measurements of Earth Attenuation from Downhole and Surface Seismic Recordings S.A.Raikesand R.E.White	892	Offset Continuation in Theory and Practice G.Bolondi, E.Loinger and F.Rocca	1045
Simulations of Reflections and Diffractions from Targets Buried in a Medium with Linear Variation of Velocity with Distance Ramesh Chander and Radhakrishna Bhat C	920	An Operator Approach to Forward Modeling, Data Processing and Migration B.L.N.Kennett	1074
Interpretation of Aeromagnetic Data from the Norwegian Sector of the North Sea J.Hospersand J.S.Rathore	929	Static Corrections for Shear Wave Sections B.Wiestand H.A.K.Edelmann	1091
Electrical Potential due to a Point Current Source over an Inhomogeneous Anisotropic Earth Barun Prasad Pal and S.P. Dasgupta	943	Seismic Refraction Method to Study the Foundation Rock of a Dam N.P.Dutta	1103
The Cross-Hole Magnetometric Resistivity (MMR) Response of a Disc Conductor R.N.Edwards	955	Estimates of Terrestrial Thermal Gradients and Heat Flow Variations with Depth in the Hinton-Edson Area of the Alberta Basin de- rived from Petroleum Bottom-Hole Tempe- rature Data F.W.Jones, C.Kushigbor, H.L.Lam, J.A. Ma-	
DECEMBER 1984		jorowicz and M.Rahman	
Pressidential Address D.B.Stafenovic	995	A Numerical Direct Interpretation Method of Resistivity Soundins using the Pekeris Model A.T.Başokur	1131
Linearized Inversion of Seismic Reflection Dat A.Tarantola	a 998	Induced Polarization in Electromagnetic In- ductive Schemes J.R.Waitand P.Dcbroux	1147
Velocity Analysis in the p-x Plane from a Slant Stack Wavefield R.Tang, A.Carswell and Wooil Moon	1016	Zero-Phase Forward Filters for Resistivity Sounding L.Mansinha	1155