



COLORADOSCHOOL OF **MINES**



CENTER FOR EARTH RESOURCES SCIENCE & ENGINEERING – “CIERSE” INTRODUCTION

M. Stephen Enders

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My Background & Interests

- Ph. D. Economic Geology
- B.Sc. & M.Sc. Geol.Engineering
- 35 Years Experience: Cu, Au, U
- Exploration, Development & Operations
- Head of Global Exploration
 - Phelps Dodge ('01-'03)
 - Newmont ('03 – '09)
- Executive Chairman – EMX
- 2011 President - SEG
- Research Professor, CSM
- Director, CIERSE



What is CIERSE?

- ▶ University-wide, multi-disciplinary center for research and education at CSM established in December 2009
- ▶ Focused on fundamental and strategic challenges in the mineral resource sector of the global economy
- ▶ Through the application of science and engineering to the discovery, sustainable development and environmentally & socially responsible production of subsurface earth resources



Who is CIERSE

- Newmont Mining Corporation
 - Founding Member
 - \$1.2 million 3-year pledge
- CSM Mining Engineering
 - Home Department
- Collaborating Departments
 - Metallurgy & Materials Eng.
 - Geology & Geological Eng.
 - Environmental Science & Eng.
 - Geophysics



CIERSE Business Model

- ▶ Focus on potentially transformational projects
 - Individually important, but synergistic with other projects
 - Such that in combination, step changes may be possible
- ▶ Newmont seed funding \$1.2 million
 - \$275,000 / 3 years to fund general & administrative costs
 - \$925,000 / 3 years to fund Stage 1 (proof of concept) research projects
 - Stage 2 projects (prototype or pilot scale tests) compete for funding
 - Stage 3 projects (commercialization) may involve other partners



CIERSE Research Interests

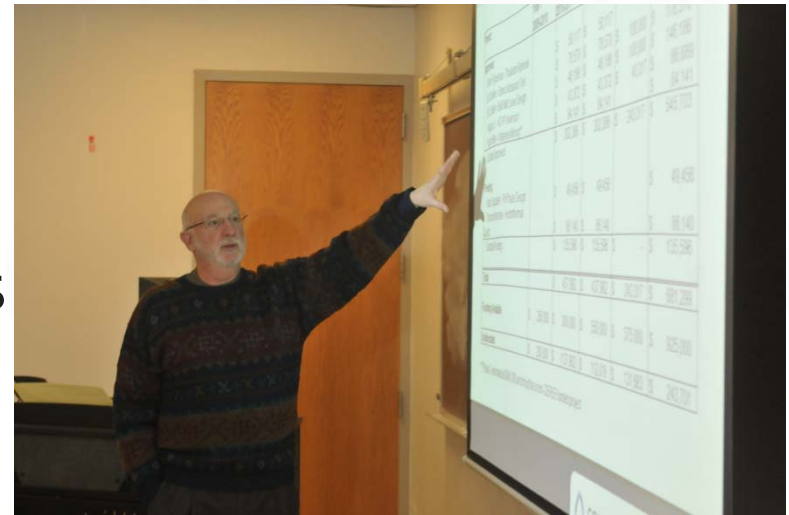
- ▶ Exploration & discovery methods & technology
- ▶ Highly efficient & low-impact mining methods
- ▶ Metallurgical characterization and mineral processing
- ▶ Energy efficiency and alternative supplies
- ▶ Environmental management & stewardship

Sustainable Development and Production of Mineral Resources



CIERSE Educational Opportunities

- ▶ Graduate student research projects
 - Working with CSM faculty & researchers and Newmont sponsors
- ▶ Lectures, seminars, short courses & workshops
 - Centered around CIERSE research interests
 - Focused on topics in innovation
 - Topics of technical relevance
- ▶ Teaching & training programs
 - Typical consulting opportunities
 - Jointly taught classes & workshops



CIERSE Research – 2009/2010 Projects

1. Innovative Water Treatment for Thallium Removal*

Linda Figueroa, Morgan Davies & Thomas Wildman
Department of Environmental Science & Engineering

2. Bond Abrasion Test Reliability Study*

Eric Spiller, Pat Taylor & Martin Uceda
Department of Metallurgy & Materials Engineering

3. Measuring the Efficiency of Mill Liner Design with Ball Considerations*

Eric Spiller, Pat Taylor & Husni Usman
Department of Metallurgy & Materials Engineering

4. 4D Inversion of Full Waveform Induced Polarization (IP) Data from Newmont's Distributed Acquisition System NEWDAS*

Yaoguo Li, Jiajia Sun & Misac Nabighian
Department of Geophysics

*** Continuing in 2011/2012**



CIERSE Research – 2010/2011 Projects

5. Remote Controlled Waterjet Mining System**

Hugh Miller, Fun-Den Wang, Brian Asbury & Doug Aho
Department of Mining Engineering
Department of Mining Engineering

6. Cathodoluminescence and Fluid Inclusion Characteristics of Hydrothermal Quartz as a Vector to Metal Mineralization**

Thomas Monecke, Jim Reynolds & Nigel Kelly
Department of Geology & Geological Engineering

**** Continuing in 2011/2012**



CIERSE Research – 2011 /2012 Projects

7. Scoping Study of Geothermal Resources in the Midas district, Nevada***

Stuart Simmons

Department of Geology & Geological Engineering

8. Mechanical Excavation Systems in Underground Mine Development***

Christian Frenzel, Mark Kuchta & Brian Asbury

Department of Mining Engineering

➤ **Other Research Projects Under Discussions**

- Waterjet technology for seafloor applications – Nautilus Minerals Inc.
- Fuel cell technology for underground mining – Vehicle Projects Inc.

***** Recently approved for start-up May 1, 2011**

