

PRELIMINARY PROGRAM
SPACE RESOURCES ROUNDTABLE VI
NOVEMBER 1–3, 2004
COLORADO SCHOOL OF MINES, GOLDEN, COLORADO

The four-digit numbers in brackets refer to the abstract number of any presentation with a supporting abstract. Using the hand tool of your Acrobat Reader, click on the title of the presentation to view the abstract.

Monday, November 1, 2004

INTRODUCTION

- 8:00 a.m. Continental Breakfast and Registration
- 8:30 a.m. Duke M. Director, Center for Commercial Applications of Combustion in Space
Welcome
- 8:45 a.m. Taylor G. J. Roundtable Program Chair
Objectives and Organization of the Meeting
- 9:00 a.m. Wegeng R.
The Moon, Mars, and Beyond: View from Headquarters
- 9:30 a.m. Sanders G. B.
Overview of ISRU Activities and Goals
- 10:00 a.m. BREAK**

LUNAR POLAR DEPOSITS

Moderator: J. J. Gillis

- 10:15 a.m. Bussey D. B. J. Spudis P. D.
The Lunar Polar Illumination Environment: What We Know & What We Don't [#6022]
- 10:45 a.m. Pappalardo R. T. Cobabe-Ammann E. Cook A. C. Greeley R.
Gulick V. C. McClintock W.E. Moore J. M. Stern S. A. Vasavada A. R.
McClelland M. Westfall J.
SILVER: Surface Imaging for Lunar Volatiles, Resources, and Exploration [#6028]
- 11:00 a.m. Taylor G. J. Neubert J. Lucey P. McCullough E.
The Uncertain Nature of Polar Lunar Regolith [#6040]
- 11:15 a.m. Gorevan S. P. Wilson J. Bartlett P. Powderly J. Lawrence D. Elphic R.
Mungas G. McCullough E. Stoker C. Cannon H. Glass B. Carrier W. D.
Schmitt H. H. McKay D. S. Morris R. V. Johnson J. Cole D. Dreyer C.
Robotic Subsurface Analyzer and Sample Handler for Resource Reconnaissance and Preliminary Site Assessment for ISRU Activities at the Lunar Cold Traps [#6043]

Monday, November 1, 2004 (continued)

11:30 a.m. Discussion: Exploration Strategy for Lunar Polar Deposits

12:00 – 1:30 p.m. LUNCH in Green Center
Welcome by Dr. John Trefny, President of Colorado School of Mines

ISRU SIMULANTS FOR THE MOON AND MARS**Moderator: G. J. Taylor**

1:30 p.m. Taylor L. A. McKay D. S. Carrier III W. D. Carter J. L.
The Nature of Lunar Soil: Considerations for Simulants [#6024]

1:45 p.m. Carter J. L. McKay D. S. Taylor L. A. Carrier III W. D.
Lunar Simulants: JSC-1 is Gone; The Need for New Standardized Root Simulants [#6023]

2:00 p.m. Discussion: Simulants

EXPLORATION TECHNIQUES**Moderators: B. Bussey and L. A. Taylor**

2:30 p.m. Matsui K. Nakamura R. Kato M. Takizawa Y.
SELENE Scientific Data Products and their Application to Characterization of Lunar Potential Resources [#6005]

2:45 p.m. Gillis J. J. Taylor G. J. Lucey P. G.
Remote Sensing Assessment of Lunar Resources: We Know Where to Go to Find What We Need [#6029]

3:00 p.m. Dissly R. W. Buehler M. G. Schaap M. G. Nicks D. Taylor G. J.
Castano R. Suarez D.
Autonomous In-Situ Resources Prospector [#6017]

3:15 p.m. Anderson R. C. Buehler M. G. Seshardri S. Schaap M. G.
Dielectric Constant Measurements on Lunar Soils and Terrestrial Minerals [#6035]

3:30 p.m. Klaus K.
Near Earth Object Characterization, Exploration and Exploitation [#6025]

3:45 p.m. Woodworth-Lynas C. M. T. Guigne J. Y. Hart D. Davidson R.
Concept for Landed Measurements of Mars that will Help Identify and Characterize Potential Surface Resources [#6042]

4:00 pm. Kuhlman K. R., Behar A. E. Jones J. A. Carsey F. Hajos G. A.
Flick J. J. Antol J.
Tumbleweed: A New Paradigm for Surveying the Surface of Mars for In-Situ Resources [#6041]

4:15 p.m. Mandell H. C.
Mars Deep Drilling Remains a High Priority [#6001]

4:30 p.m. Stoker C.
Drilling to Extract Liquid Water on Mars: Feasible and Worth the Investment [#6002]

5:00 p.m. **SPACE RESOURCES ROUNDTABLE BOARD MEETING
(OPEN TO ALL)**

Tuesday, November 2, 2004

8:00 a.m. Continental Breakfast and Registration

**MATERIALS HANDLING AND PROCESSING TECHNIQUES
Moderators: L. Gertsch and A. Ignatiev**

8:30 a.m. Schmitt H. H.
Solar Wind Helium Concentrations in Undisturbed Lunar Regolith [#6039]

8:45 a.m. Jenkins J. T. Louge M. Y. Rame E.
Granular Flow and In-Situ Resource Utilization [#6019]

9:00 a.m. Behringer R. P. Wilkinson R. A.
Granular Materials and Risks In-Situ [#6021]

9:15 a.m. Schissler A. Kecojevic V.
Intelligent Excavation for the Moon [#6016]

9:45 a.m. Boucher D. S. Richard J.
Report on the Construction and Testing of a Bucket Wheel Excavator [#6004]

10:00 a.m. BREAK

10:15 a.m. McCandless A. Motakef S. Guidry D. Overholt M.
*Micro-Structured Heat Exchangers and Reactors for ISRU
and Energy Conversion* [#6038]

10:30 a.m. Rodriguez G.
*Lunar and Martian Fiberglass as a Versatile Family of ISRU
Value-Added Products* [#6034]

10:45 a.m. Westfall R. Jenkin W. C.
Steel Production Utilizing Iron Extracted from Lunar Ores and Soils [#6020]

11:00 a.m. Sibille L. Gavira-Gallardo J. A. Hourlier-Bahloul D.
*Synthesis of Sol-Gel Precursors for Ceramics from Lunar and
Martian Soil Simulants* [#6015]

11:15 a.m. Zhang X. Yi H. C. Guigné J. Y. Mannerbino A. Moore J. J.
*The Application of Self-Propagating High Temperature (Combustion)
Synthesis (SHS) for In-Space Fabrication and Repair* [#6011]

11:30 England C.
Extraction of Oxygen from the Martian Atmosphere [#6036]

Tuesday, November 2, 2004 (continued)

12:00 – 1:30 p.m. **LUNCH** in Green Center

1:30 – 2:30 p.m. **PANEL DISCUSSION**
 Mars Human Missions: Propellant from Atmosphere, Regolith, or Ice?
 Panelists: Sanders J. Taylor G. J. England C. Ash R.

MINING CLAIMS AND SPACE LAW**Moderator: M. Duke**

2:30 p.m. White W. N.
Space Law Update: Real Property Rights and Resource Appropriation [#6009]

2:45 p.m. Rodriguez G.
Telepossession Transforms Asteroids into Resources [#6033]

3:00 p.m. **Discussion: Legal Issues**

IMPROVING OPERATIONS ON PLANETARY SURFACES**Moderator: S. Mackwell**

3:15 p.m. Joyner R. Rodriguez G.
Power Lander for Support of Long-Term Lunar Presence [#6032]

3:30 p.m. Wray T. Rodriguez G.
Using Spent Fuel Tanks as Habitats [#6031]

3:45 p.m. Angel H. Thanh P. Nakagawa M.
Dust Mitigation of Astronaut Spacesuits [#6030]

4:00 – 4:45 p.m. **Discussion: ISRU Demonstration Experiments and Flights**
 Moderator: Jeff Taylor

6:00 p.m. **RECEPTION AND DINNER** in Green Center
 Speaker: Robert Ash
“Why Don’t You See if You Can Make Rocket Fuel at Mars?” — 27 Years Later

Wednesday, November 3, 2004

8:00 a.m. Continental Breakfast and Registration

ECONOMICS AND EXPLORATION ARCHITECTURES**Moderators: H. H. Schmitt and B. Blair**

8:30 a.m. Blair B. B. Diaz J. Ruiz B. Duke M. B.
ISRU Technology Modeling and Analysis [#6026]

8:45 a.m. Blair B. B. Duke M. B. Diaz J. Ruiz B.
Costs and Benefits of ISRU-Based Human Space Exploration [#6027]

Wednesday, November 3, 2004 (continued)

- 9:00 a.m. England C. Hallinan K. P.
Minimizing Launch Mass for ISRU Processes [#6037]
- 9:30 a.m. Reynerson C. M.
Exploration of the Impact of ISRU on Architectural System Mass and Cost [#6008]
- 9:45 a.m. Davis H. P.
Space Transportation for a Lunar Resources Base [#6013]
- 10:00 a.m. O'Dale C. D.
Lessons from Earth: Experiences Which can Guide Lunar and Asteroidal Development [#6006]
- 10:15 a.m. BREAK**
- 10:30 a.m. Heiss K. P.
Economic Laws and the Lunar Imperative: Outline of Components for a Sustained Development Strategy [#6007]
- 10:45 a.m. Konesky G. A.
Mission Design for Economically Self-Supporting Large Scale Lunar Telepresence [#6010]
- 11:00 a.m. Morin L. M. E.
Rocks to Robots: A Biological Growth Approach to Rapid Lunar Industrialization or How to Realize Von Neumann's Vision [#6018]
- 11:15 a.m. Nakamura T.
Solar Energy Utilization for In-Situ Resource Utilization [#6014]
- 11:30 a.m. Ash R. L.
Toward a Sustainable Mars Infrastructure [#6012]
- 11:45 a.m. Final Remarks
- 12:00 p.m. Meeting Adjourns**
- 1:30 p.m. **ISRU CAPABILITY WORKSHOP**

PRINT-ONLY PRESENTATIONS

- Kuhlman K. R. Kulcinski G. L. Schmitt H. H.
Simulation of Helium-3 Extraction from Lunar Ilmenite [#6044]