

OB-1 Lunar Highlands Physical Simulant Evolution and Production

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NORCAT/EVC - Joint Venture Partners

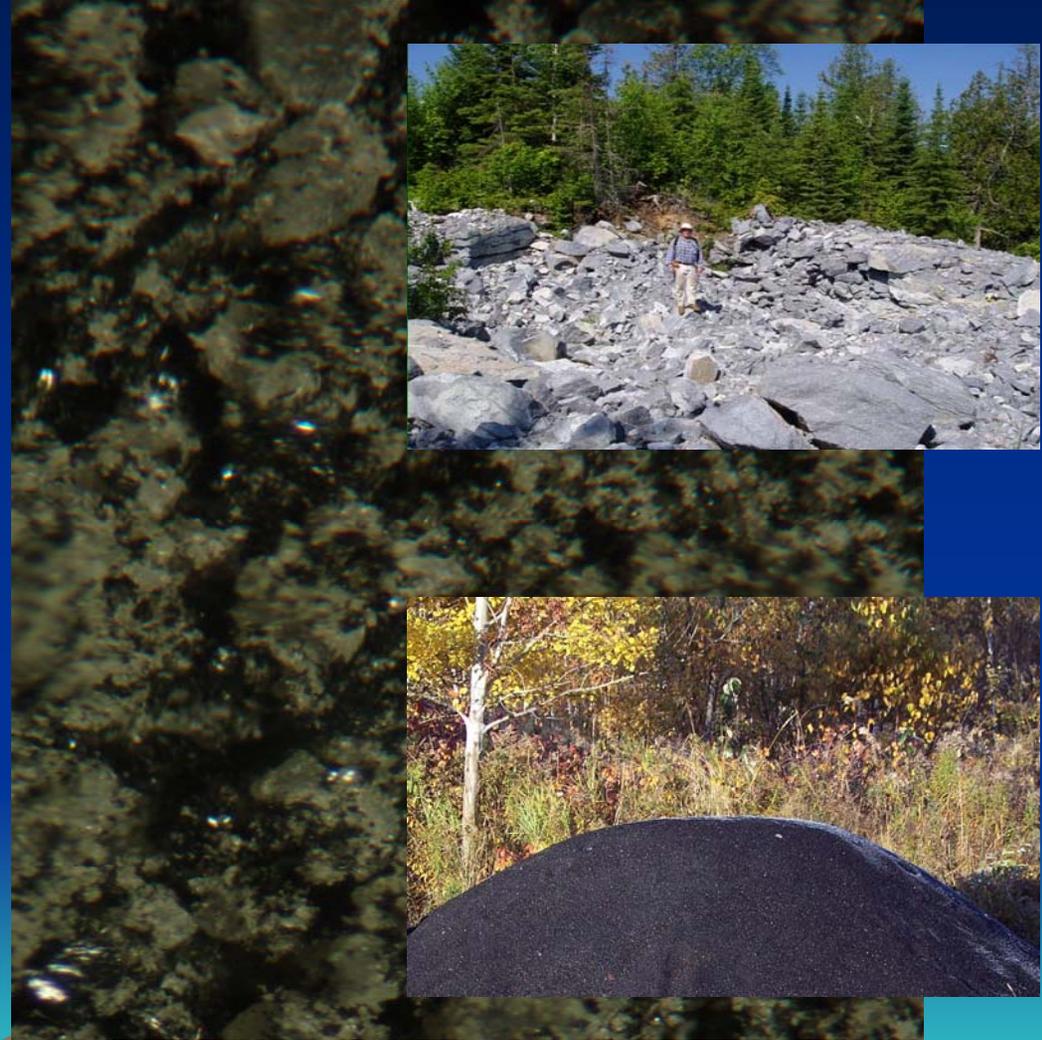
Development Rationale:

- Planetary Drilling Equipment Development for NASA RESOLVE and Canadian Space Agency's STDP program
- Physical simulant is required for relevant equipment testing.
- Sufficient quantities of existing simulants were not readily available.



Source Materials

- Anorthosite acquired from Avalon Ventures Ltd. Quarry located in Foleyet, Ontario
- Olivine slag added to enhance abrasive qualities.
- Combined product is OB-1
- Custom processing protocol developed using Jaw, Roll and Ring crushers
- Particle size testing performed and compared to Apollo 16 Highland Lunar Samples 64501 and 64500



Physical Characteristics

OB-1 Size Distributions

	0-75 μ m	75 μ m to 150 μ m	150 μ m to 250 μ m	250 μ m to 1.18mm	1.18mm to 9.5mm	>9.5mm
OB-1 Target Percentage*	39.88%	19.60%	13.14%	16.85%	7.32%	3.21%
OB-1 Batch 1 Results	38%	27%	13%	12%	7%	3%
OB-1 Batch 2 Results	36%	17%	19%	18%	8%	2%

OB-1 target percentages based on work by Melissa Battler of the University of New Brunswick

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Physical Characteristics OB-1 vs. Lunar Material

	OB-1 Highland Lunar Simulant	Highland Lunar Regolith (Lunar Sourcebook)
Density	Max dry ranges from 2.135 g/cm ³ to 2.190 g/cm ³ (standard and modified proctor tests) Loose 1.815 g/cm ³	In situ bulk ranges from 1.40 to 2.29 g/cm ³ (Apollo 16 and 17 missions) p. 484
Specific Gravity	Mean at 20°C: 3.071	Recommended SG for typical lunar soil: 3.1 p. 482

Internal use of OB-1

- Customized cryochamber
- 1m stackable proctor mold
- Simulant compaction room



Increase Production?

- Requests from other potential users
- Until now production has been done at a lab scale
- Time consuming-low yield
- Increased production required



Increase Production!

- Aerosion -Toll grinding plant
- Ability to process 25 tonnes per day
- Various screen sizes available
- 250 tonnes of pre-processed anorthosite by-product material available as feedstock
- This feedstock meets our particle size requirements up to 600 μ m

Production

- NORCAT/EVC will process 25 tonnes for internal use
- Potential customer interested in an additional 75 tonnes
- Tentative production start date is December 2007

Overcoming the Issues

- Incorporating large particle size anorthosite component
- Incorporating glass component
- Mixing OB-1
- Storage requirements-cost vs. shelf life
- Shipping containers

Shipping and Handling



Seal



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References

Battler, M.M., Richard, J., Boucher, D., Spray, J.G.,
Progress Report: Development and Production of Lunar Highland Regolith
Simulant OB1
Presentation delivered at the PTMSS 2006

Leanne Sigurdson, NORCAT and Jim Richard, EVC
OB-1 Lunar Highlands Regolith Physical Simulant
Presentation delivered at the PTMSS 2007