JSC-1A Production and Distribution

Updates

October 10, 2007

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New Lunar Simulants

- The 2005 Lunar Regolith Simulant Materials Workshop recommended the development of new simulants for regolith in the lunar mare, highland and polar regions.
- They identified a need for an immediate “stop gap” simulant (such as JSC-1) for current BAA projects and the Centennial Challenges
- Recommended that new simulants consider:
  - Improved traceability and characterization
  - High titanium vs. low titanium
  - Improved geomechanical properties
  - More controlled distribution

JSC-1A Lunar Mare Regolith Simulant

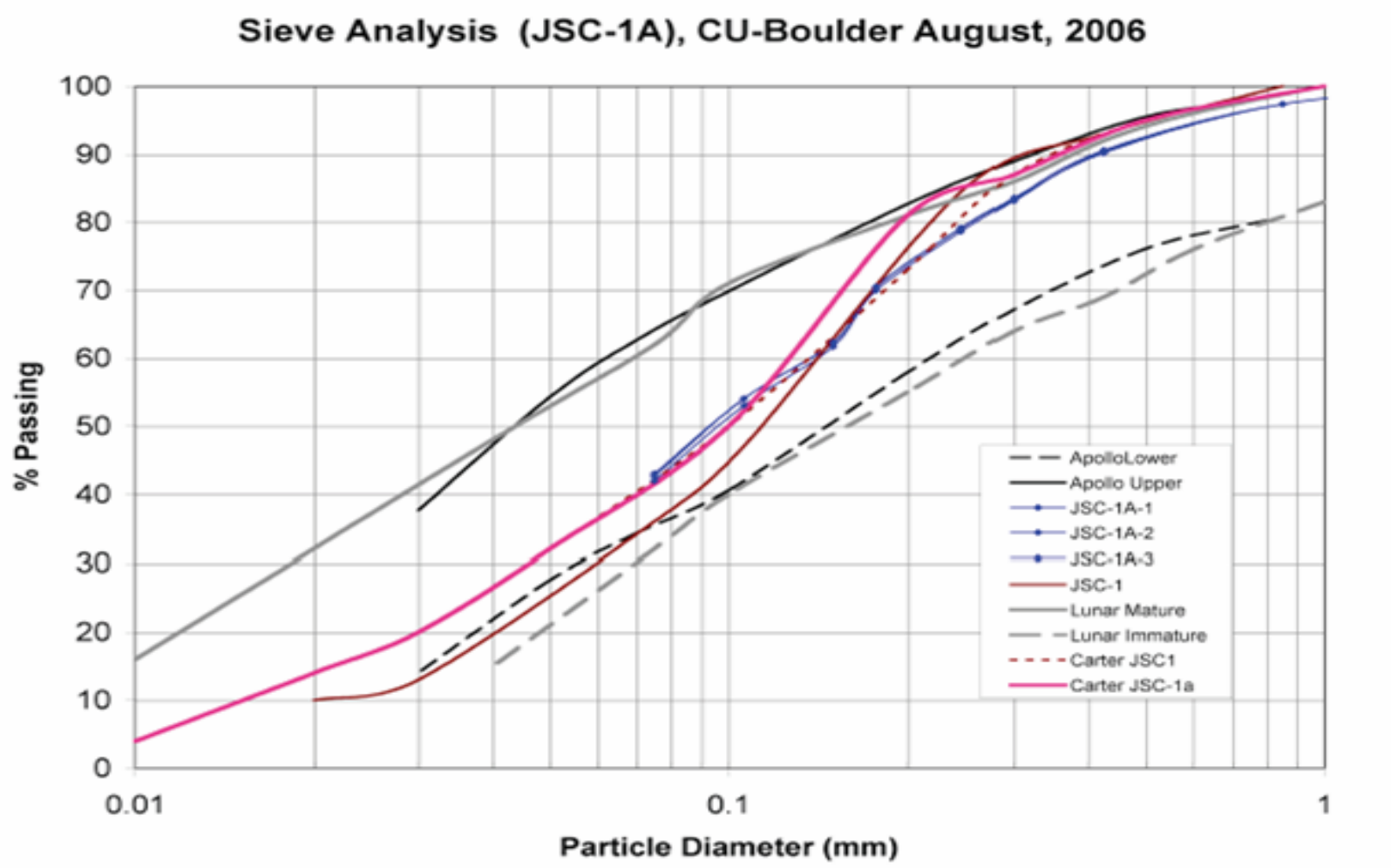
- ORBITEC was contracted by NASA/MSFC to create and distribute 16 metric tons of a JSC-1 reproduction simulant.
- JSC-1A is being produced by ETSimulants (Dr. James Carter from UT-Dallas)
- Additional simulant will be available commercially at **www.planet-llc.com** in January 2008.

The JSC-1A Simulant Family

- **JSC-1AF**
  - Average particle size of 27 µm
  - Available from April 2006 – August 2007
- **JSC-1A**
  - Reproduction of JSC-1 (< 1mm)
  - 14 metric tons in production for NASA, all has been allocated
  - Available from October 2006 – December 2007
- **JSC-1AC**
  - Average particle size 1-5 mm
  - 1 metric ton in production for NASA, only 280 kg allocated
  - Available December 2007

JSC-1AF

JSC-1A Particle Distribution



Analyses courtesy of Dr. Susan Batiste at CU-Boulder and Dr. James Carter of ET Simulants

JSC-1A Particle Size Distribution

Sample	Size Range (microns)
JSC-1A median	99 - 105
JSC-1 median	98 - 117
Apollo 11 median	48 – 105
Apollo 12 median	42 – 94
Apollo 14 median	75 - 802
Apollo 15 median	51 - 108

JSC-1A Major Element Composition

Oxide	JSC-1A (wt%)	JSC-1 (wt%)	Lunar Soil 14163
SiO2	46.67	47.71	47.3
TiO2	1.71	1.59	1.6
Al2O3	15.79	15.02	17.8
Fe2O3	3.41 (JSC-1AF)	3.44	0.0
FeO	7.57 (JSC-1AF)	7.35	10.5
MnO	0.19	0.18	0.1
MgO	9.39	9.01	9.6
CaO	9.90	10.42	11.4
Na2O	2.83	2.70	0.7
K2O	0.78	0.82	0.6
P2O5	0.71	0.66	--

JSC-1A Characterization

- JSC-1AF characterization available since December 2006
- NASA's draft characterization of JSC-1A became available in June 2007
- Errors identified in the FeO/Fe2O3 content so it was not widely distributed
  - Errors being corrected
  - Will be posted on www.lunarmarssimulant.com
  - Contact Marty Gustafson (gustafsonm@orbitec.com) for copy

Completed Distribution

Simulant	Ton	Status	Notes
JSC-1AF	1	Delivered	No material remaining
JSC-1A	MT-1	Delivered	JSC / KSC
	MT-2	Delivered	Glenn / Small orders
	MT-3	Delivered	Lockheed Martin
	MT-4	Delivered	JSC
	MT-5	Delivered	KSC
	MT-6	Delivered	Small orders / 400 kg left
	MT-7	Delivered	Glenn
	MT-8	Delivered	KSC
	MT-9	Delivered	Glenn
	MT-10	Ready to ship	JSC

Future Distribution

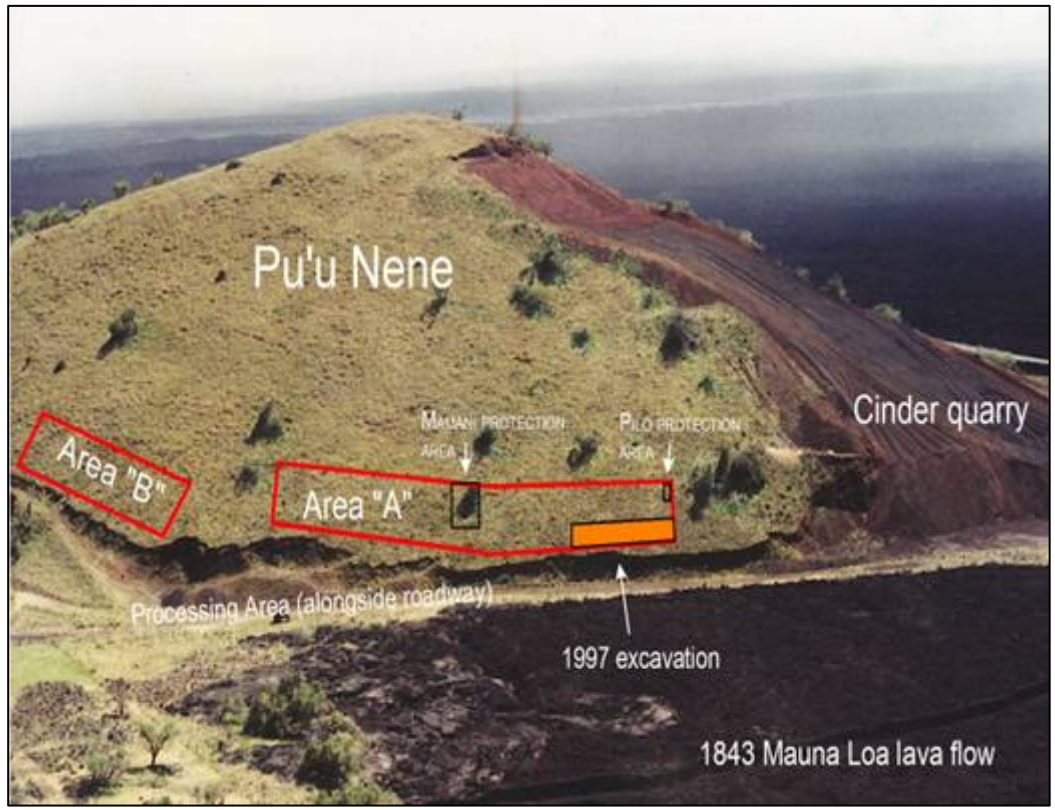
Simulant	Ton	Status	Notes
JSC-1A	MT-11	Ready 10/18	Lockheed Martin
	MT-12	Ready 11/5	JSC
	MT-13	Ready 11/23	Glenn / KSC
	MT-14	Ready 12/10	JSC
JSC-1AC	MT-4	Ready 12/31	Small orders / 700 kg left

Ordering Information

- There is a small quantity of NASA's JSC-1A available
  - Request at www.lunarmarssimulant.com
  - Email Marty Gustafson at gustafsonm@orbitec.com
- There is plenty of JSC-1AC available
  - Request at www.lunarmarssimulant.com
  - Email Marty Gustafson at gustafsonm@orbitec.com
- Up to an additional five tons of JSC-1A is available for commercial purchase from Planet LLC
  - Email Marty Gustafson or call me at 608-229-2787

Martian Regolith Simulant

- ORBITEC has also reproduced JSC-Mars-1 Martian regolith simulant to match the 1997 NASA effort
- Created from sieved palagonatized tephra ash from Pu'u Nene
- Working with the former producer, GeoHazards Consulting International, Dr. Jack Lockwood, 8 tons is available.



Martian Simulant Production

Contacts for Simulants

To request NASA funded simulant, visit: www.lunarmarssimulant.com, or contact:

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To purchase commercial simulant, visit:

www.planet-llc.com