



Simulant Development & Use

Problems, Current Status, & Recommendations

ISRU System Capability
Leadership Team
2017



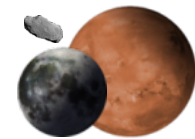
Problem Statements - Simulant Development & Use for NASA



- There is no coordinating body for simulant requirements, how simulants are developed and manufactured, and how/which simulants should be used in NASA funded development activities.
- There is a wide variety of past/current simulants (>33 lunar) in the US and internationally. There is limited comparison of the attributes between the simulants
- Existing simulants are limited and quality control has been found to be an issue.
- Development of human exploration surface systems, especially *In Situ* Resource Utilization (ISRU), require simulants for development and certification testing.
 - ISRU development can require a significant amounts of simulant (tons, 10's of tons)
 - New simulants are needed for Mars dust and ISRU development that better reflect current knowledge of minerals, contaminants and water resources
 - There are no guidelines on when simulants should be replaced or how much they can be used before initial characteristics are no longer valid
- When a standard simulant is not available or costs too much, each developer uses their own simulant, with unknown quality, so results of testing cannot be compared to other developers or potentially to actual use at the destination of interest.



Action And Questions to be Addressed



- Assemble a team to provide recommendations on what NASA's roles and responsibilities should be with the development, production, and distribution of simulants for human exploration hardware development and flight certification
 - Should NASA establish a board to define requirements, determine if terrestrial feedstock exists, can be manufactured at desired quantities, and for what price? Who should be on the board and how should it be established and funded?
 - Should NASA characterize and maintain understanding of existing simulants? (including foreign simulants?). Should NASA perform its own assessment of physical/mineral attributes or rely on simulant producers?
 - How should new simulants be developed and produced? How should the final product be verified on a continuous basis?
 - How should the type, quantity, quality of simulants produced be managed? Should production and stocks of feedstock for distribution be by commercial industry, NASA, or some other arrangement?
 - Should organizations outside of NASA be involved in simulant oversight and management? LEAG, MEPAG, SSERVI, AIAA and/or ASCE for standards and best practices?

- Core Team Members from JSC, MSFC: JPL, KSC, GRC, ARC, GSFC, LaRC

- Recommendations to be presented to NASA management before the end of FY17