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| <b>Fiscal Year:</b>                               | FY 2007   | <b>Task Last Updated:</b>             | FY 05/29/2009     |
| <b>PI Name:</b>                                   | Jeevarajan, Antony Ph.D.  |                                       |                   |
| <b>Project Title:</b>                             | Study of Lunar Dust and Lunar Simulant Activation, Monitoring, Solution and Cellular Toxicity Properties  |                                       |                   |
| <b>Division Name:</b>                             | Human Research  |                                       |                   |
| <b>Program/Discipline:</b>                        | HUMAN RESEARCH  |                                       |                   |
| <b>Program/Discipline--Element/Subdiscipline:</b> | HUMAN RESEARCH--Environmental health  |                                       |                   |
| <b>Joint Agency Name:</b>                         | <b>TechPort:</b>  | No                                    |                   |
| <b>Human Research Program Elements:</b>           | (1) <b>SHFH</b> :Space Human Factors & Habitability (archival in 2017)  |                                       |                   |
| <b>Human Research Program Risks:</b>              | (1) <b>Dust</b> :Risk of Adverse Health and Performance Effects of Celestial Dust Exposure  |                                       |                   |
| <b>Space Biology Element:</b>                     | None  |                                       |                   |
| <b>Space Biology Cross-Element Discipline:</b>    | None  |                                       |                   |
| <b>Space Biology Special Category:</b>            | None  |                                       |                   |
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| <b>PI Organization Type:</b>                      | NASA CENTER   | <b>Phone:</b>                         |                   |
| <b>Organization Name:</b>                         | NASA Johnson Space Center   |                                       |                   |
| <b>PI Address 1:</b>                              | 2101 NASA Parkway, SK111  |                                       |                   |
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| <b>PI Web Page:</b>                               |   |                                       |                   |
| <b>City:</b>                                      | Houston   | <b>State:</b>                         | TX                |
| <b>Zip Code:</b>                                  | 77058   | <b>Congressional District:</b>        | 36                |
| <b>Comments:</b>                                  |   |                                       |                   |
| <b>Project Type:</b>                              | GROUND  | <b>Solicitation / Funding Source:</b> | Directed Research |
| <b>Start Date:</b>                                | 10/02/2006  | <b>End Date:</b>                      | 12/31/2010        |
| <b>No. of Post Docs:</b>                          |   | <b>No. of PhD Degrees:</b>            |                   |
| <b>No. of PhD Candidates:</b>                     |   | <b>No. of Master' Degrees:</b>        |                   |
| <b>No. of Master's Candidates:</b>                |   | <b>No. of Bachelor's Degrees:</b>     |                   |
| <b>No. of Bachelor's Candidates:</b>              |   | <b>Monitoring Center:</b>             | NASA JSC          |
| <b>Contact Monitor:</b>                           | Woolford, Barbara   | <b>Contact Phone:</b>                 | 218-483-3701      |
| <b>Contact Email:</b>                             | <a href="mailto:barbara.j.woolford@nasa.gov">barbara.j.woolford@nasa.gov</a>  |                                       |                   |
| <b>Flight Program:</b>                            |   |                                       |                   |
| <b>Flight Assignment:</b>                         | NOTE: Start/end dates changed to 10/2/2006-12/31/2010 (previously 4/30/2006-1/31/2011) per B. Woolford/JSC via S. Steinberg-Wright/JSC (9/2009) |                                       |                   |
| <b>Key Personnel Changes/Previous PI:</b>         |   |                                       |                   |
| <b>COI Name (Institution):</b>                    | Wallace, William ( Universities Space Research Association )  |                                       |                   |
| <b>Grant/Contract No.:</b>                        |   |                                       |                   |
| <b>Performance Goal No.:</b>                      |   |                                       |                   |
| <b>Performance Goal Text:</b>                     |   |                                       |                   |

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| <b>Task Description:</b>                    | <p>With the plan in place to return humans to the moon by 2020, it is imperative to understand the hazards that may be faced and to determine ways to minimize them. Understanding the effects of lunar dust on both human physiology and mechanical equipment is one of the most pressing concerns, as problems related to lunar dust during the Apollo missions have been well documented. While efforts were made to remove the dust before reentering the lunar module, via brushing of the suits or vacuuming, a significant amount of dust was returned to the spacecraft, causing various problems. For instance, astronaut Harrison Schmitt complained of “hay fever” effects caused by the dust, and the abrasive nature of the material was found to cause problems with various joints and seals of the spacecraft and suits. It is clear that, in order to avoid potential health and performance problems while on the lunar surface, the negative properties of lunar dust must be quenched.</p> <p>Our research will focus on several related areas of research regarding lunar soil: 1) understanding the activation and deactivation processes of lunar soil, as well as how to monitor these processes, 2) understanding the properties of lunar soil in solution (dissolution), and 3) understanding the effects of lunar soil on cellular systems. Initial studies will be carried out using several different materials. Due to the scarcity of pristine lunar soil, tests will be conducted with lunar simulant, JSC-1A-vf, and quartz and titania, which have been used as positive and negative controls, respectively, in toxicological studies. Knowledge of the activation and deactivation processes is important due to the likely passivation of the active surfaces of lunar soils prior to their transfer to long-term storage. In order to determine methods for dust mitigation on the lunar surface, we must first activate the materials and determine the best methods for deactivation. Additionally, the particles themselves may not require activation in order to be toxic. Therefore, dissolution and cellular toxicity studies will be carried out to determine if any toxic properties of lunar soil are due simply to their chemical makeup.</p> |
| <b>Rationale for HRP Directed Research:</b> |  |
| <b>Research Impact/Earth Benefits:</b>      |  |
| <b>Task Progress:</b>                       | New project for FY2007. Task added to Task Book in May 2009.   |
| <b>Bibliography Type:</b>                   | Description: (Last Updated: 12/20/2011)  |