

<b>Fiscal Year:</b>	FY 2012	<b>Task Last Updated:</b>	FY 08/24/2012
<b>PI Name:</b>	James, John T. Ph.D.		
<b>Project Title:</b>	LADTAG Lunar Dust Health Standard		
<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 (2) <b>Medical Conditions</b> :Risk of Adverse Health Outcomes and Decrements in Performance Due to Medical Conditions that occur in Mission, as well as Long Term Health Outcomes Due to Mission Exposures (3) <b>Renal Stone</b> :Risk of Renal Stone Formation		
<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>Organization Name:</b>	NASA Johnson Space Center		
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<b>Zip Code:</b>	77058	<b>Congressional District:</b>	22
<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>	09/30/2013
<b>No. of Post Docs:</b>	0	<b>No. of PhD Degrees:</b>	0
<b>No. of PhD Candidates:</b>	0	<b>No. of Master' Degrees:</b>	0
<b>No. of Master's Candidates:</b>	0	<b>No. of Bachelor's Degrees:</b>	0
<b>No. of Bachelor's Candidates:</b>	1	<b>Monitoring Center:</b>	NASA JSC
<b>Contact Monitor:</b>	Whitmore, Mihriban	<b>Contact Phone:</b>	281-244-1004
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<b>Flight Program:</b>			
<b>Flight Assignment:</b>	NOTE: End date changed to 9/30/2013 per PI (Ed., 8/17/2012) NOTE: End date changed to 8/7/2012 per HRP SMO information (Ed., 12/14/2011) NOTE: End date changed to 9/30/2011 per HRP SMO information (Ed., 10/14/2011) 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>	none		
<b>COI Name (Institution):</b>	Khan-Mayberry, Noreen ( NASA Johnson Space Center ) McKay, David ( NASA Johnson Space Center ) Jeevarajan, Antony ( NASA Johnson Space Center ) Loftus, David ( NASA Ames Research Center ) Lam, Chiu-wing ( Wyle Laboratories )		
<b>Grant/Contract No.:</b>	Directed Research		

<b>Performance Goal No.:</b>	
<b>Performance Goal Text:</b>	
<b>Task Description:</b>	<p>Although there were a few early attempts to understand the toxicity of lunar dust obtained by Apollo astronauts or the Lunar probes, no scientifically defensible toxicological studies have been performed on authentic lunar dust. The multi-center LADTAG (Lunar Airborne Dust Toxicology Advisory Group) was formed and responded to a request from the Office of the Chief Health and Medical Office (OCHMO) to develop recommendations for defining risk criteria for human lunar dust exposure, and then set an environmental standard. The Lunar Airborne Dust Toxicology Advisory Group (LADTAG), chaired by Dr. John T. James, NASA's Agency Toxicologist &amp; Dr. Russell L. Kerschmann, ARC Space Life Science Division Chief &amp; board certified pathologist, formed a world class group of technical experts in lunar geology, inhalation toxicology, biomedicine, cellular chemistry and biology from within the agency along with the nations' leading external experts in these fields. Based upon LADTAG's recommendations, NASA decided to develop a research database on which a defensible exposure limit can be set. Lunar Dust Toxicity Research Project's analysis of lunar dusts and lunar dust simulants will include detailed particle characterizations (size distribution, morphology, and mineralogy), determining the properties of particle activation (degree of reactivity and persistence of reactivity), determining how to reactivate lunar dust, the process of dust passivation and discerning the pathological mechanisms of lunar dust exposure via inhalation, intratracheal instillation, cell culture exposure, dermal exposure and ocular exposure. The resulting set of health standards will be time-based and will vary by the duration and type of exposure. It may also be necessary to set multiple standards for different types of lunar dust, as well as, for dust in its fresh or activated state vs. aged and passivated dust. Development of time-based standards, acute exposure limits, exposures of a few hours, and chronic exposure limits, episodic exposures up to six months, for inhalation (pulmonary) toxicity and human risk criteria will be developed no later than 2010. LDTRP does not rule out the development of setting other (non pulmonary) standards and human health risk criteria, for dermal and ocular exposure, contingent upon research findings of non-airborne dust toxicity studies.</p>
<b>Rationale for HRP Directed Research:</b>	This research is directed because it contains highly constrained research, which requires focused and constrained data gathering and analysis that is more appropriately obtained through a non-competitive proposal.
<b>Research Impact/Earth Benefits:</b>	Improved understanding of the pulmonary toxicity of mineral dusts.
<b>Task Progress:</b>	<p>Our inhalation study has been modified to perform additional inhalation work to demonstrate a no-effect level in test animals. We are about to begin a supplemental inhalation study at lower concentrations, and we have been granted an extension to complete this inhalation work. We have been able to demonstrate adequate performance of our inhalation apparatus down to 2.5 mg/m<sup>3</sup>, well below the previous, lowest concentration of 20 mg/m<sup>3</sup>.</p> <p>Several publications are in process: the ocular toxicity has been accepted for publication in BMC Ophthalmology, and is in final formatting by the journal. Publications on the respiratory instillation studies are in preparation. Three other reports will be submitted to the journal Science within 2-3 weeks. In addition, we have a general manuscript on the mechanisms associated with mineral dust toxicity in test animals that is ready to go once the core of 3 papers is accepted.</p>
<b>Bibliography Type:</b>	Description: (Last Updated: 01/23/2014)
<b>Articles in Peer-reviewed Journals</b>	<p>Meyers VE, García HD, Monds K, Cooper BL, James JT. "Ocular toxicity of authentic lunar dust." BMC Ophthalmol. 2012 Jul 20;12:26. <a href="http://dx.doi.org/10.1186/1471-2415-12-26">http://dx.doi.org/10.1186/1471-2415-12-26</a> ; PubMed <a href="https://pubmed.ncbi.nlm.nih.gov/22817808/">PMID: 22817808</a> , Jul-2012</p>