Science/PP Interface Issues
For Mars Sample Return (MSR)

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Jan. 20, 2010

Pre-decisional: for discussion purposes only
Many MSR-related planning questions are separately of interest to PP and “science”.

However, some are of mutual interest:

1. *Some* contamination control aspects
2. *Initial subdivision* of returned samples
3. *Size and diversity* of the returned collection
4. Other?

_Ultimately, the mission can only be designed and operated around a single set of requirements._

_How can we ensure that both interests are served?_
Returned Sample Flow Overview

Samples collected on Mars

Pre-decisional: for discussion purposes only

Preliminary analysis on Earth

Decisions here affect all future sample use!

Returned samples subdivided

HAZARD ASSESSMENT

Implementation is sensitive to different kinds & degrees of contamination.

FULL PROGRAM OF ANALYSIS TO COMPLETE MISSION SCIENTIFIC OBJECTIVES
Questions for Science Planning:

✧ How do different levels of sample contamination affect ability to achieve scientific objectives?

Question for PP Planning:

✧ What are the effects of different sample contamination levels on determination of returned sample hazard potential?

Engineering Consequences of Above:

✧ What contamination control requirements during returned sample analysis should be adopted by the MSR campaign?
✧ How should they be applied to MSR’s various primary systems?
✧ What overall mission contamination control requirements must be implemented?
# Possible Overlapping Contamination-related Interests

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Maximize diversity for Science!

“but is that harder to test for biohazards”?

Maximize subsample **uniformity** for PP???

**OR**

Maximize subsample **diversity** for PP???

**Balance Issues**

1) **Samples must be subdivided**….
2) **Sample diversity vs total mass**?
3) **Statistically significant subsamples**?
4) **Destructive and nondestructive testing**?
5) **Sacrificial samples**?
6) **Well-mixed vs. discrete materials**?
A call for action!

NASA's 2018 sample caching mission:

- Announcement of Opportunity (AO) scheduled for ~May, 2012
- System Requirements Review (SRR) for ~Feb. 2013

**Science inputs**

Science team proposes quantitative contamination limits relevant to science & total sample mass needed

**PP inputs**

PP bodies (on an international basis) determine quantitative contamination limits relevant to PP, & total sample mass needed

A coordination group consolidates and integrates, proposes draft requirements

**Integration**

- NASA-initiated efforts
  - Summ/Fall, 2011?
- ESA Study
  - Fall 2012

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Acronyms

- PP Planetary Protection
- MSR Mars Return Sample
- MEPAG Mars Exploration Program Analysis Group
- E2E-iSAG End-to-End International Science Analysis Group
- RS Returned Samples
- NASA National Aeronautics and Space Administration
- MCR Mission Concept Review
- AO Announcement of Opportunity
- SRR System Requirements Review
- ESA European Space Agency