Human Research Program
2010 Chair Standing Review Panel Meeting

Final Report
January 2011

I. Executive Summary & Overall Evaluation

The 13 Human Research Program (HRP) Standing Review Panel (SRP) Chairs, and in some cases one or two additional panel members (see section XIV, roster), referred to as the Chair (+1) SRP throughout the remainder of this document, met at the NASA Johnson Space Center (JSC) on December 7, 2010. The purpose of the meeting was to assess integration across the HRP scientific disciplines based on a recommendation from the 2009 HRP SRP review. During the one-day meeting, each of the HRP Elements and Projects presented the changes they made to the HRP Integrated Research Plan (IRP Rev. B) over the last year, and what their top three areas of integration are between other HRP Elements/Projects. The Chair (+1) SRP spent sufficient time addressing the panel charge, either as a group or in a separate closed session, and the Chair (+1) SRP and the HRP presenters and observers, in most cases, had sufficient time to discuss during and after the presentations. The SRP made a final debriefing to the HRP Program Scientist, Dr. John B. Charles, prior to the close of the meeting on December 7, 2010.

Overall, the Chair (+1) SRP concluded that most of the HRP Elements/Projects did a commendable job during the past year in addressing integration across the HRP scientific disciplines with the available resources. The Chair (+1) SRP agreed that the idea of integration between HRP Elements/Projects is noble, but believes all parties involved should have the same definition of integration, in order to be successful. The Chair (+1) SRP also believes that a key to successful integration is communication among the HRP Elements/Projects which may present a challenge. The Chair (+1) SRP recommends that the HRP have a workshop on program integration (with HRP Element/Project representatives and maybe outside experts), to interpret the several meanings of integration and how they best can be implemented for the HRP.

Another suggestion regarding integration between HRP Elements/Projects is that the HRP convene a meeting of scientists who have a good record of pursuing multidisciplinary/integrative research in the general areas that are relevant to the HRP; identify those that are of high priority; and then support research on those, giving priority to multidisciplinary/integrative teams in which all relevant HRP disciplines are represented. Some of these teams may be already established and functioning within the HRP; others might be organized in response to NASA's research announcements.

Lastly, the Chair (+1) SRP felt that there were two overarching issues that spanned across all of the HRP Elements/Projects. The first, which was discussed in great detail, is access to the astronaut medical records, psychological as well as physical. New research will not be useful unless one has access to what has been done, what has worked, and what has not worked. Second is access to records of what medications are being taken by the astronauts while in-flight.

The Chair (+1) SRP feels that there needs to be good medical reconciliation to know beginning to end what is happening healthwise to the astronauts.

Although not all of the SRP members attended the face-to-face meeting in Houston, they all received copies of the review materials provided by the HRP Elements/Projects and provided feedback to their appropriate 2010 SRP chair. Below are detailed comments from each of the HRP SRPs (except Pharmacology) based on the information they received prior to and during the meeting on December 7, 2010.

II. Comments from the Advanced Environmental Health/Advanced Food Technology (AEH/AFT) SRP

Advanced Food Technology Discipline:

The overall direction of Advanced Food Technology at NASA remains similar to directions presented and discussed at the initial AEH/AFT SRP meeting held in November 2009. The focus of the current review is on integration with other areas within the HRP, and did not reference the efforts devoted to processing and preparation systems associated with the Mars mission. It is assumed that these efforts are continuing, but with appropriate revisions needed to respond to current changes in the direction of the mission. The joint venture (with Nutrition) on development of "high microbial concentration" foods does introduce a new set of questions about the fate of the microbial flora being introduced into a confined space during a space mission. These questions should be addressed as a part of the overall product development effort. In addition, a thorough review of the research literature on functional foods should be completed to ensure that these foods are developed in the most efficient manner. The efforts to ensure acceptable food systems and the impacts on crew behavior will require more careful integration with the Behavioral Health and Performance Element during the product development steps, with specific attention to the interface between sensory panels and consumer insights.

Advanced Environmental Health Discipline:

The AEH/AFT SRP felt that the microbiology research has not changed since last year. Based on what was presented to the SRP, there is no way of evaluating whether the work is appropriate or not, let alone what integration is being done. The SRP felt as though none of the microbiology research was being outsourced and that this is a huge deficit in the research. There is a lot of good research being done outside of NASA in environmental microbiology and it would be beneficial for this group to try and reach out to other scientists.

III. Comments from the Behavioral Health and Performance (BHP) SRP

The BHP SRP appreciated the presentations and discussions by and with the BHP Element and the HRP staff, but the Chair (+1) SRP meeting did not accomplish what the SRP expected. Perhaps inescapably, the presentations were primarily concerned with the issues faced by each disciplinary area and implications for and from other areas were generally merely mentioned, not explored in any depth. The SRP is aware that this may have been a function of the time constraints of the meeting and also of the fact that the panel chairs themselves had up to this

point been to a great extent focused on the issues that face HRP in each individual discipline.

The SRP was also disappointed in the lack of attention that the BHP Element paid to the thrust of their recommendation from the 2009 HRP SRP Final Report urging that more attention be paid to enhancing the behavioral health, performance, morale, etc., of astronauts rather than focusing narrowly on prevention and countermeasures targeting deficits and disturbances.

All of the disciplines in the BHP Element (behavioral health, individual and group performance, and sleep) are thoroughly interrelated. The SRP also feels that the BHP Element is closely related to most of the other HRP Elements/Projects as well, for example, physiological issues arising from microgravity, or radiation, degradation of immune functioning, poor nutrition, loss of bone and muscle integrity, etc.; all of these impinge on behavioral health and performance. In turn, behavioral health and performance has implications for how astronauts cope with the challenges of spaceflight in general, including the problems listed above, and with the special demands of Extravehicular Activities (EVAs) and surface exploration. The SRP felt that much of this complex interrelationship was given relatively short shrift in the presentations and discussions at the meeting.

When some of these concerns were raised at the meeting, they tended to be dismissed; for example, the question of how dietary changes designed to reduce bone loss would affect the taste of the food. Research shows that taste preferences are partly a matter of what one is used to; if, e.g., Americans are used to the taste of X amount of salt in their food, how will they react to a diet that contains 20% less than that? It is also known that familiar food, flavorful food, "comfort" food, and so on, are important influences on mood and morale in isolated, confined environments, and altering their taste has adverse consequences, while providing them at a satisfying level enhances morale and performance. No explanation of either the reasons or the consequences of the fact that astronaut food consumption is below terrestrial levels, sometimes drastically so in individual cases, was given. It could be a warning sign of possible malaise, depression, disaffection (a psychological symptom requiring attention); or it may just be a sign that the food is distasteful or that the individual is too busy to eat. Those would also be worthy of some kind of intervention. The SRP recommends that research programs that draw upon all relevant disciplines (e.g. nutrition, food science, sensory and social psychology) are needed.

The topic of illumination in the International Space Station (ISS) was also discussed at the meeting and is another example of a concern that was dismissed by the BHP Element. Vision is obviously crucial to task performance, and perhaps less obviously, but with thorough documentation, to mood and social interaction; yet a dim light level is tolerated "because the system is old." The SRP feels that the human factors discipline needs to be serious about this, and also about how the monotonous internal environment can be made more interesting and varied by changes in the level, color, pattern, etc., of illumination and by allowing some control over illumination to be exercised by the astronauts.

The SRP urges the HRP to foster the inclusion of behavioral health and performance components in multidisciplinary approaches to a wider range of concerns.

IV. Comments from the Bone and Muscle Risk SRP

Bone Discipline:

1. The Bone SRP commends the Human Health Countermeasures (HHC) Element for addressing the recommendations in the 2009 HRP SRP Final Report for greater integration of the bone and muscle research gaps and tasks, especially concerning nutrition, exercise, and pharmaceutical countermeasures.

2. A new research gap identified in the 2009 HRP SRP Final Report remains a high priority item. More information is needed to define the risk of bone loss as a function of mission duration and to define the post-flight risk of inadequate recovery of skeletal health. To these ends, it is recommended that existing databases and medical records be unified and exploited with advanced statistical methods. Innovative approaches and collaboration with Space Medicine need to be developed to expedite this important research. Such data mining is needed to identify possible factors (e.g., age, gender, bone mineral density (BMD), and other parameters at baseline; duration and numbers of missions; in-flight exercise, nutrition, vitamin D supplementation, pharmaceuticals, changes in weight/height) for associations with extent of bone loss. In addition, similar research is needed to test for associations for those factors and post-flight recovery of BMD and bone strength, fractures, non-union fractures, and kidney stones. The risk of intervertebral disc (IVD) damage can be better defined by a similar approach. Research is needed to ascertain the skeletal risks experienced from previous missions.

3. The SRP feels that it is important to incorporate advances in skeletal research into bone discipline tasks. For example, it is important to use state-of-the-art methods, such as extreme computed tomography (CT) scanning, for measuring changes in bone quality in-flight and post-flight. New methods are in development to monitor blood flow in bone and brain with a radio detection and ranging (RADAR) ultrasound device. Alternatives to bisphosphonates should be studied, such as denosumab and anti-sclerostin antibodies. It seems prudent to articulate a process for adopting advances in osteoporosis drugs into the bone discipline task portfolio.

4. It is highly commendable that the bone discipline participates in outreach activities such as NASA's first Bone Summit that was held at JSC on June 7 - 8, 2010. The SRP would benefit from seeing a list of annual outreach activities with short summaries of participating organizations, their recommendations, and action items.

Muscle Discipline:

1. The Muscle SRP agrees that the response of the HHC to the critique of muscle gaps and tasks was very good. While the response regarding muscle gaps and tasks itemized each task, old and new, in response to gaps in knowledge, old and new, the SRP feels the rationale behind each response needed more detail. For example, the SRP recommended that M3, M4 and M5 be restated and integrated into one gap and include a larger set of tasks. The HHC response was that tasks are better left separate to allow greater flexibility. More detail would have aided the SRP in understanding the rationale for this

apparent disagreement and better understand how the HHC planned to move through the various related projects.

2. While it was good to see the muscle discipline return to basic muscle interests it is strongly recommended that they reach out to the sensorimotor group integrating the sensory properties of muscle into the total picture of movement control. Several new gaps have been proposed, e.g. M23 and M24, but these efforts came from the Nutrition SRP. Still others came from the Sensorimotor SRP, e.g. SM7. The muscle discipline needs to reach out to groups other than the traditional exercise group, for example, seeking an integrated approach to solving the challenges of living and working in microgravity.

3. It is strongly recommended that the emphasis on cardiovascular fitness include submaximal estimates of performance both in cardiovascular loads and muscle and joint loading. Max$V0_{2max}$ measures just that, i.e. maximal oxygen uptake capabilities, and does not correlate highly with individual performance. These recommendations are presented in light of the prolonged discussion by the SRP and the HHC scientists on task assessment, pre- and post-flight task performance, post-flight performance, etc.. Addressing these general issues of performance assessment/demands on the human body in microgravity warrants a more holistic approach involving integrated systems physiology and collaborations with the traditional exercise physiologists, human factors engineers and sensorimotor physiologists to name a few.

4. The HHC's response to the SRP's critique (2009 HRP SRP Final Report, page 13) that tasks used to address gaps M7, M8 and M9 should be re-evaluated, i.e., not all task directly address the gaps, requires further explanation. What was HHC's rationale for their disagreement with the SRP critique (see previous comments related to more detail needed in the HHC response). The goal of establishing a minimal exercise regimen to maintain fitness levels required by tasks identified as critical to mission success has its foundation in understanding performance demands on the crew during their missions on the ISS. Task performance is critical, specific task demands need to be better understood. The SRP suggested some of the eight proposed tasks were not at all related to the gaps as understood by the SRP. This critique was not completely addressed. For example, 1) why was gap M7 given high priority and M8 given a low priority (IRP Rev. B page 417)?; 2) statements such as "*this task addresses minimal hardware and protocols needed to maintain fitness for space exploration*," "*findings may minimize the volume of exercise needed*" and "*evaluating potential supplements that may allow for reduced exercise hardware or time spent exercising*" appear rather general (see IRP Rev. B). The SRP concedes more information is needed but understanding task demands in microgravity, in the presence of declining capabilities, is paramount. How the tasks itemized in the IRP Rev. B will explicitly supply the needed information remains unknown. Additional clarification for the SRP would be helpful.

V. Comments from the Cardiovascular Risk SRP

The cardiovascular component of the HHC Element was seen as highly responsive to the recommendations made by the Cardiovascular Risk SRP in the 2009 HRP SRP Final Report. A number of activities have been consolidated and new programs initiated. Discontinuation of the lunar analog bed rest program was appropriate. Most importantly, a number of longstanding issues that were addressed over many years have been concluded or otherwise finalized and streamlined. Studies of lower limb arteriole atrophy and the influence of promethazine on orthostatic tolerance have already produced relevant data.

The major focus of 2009 Cardiovascular Risk SRP review was discussion of how certain cardiovascular issues and their countermeasures could be integrated with ongoing work or future planning in the nutrition area and also the bone muscle areas. Solid evidence was presented that this integration is underway and that the three disciplines working on these problems are integrating and coordinating their efforts. Additionally, integration is also evident in the Functional Task Test and the SPRINT testing. The cardiovascular group in the HHC Element was also responsive to concerns about promethazine use by astronauts. This was discussed again at this year's Chair (+1) SRP meeting and highlights the continued need for better communication/collaboration between the HRP and medical elements of space flight and astronaut clinical care.

Strong evidence was presented demonstrating that all the recommendations made by this SRP in the 2009 HRP SRP Final Report were acted upon and that substantial progress has been made in the last 12 months. There is ongoing concern related to promethazine that was also discussed.

VI. Comments from the Extravehicular Activity (EVA) Risk SRP

The EVA Risk SRP feels that the EVA discipline will be the area of the HRP most impacted NASA's new mission goals and objectives for human space exploration. Until recently, a significant focus of EVA has been on lunar exploration, however, this is now in question.

After the recent review at the Chair (+1) SRP, where the Panel received an update from all of the HRP Elements/Projects, the following are the observations and comments from the EVA Risk SRP:

1. **EVA Physiology, Systems, and Performance: Optimizing EVA and Human Performance**
    a. NASA now has different mission objectives being considered, i.e., lunar, near-Earth asteroid (NEA), etc., which dramatically changes the programmatic goals for EVA. The biggest issue remains the lack of a clearly defined exploration mission objective, which will ultimately drive the specific EVA needs. Until NASA decides on mission objectives (i.e., mission to a NEA or the moon/Mars for example), the suit design tasks can only focus on mostly generic EVA components and related technologies rather than definition of a complete system. Little is known about the proposed new environments/mission scenarios.

b. The restructuring of the human spaceflight program is obviously going to greatly impact all EVA R&D activities since spacesuit design requirements are highly dependent on mission goals.

c. The EVA Risk SRP concurs with the hold on suiting testing until mission objectives are clarified.

d. The EVA Risk SRP believes the NASA mission objectives must be defined before analog testing can be conducted.

2. Occupant Protection

a. The emphasis on occupant protection is needed work and it is good that the effort is being worked in collaboration with the Space Human Factors Engineering project. The information presented during the Chair (+1) SRP meeting indicates a good understanding of the problem, and a reasonable set of near term forward work. The EVA Risk SRP suggests that NASA also contact the Fédération Internationale de l'Automobile (FIA), the international body for motor sport. The FIA, and Formula 1 in particular, have an extensive and sophisticated crash safety program.

b. In regards to the new emphasis on occupant protection, NASA should consider the relationship of the design of Intravehicular Activity suits for launch, entry and abort, and/or perhaps have some bearing on suit design against an EVA crewmember colliding with an object or falling on a planetary surface. The operational goals are described as including 'to develop standards by which all future spacecraft and hardware systems will be evaluated for crew injury protection' which appears to extend the study from suits to overall vehicle design safety implications. While this is arguably an important consideration, it is not clear how this might actually be accomplished without additional clarification.

3. Decompression Sickness (DCS)

a. A 2010 Non-Advocate Review Panel performed a risk status review of the Risk of Decompression Sickness in Lunar Mission Operations, and recommended that a "*detailed long-term research plan should be developed… not only to define the DCS risk for the specific scenarios presented, but also the broader based research goal of determining the basis for determining the risk for future scenarios…There is a need to perform extensive and comprehensive human research studies to evaluate the risk of DCS based on the anticipated operational mission scenarios*."

b. The first stage in the mitigation of any operational risk, including the risk of DCS, should be to attempt to eliminate the risk through engineering out the DCS risk to the extent possible. DCS risk should not be an inherent part of nominal spaceflight operations. With current fiscal constraints, the setting of priorities will be important.

c. The current budget NASA has allocated towards studying the DCS problem would be better directed toward acting on the problem by devising an effective engineering solution for nominal EVA operations. The remaining efforts in the arena of DCS should be directed at determining if credible, survivable, off-nominal DCS scenarios are likely to be encountered, and, if so, if means of reasonable cost and complexity can be brought to bear on those scenarios to reduce their probability or severity.

4. **Budget**
   a. The EVA Risk SRP continues to request the budget information for the EVA discipline. The point of the SRP's work is to help NASA direct limited resources (particularly money) in a fashion such that overall programmatic risk is minimized. Without a sense of how much money will be spent on the EVA discipline and how much risk reduction will be bought thereby, it is not possible to judge the worth or relative priority of each research project. However, without any budgetary information, it is still impossible to evaluate the relative scope of the various tasks and thus determine whether one task or the other is consuming too much of the overall HRP resources.

5. **Integration of Disciplines**

   There is a general need for more integration with other disciplines. The cross directorate JSC team activities aimed at integrated suit testing appear to offer a means of taking into account the EVA Risk SRP recommendation in the 2009 HRP SRP Final Report to address countermeasures in the context of suit design and operations; however, with the programmatic changes made by NASA that cancelled the lunar missions since the 2009 Final Report, this work may not be as relevant at the present time with no clear NASA mission goals to help prioritize EVA suit needs.

VII. Comments from the Exploration Medical Capabilities (ExMC) SRP

The ExMC SRP was disappointed in the progress the ExMC Element has taken over the last year. The emphasis during the 2009 HRP SRP meeting was on the various condition lists; addressing those gaps and addressing the integration with all the other disciplines. What was presented at the 2010 Chair (+1) SRP was an emphasis on technology and the technology watch which the SRP gave very little priority. The technology watch is something that the ExMC Element has tried to integrate in the majority of the tasks. The ExMC Element states that they are integrating across disciplines on technology watch, but the SRP emphasized that they could not just focus on technology, but also need to focus on the various problems that were being addressed by the other disciplines. Integration within the disciplines, not necessarily what they were doing towards integration, but integration in terms of finding solutions for some problems was more important. The SRP did recognize that the telemedicine was included, which is important, but it is an isolated topic.

What was most disappointing to this SRP is that the number one recommendation from the 2009 HRP SRP meeting was that the conditions list needed to be made more widespread and more

integrated with the other disciplines. All that was presented to the 2010 Chair (+1) SRP was that the conditions list had been updated, but nothing else. Integrating the conditions list, would be beneficial to all of the HRP Elements/Projects.

VIII. Comments from the Immune Risk SRP

The Immune Risk SRP is very pleased with the way the HHC Element has taken the suggestions from the 2009 SRP. The Immune SRP recommends that the HHC Element at least bring up to a level, if not prioritize biomarkers as opposed to the emphasis on some of the molecular mechanisms. While those are interesting, those are more removed when translated to human health than biomarkers.

IX. Comments from the Nutrition Risk SRP

The Nutrition Risk SRP feels that the HHC Element has addressed the concerns from the 2009 SRP, particularly the potential role of the systemic inflammatory response in the development of altered nutritional status and metabolic regulation during spaceflight, particularly for missions of longer duration. The development of programs investigating very long chain polyunsaturated fatty acids of the omega-3 class represent one of these measures, and of course there may be others including the role of other specific nutrients such as arginine and glutamine for immune enhancement, low glycemic index diets reduced in saturated fats for reduced inflammatory stimulation, and meal replacement formulas for the anorectic astronaut to name a few. The SRP believes that the Nutrition Group is pursuing this field appropriately. The SRP did also mention the use of new state of the art kinetic techniques to model substrate utilization but this was intended as a suggestion for consideration. The SRP believes the HHC Element has responded to the 2009 SRP Final Report in an excellent fashion.

X. Comments from the Sensorimotor Risk SRP

The HHC responses to the recommendations of the 2009 Sensorimotor Risk SRP are exemplary. The great majority of the topics raised in the prior review have been addressed in appropriate and innovative ways that will likely lead to mitigation of the risks the panel identified. The issue of promethazine remains a concern. The plan to explore antagonists to cancel the effects of promethazine may help mitigate some of the adverse effects of this drug although the antagonists themselves may cause other sensorimotor problems. Future efforts should include evaluation of alternative drugs and of the pre-habilitation training that is being investigated as better treatments of space motion sickness.

NASA's researchers have also been commendably proactive in developing links between their work and that of other groups. Additional links might be sought in the areas of sleep, radiation and mental health.

XI. Comments from the Space Human Factors Engineering (SHFE) SRP

Based on the content presented by the SHFE Project, it was not possible for the SHFE SRP to

determine the status of recommendations from the 2009 SHFE SRP Final Report. Specifically, the SRP could not tell which risks, gaps, and tasks got incorporated by the SHFE program. The SHFE Project indicated the three previous risks had now been incorporated into five new risks, briefly summarized as:

- Trust in automation & robotics (suggested as a new risk by the SRP in 2009)
- Training
- Usability and Workload
- Human Factors Tools and Models
- Human-Computer Interaction and Architecture

The material presented during the Chair(+1) SRP meeting appeared to be part of a work in progress, which would require a second conversation once the new organization had been put into place, in order to map the SRP inputs from the 2009 Final Report to the new risk structure.

The SRP would like a feedback loop with the SHFE Project identifying what has been incorporated from the work we have already done, and help the SRP understand how the new risk structure maps onto the old one that was presented for the 2009 SRP review.

The SRP thought it was evident from the presentations of other HRP Elements/Projects, particularly BHP and EVA, that they were considering and had already proposed mechanisms for integration with SHFE deliverables. There are numerous points of integration that the SHFE SRP think should be occurring between SHFE and the following HRP Elements which were not apparent from those Elements' presentations:

- Sensorimotor, in terms of performance under vibration and acceleration conditions.
- Exploration Medical Capabilities, in terms of medical information system design and training.

In general, the SRP recommends that integration should be sought between the SHFE Project:

- Any disciplines proposing information systems for use by humans, which require design and testing of displays and controls, and
- Any disciplines designing tasks for performance by humans.

Lastly, the SRP recommended in the 2009 SRP Final Report and continues to strongly feel that access to critical incident data from past NASA missions is essential to determining the potential for human error on future exploratory missions with humans using machine systems.

XII. Comments from the Space Radiation SRP

The Space Radiation SRP was very impressed with the Space Radiation Element. The SRP feels that they have done an outstanding job in what they would call vertical integration; going from radiation in space, to spacecraft, orbits, molecules, cells, people, law, ethics; the whole range is well covered. "Horizontal" integration across disciplines is different and may neither be required nor appropriate in all cases with respect to the Space Radiation Element. The SRP believes that the Space Radiation Element, like the other HRP Elements/Projects would greatly benefit from a workshop to discuss integration across disciplines.

XIII. 2010 Chair (+1) Standing Review Panel Meeting Charge

The 2010 Human Research Program (HRP) Standing Review Panel (SRP) is chartered by the HRP Program Scientist at the NASA Johnson Space Center (JSC). The goal of the HRP is to provide human health and performance countermeasures, knowledge, technologies, and tools to enable safe, reliable, and productive human space exploration. The purpose of this 2010 HRP Integrated SRP (ISRP) is to evaluate and comment on integration across the HRP scientific disciplines. The 2010 Integrated SRP will be composed of the chairs of the 2009 Individual SRPs plus, normally, one other member from each panel. Your report will be delivered to the HRP Program Scientist and will also be provided to other personnel throughout HRP for consideration in developing the next iteration of the HRP Integrated Research Plan (IRP). Once the report is finalized it will be made available to the public.

The SRP chairs are asked to consider the following when assessing the HRP discipline integration in preparing their reports:

A. Does the revised IRP Rev. B adequately address integration across the HRP disciplines necessary to achieve the objective of understanding and mitigating risk to human space exploration?

    i) Are any important areas of potential integration across disciplines missing in the IRP?
    ii) Are gap or task dependencies across risks, elements, and disciplines adequately identified?
    iii) Given that the IRP will likely be reorganized or restructured, are there better ways to promote integration in the document?

2. Comment on any additional information provided by the HRP that is not addressed in #1 or 2 above (e.g., IRP Rev. B incorporation of SRP 2009 recommendations).

3. Expect to receive review materials at least eight weeks prior to the site visit. All SRP members will receive review materials even though only a subset will attend.

4. Via email or a teleconference (set up through NRESS), discuss the review materials with your 2009 SRP panel prior to the meeting in December. Be sure that you have all questions or concerns that your SRP panel would like you to relay during the meeting.

5. Attend the ISRP meeting at NASA/JSC on December 7, 2010.
    i) Attend presentations on integration, question and answer session, and briefing.
    ii) Prepare a draft report with recommendations on integration from the ISRP that will be briefed to the Program Scientist by the ISRP chairperson or panel. The report should address #1 and 2 above and any other information considered relevant by the SRP.

6. At the end of the meeting, debrief the HRP Program Scientist and members of the HRP Science Management Office of your recommendations and suggestions.

7. The meeting on December 7, 2010 will be transcribed by a stenographer. The NRESS Peer Review Administrator will use these notes to draft a report that contains the recommendations you suggested during the site visit. The final report should provide a comprehensive review of Item #1 above and any additional information from item #2. All participants will need to provide input to this report so that it can be submitted to the HRP Program Scientist no later than January 22, 2011.

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