JOHNS HOPKINS UNIVERSITY **Applied Physics Laboratory**
Laurel MD 20723-6099

SDO-12621
December 12, 2012

To: Distribution

From: D. Y. Kusnierkiewicz

Subject: Minutes and Action Items from the Van Allen Probes Post-Launch Assessment Review

Attachments: 1) List of Attendees
2) Action Items

The subject review was held at the JHU/APL on November 19, 2012. The review board membership was:

Steve Battel, Battel Engineering (via Meeting Place), Chair of the NASA Standing Review Board
Carolyn Dent, NASA GSFC, Mission Operations
Chris Hersman, JHU/APL, SD Assistant Chief Engineer, Systems Engineering
Mark Holdridge, JHU/APL, Section Supervisor, Mission Operations Management
Dave Kusnierkiewicz, JHU/APL Review Chair, Systems Engineering
Steve Thibault, JHU/APL, Group Supervisor Integration and Test

The review board unanimously concluded that the project had met the Post-Launch Assessment Review (PLAR) entrance and success criteria as defined in NPR 7123.1A. *Systems Engineering Procedural Requirements.*

Significant Items of Discussion

Overall, the instrument suite on the VAP spacecraft is producing very high-quality measurements of the radiation belt environment, and both spacecraft are performing well within expectation.

The EMFISIS team has reported a "rogue" narrowband signal at 2 kHz. This appears to be an intermodulation product that appeared after the EFW instrument turned on. Since the signal is not a broad-spectrum or multi-frequency emission it does not affect mag field measurements, and has no impact on the instrument performance.

The on-orbit performance of the (two) micro-dosimeters on the RPS-A instrument was characterized as "noisy", most likely due to the cold flight operating temperatures. There is no impact on instrument performance. The project agreed to open an anomaly report for the benefit of future missions. (The dosimeters have been baselined for Iridium NEXT). The parts were manufactured by Teledyne. The RPS PI (Joe Mazur) reported that many Teledyne parts have undergone manufacturing improvements since RPS took delivery of their parts.

The RBSPICE-A instrument has experienced anomalous operation with the time-of-flight portion of the instrument, which is not yet fully operational. This issue is documented in the JHU/APL Anomaly/Problem Failure Reporting system as PFR RB-P-56, and is also the subject of Tiger Team investigation. The performance of RBSPICE-A is being carefully monitored as attempts are made to bring it to a fully operational state. The RBSPICE-A energy system has been operating nominally since commissioning.

The RBSPICE-B instrument also experienced a similar anomaly with the time-of-flight system, but it has been successfully mitigated. It is noted that full achievement of Level-1 science requirements requires time-of-flight and energy measurements from both RBSPICE instruments.

One other operational issue from the review has now been addressed by a new flight software upload. (The issue was the subject of Action Item #1). The spin rate of the spacecraft increases in eclipse (the spin period decreases), resulting in large phase angle knowledge errors by the end of the eclipse period. This effect is due to contraction of the spin plane wire booms. A new flight software upload (FSW 4.0.1; uploaded to both spacecraft post-PLAR) revises the on-board model so the spin phase angle reported to the instruments accounts for spin rate changes during eclipse.

Several anomalies have occurred due to the radiation environment. The transceiver SRAM SEU counter experiences an anomaly that results in an erroneously high error count (Anomaly RB-A-503), and the IEM single-board computer and solid state recorder (from BAE) have experienced a higher-than expected rate of correctable EDAC errors (PFR RB-P-54). The transceiver anomaly is mitigated by existing normal operations procedures (resetting the transceiver firmware), and the IEM anomaly was successfully addressed with flight software upload 4.0. (which fixed in software a hardware design issue in the BAE bridge chip).

The Engineering Radiation Monitor (ERM) on spacecraft "A" experiences periodic "freezes". This behavior was seen before in ground thermal vacuum testing. The RBSPICE software detects this condition and resets the ERM. In addition, a life-limiting condition (the operation of a reed relay into a small capacitive load) has been identified in the ERM. Mitigation plans are being formulated. The ERM is not required to meet any mission science requirements, but nonetheless is providing a valuable data set on the accumulated radiation dose and charging environment.

Aside from the anomalies noted above, both spacecraft are operating nominally and all indications are that the spacecraft subsystems are healthy. The spacecraft power, thermal, and propulsion subsystems are performing as expected. Both spacecraft have over 20 kg of unallocated propellant reserves. The launch vehicle performance was very good.

Distribution:
Attendees
SD-MAC
SE Group Supervisors
Ed Birrane
Alice Bowman
Brian Duncan
Kevin Heffernan
Steve Pereira
Steve Williams
Archives

Attachment 1 to:
SDO-12621

List of Attendees

Name	Organization	
Leslie Ambrose	NASA GSFC	Leslie.l.ambrose@nasa.gov
Steve Arnold	JHU/APL	Steve.arnold@jhuapl.edu
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John Wygant (via Meeting Place)	University of Minnesota	jwygant@ham.space.umn.edu

Action Items

Action Item #1:
Originator: Carolyn Dent
Subject: Spin phase angle knowledge in eclipse
Presenter: Jim Stratton, slide 4.0-28
Action: Provide a more detailed characterization of the estimated spin rate/phase variation during eclipse. Address whether or not the required performance and knowledge can be achieved. If not, provide an assessment of the impact on science of not meeting the requirement.

Action Item #2:
Originator: As noted below
Subject: Documenting various lessons learned
Presenter: Jim Stratton
Action: Document, via the project PIMS Lessons Learned module, the lessons learned from:

a) The transceiver anomaly (RB-A-503). Originator: Chris Hersman. Reference Slide 4.0-14
b) The minor mechanical misalignment of the sun sensor during I&T. Originator: Steve Thibault. Reference Slide 4.0-23
c) The ERM Life-limiting mechanism. Originator: Steve Battel. Reference Slide 4.0-20.