



# **Herschel/Planck Project**

## **JPL PA Status**

**Tim Larson**

**JPL H/P Mission Assurance Manager**

**2<sup>nd</sup> Quarterly PA Managers Meeting**

**18 April 2002**

**Milan, Italy**

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- **JPL contributions:**

- **Herschel**

- SPIRE: Bolometer Detector Assemblies, JFET Modules, RF Filter Modules, cryo harnesses
- HIFI: High power amps, high and low frequency diodes, Band 5 and 6 mixers and LO chains

- **Planck**

- HFI: Bolometer modules (100GHz to 853GHz)
- LFI: Sorption cryo cooler subsystem (cold end interfaces with LFI and HFI instruments, mechanical and thermal attachment to the S/C structure and radiators)

- **PA Approach**

- **JPL Mission Assurance process applied to all project elements**
- **One Mission Assurance Manager and support team for consistent application across the project**
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- **Disciplines managed by MAM**
  - **Project Risk Management**
  - **Reliability**
    - Reliability analyses
    - Environmental requirements and testing
  - **Quality Assurance**
  - **Safety Assurance**
  - **Contamination Control**
  - **Materials and Processes**
  - **Electronic Parts Assurance**
    - Parts selection, evaluation, procurement
  - **Configuration Management**

- **Scope**

- **MAM is part of project staff with independent reporting path through the Office of Safety and Mission Success**
- **Mission assurance program is peer reviewed by MA organization**
- **MAM reports at:**
  - Project Monthly Management Reviews
  - Monthly OSMS reviews
  - Presents MA Fever Chart at quarterly program office reviews

- **SPIRE**
  - RAL comments incorporated, approval pending
- **HIFI**
  - Approved by SRON
- **LFI (Cooler)**
  - Draft submitted to Laben
- **HFI**
  - No formal requirement flowed down from Cardiff
  - Business Agreement references JPL Herschel Planck Project Mission Assurance Requirements document
  - Same MA processes/requirements are applied to HFI element

- **Materials and processes specialist reviews materials usage lists concurrently with design progress**
- **Non-standard materials and processes are identified and qualified prior to use**
- **Status –**
  - **SPIRE – all materials have been reviewed and approved. Will finalize materials list and forward to RAL.**
  - **HIFI – materials are being reviewed, design in progress. Final list by CDR.**
  - **Cooler – materials review is up to date with current design status. One material to be qualified. Final list by CDR.**
  - **Hfl – all materials have been reviewed and approved.**

- **Project Interface Engineer coordinates all support from the parts assurance organization**
  - Parts selection, parts specialists, procurement, stores, kitting, FA lab
- **All electronic parts are used outside of standard temperature ranges (from 100mK to 120K)**
  - Custom made parts (HIFI diodes) are qualified at the part level (some are used in JPL HIFI hw, some are shipped to other HIFI consortium members)
  - Procured parts – DPAs and component evaluation performed where necessary
  - Parts will undergo rigorous assembly level qualification and acceptance test program

- **Contamination Control Plan is in place**
- **Contamination control engineer participated in earlier ESA contamination control working group meetings**
- **All facilities handling flight hardware are evaluated and certified to appropriate levels (most labs and assembly areas must meet class 100.000 level)**
- **When environmental tests are performed in areas not meeting the class 100.000 requirement, hardware is placed inside special fixtures for protection**



- **Reliability analyses**
  - FMECAs, WCAs, and PSAs performed as appropriate
- **Environmental requirements**
  - Thermal, vibration, EMC, radiation
- **Single Point Failures**
  - **SPIRE**
    - Will discuss potentially serious SPF issue at upcoming Detector Summit on April 24, 25
  - **HIFI**
    - Failures lead to loss of bandwidth
  - **COOLER**
    - Two identical, fully redundant coolers
  - **HFI**
    - Failures lead to gradual loss of bandwidth

- **Problem/Failure Reporting System**

- **P/FR system used to track all problems, anomalies, and failures on the flight hardware**
- **Includes description of problem, analysis of root cause, corrective action, and verification**
- **Requires review by CogE, project element management, reliability, safety, MAM**
- **Problems with serious impact and/or uncertain corrective action result in a 'red flag P/FR' requiring project manager approval for closure**

- **Safety engineer reviews all facilities, tests and processes that could threaten the hardware**
  - **Operational Safety Reviews**
  - **Pre-test Reviews**
  - **Facility Safety Reviews**
- **Safety Data Package will be prepared for the Sorption Cooler**

- **Quality Assurance reviews and approves all AIDS (Assembly and Inspection Data Sheets) that control all assembly, handling, test and other activities on the flight hardware**
  - These AIDS define the inspection points
  - AIDS are maintained under configuration control
- **PA/QA personnel review all qualification and acceptance test plans and procedures**
- **QA personnel witness all tests**
- **Vendors are surveyed and approved by QA**
- **PA requirements are passed on to all subcontracts**

- No deliverable software

- **All controlling documents are listed in the Business Agreements and Specification Documents**
- **Drawing Trees list all drawings that define the hardware**
- **All test and engineering procedures, plans, AIDS, other documents, and drawings are placed in JPL PDMS (Project Data Management System) database**
- **This system is used to store and track release status of drawings and documents**
- **ECRs are part of this system, and are used to track changes to controlled documents and drawings**
- **All IRs (Inspection Reports) are also tracked in this database for CogEngineer disposition and QAE concurrence**

- **All EIDPs will include:**
  - **ADP**
  - **List of open IRs**
  - **List of open P/FRs**
  - **Handling Documents**
  - **Any other documentation defined in the Business Agreement**



# PA Documentation Status



Document	JPL-D	Status
Mission Assurance Requirements for the Herschel/Planck Mission	D-16642	Released 1/01
Herschel/Planck Risk Management Plan	D-16857	Released 11/00
Herschel/Planck Configuration Management Plan	D-16873	Released 1/01
Herschel/Planck Mission Assurance Plan (includes Parts/Materials/ Processes, Quality Assurance, Reliability)	D-16874	Released 2/01
Herschel/Planck Safety Plan	D-16875	Released 12/00
Herschel/Planck Problem/Failure Reporting Plan	D-19151	Released 10/00
Herschel/Planck Environmental Requirements Document	D-19155	Released 2/01
Herschel/Planck Contamination Control Plan	D-19156	Released 4/01
Herschel/Planck Quality Assurance Plan	D-19173	Released 9/01