



# PERFORMANCE ASSURANCE

**BRIAN KLATT**  
**MISSION ASSURANCE MANAGER**

*Cosmic **RA**y Telescope for the **E**ffects of **RA**diation*



# QUALITY ASSURANCE

- QUALITY MANAGEMENT SYSTEM
  - MEETS ISO 9001 INTENT
  - PROCEDURES AND PROCESSES DOCUMENTED
  - STRICT TRAVELER SYSTEM
- FAILURE REPORTING AND CORRECTIVE ACTION
  - ROOT CAUSE FAILURE ANALYSIS
  - 24 HOUR REPORT TO GSFC

*Cosmic RAY Telescope for the Effects of Radiation*



# SYSTEM SAFETY

- **PRELIMINARY HAZARD ANALYSIS**
  - POTENTIAL HAZARDS ARE
    - PURGE BOTTLE
    - HIGH VOLTAGE
    - RADIOACTIVE SOURCE
  
- **PROVIDE SUPPORT FOR**
  - SYSTEM HAZARDS ANALYSIS
  - OPERATIONS HAZARDS ANALYSIS
  - MISSILE SYSTEM PRELAUNCH SAFETY PACKAGE
  - SAFETY MEETINGS
  - ORBITAL DEBRIS ASSESSMENT
  
- **GROUND OPERATIONS PROCEDURES**
  - CRaTER Project will write procedures

*Cosmic **RA**y Telescope for the **E**ffects of **R**adiation*



# RELIABILITY

- **Failure Modes and Effects Analysis**
  - Interface Level
  - Critical Items List
  - Severity Category determined
- **Part Stress Analysis**
  - Derating per EEE-INST-002
- **Reliability Assessment**
  - Prediction per MIL-HDBK-217 (Part Count)
  - Probability of Mission Success ( $P_s$ )

*Cosmic RAY Telescope for the Effects of Radiation*



## SOFTWARE ASSURANCE

- CRaTER does not have any flight software
- CRaTER does not provide software for the spacecraft on-board computer.
- CRaTER Project will not be providing any software for the GSFC I&T System
- Software Assurance is not applicable for CRaTER

*Cosmic RAY Telescope for the Effects of Radiation*



# Risk Management

- Risk Management Plan is document number 32-01202
  - Identification
  - Analysis
  - Planning
  - Tracking
  - Controlling
  - Documenting

*Cosmic RAY Telescope for the Effects of Radiation*



# DESIGN REVIEWS

- Formal Reviews
  - Preliminary Design Review (IPDR)
  - Critical Design Review (ICDR)
  - Mission Operations Review (MOR)
  - Pre-Environmental Review (IPER)
  - Pre-Ship Review (IPSR)
  - Flight Operations Review (FOR)
- Peer Reviews
  - Frequent internal peer reviews conducted
  - Part of the configuration management process
  - Documented in the Configuration Management Plan

*Cosmic RAY Telescope for the Effects of Radiation*



# DESIGN VERIFICATION

- Performance and Environmental Verification Plan in process
- System Performance Verification Matrix
- Environmental Test Matrix
- Verification Procedures
- Instrument Verification Reports

(performance, structural, mechanical, EMC, vacuum, thermal)

*Cosmic RAY Telescope for the Effects of Radiation*





# WORKMANSHIP and ELECTRONIC PACKAGING

- **WORKMANSHIP**
- NASA-STD-8739.1 –Staking and Conformal Coating
- NASA-STD-8739.2 –Surface Mount Technology
- NASA-STD-8739.3 – Soldered Electrical Connections
- NASA-STD-8739.4 – Crimping, Cables, Harnesses, and Wiring
- NASA-STD-8739.7 - Electrostatic Discharge (ESD) Avoidance
- **PRINTED CIRCUIT BOARDS**
- IPC-2221 – Generic Standard On Printed Board Design
- IPC-2222 – Sectional Standard on Rigid PWB Design
- IPC-6011 – Generic Performance Specification for PWBs
- IPC -6012 – Qualification and Performance Specification for PWBs
- **NEW/ADVANCED PACKAGING**
- None

*Cosmic RAY Telescope for the Effects of Radiation*



# MATERIALS and PROCESSES

- Material Selection
  - Stress Corrosion Cracking
  - Condensable Volatiles - less than 0.1%
  - Total Mass Loss - less than 1%
- Shelf-Life Controlled Materials
- Materials Identification and Usage List
- Fasteners
- Lubrication - none
- Raw materials
- Processes
  - Conversion Coating (alodine and/or anodize)
  - Paint
  - No welding, brazing, or metallurgical joining

*Cosmic RAY Telescope for the Effects of Radiation*



## EEE PARTS

- Part Control Board - MAM and Systems Engineer
- Part Selection - EEE-INST-002 (SMDs, MIL, Mfg. HI-Rel)
- Part Qualification - EEE-INST-002
- Part Screening - EEE-INST-002
- Part Derating - EEE-INST-002
- Radiation
- CRaTER EEE Parts Database
- Alerts

*Cosmic RAY Telescope for the Effects of Radiation*



# CONTAMINATION CONTROL

- Contamination Control Plan is CRaTER document number 32-01203
- CRaTER Contamination Sensitivity
- Materials Selection
- Procedures
- Hardware Inspections
- Hardware Protection

*Cosmic RAY Telescope for the Effects of Radiation*



# PRESERVATION, PACKING, and HANDLING

## Control Flight Hardware

Segregate Flight Hardware

- Receiving
- Bonded Stock
- In-Process

Control Access

- Flight Assembly Area
- Bond Room

## Protect Flight Hardware

ESD Gloves and Coats

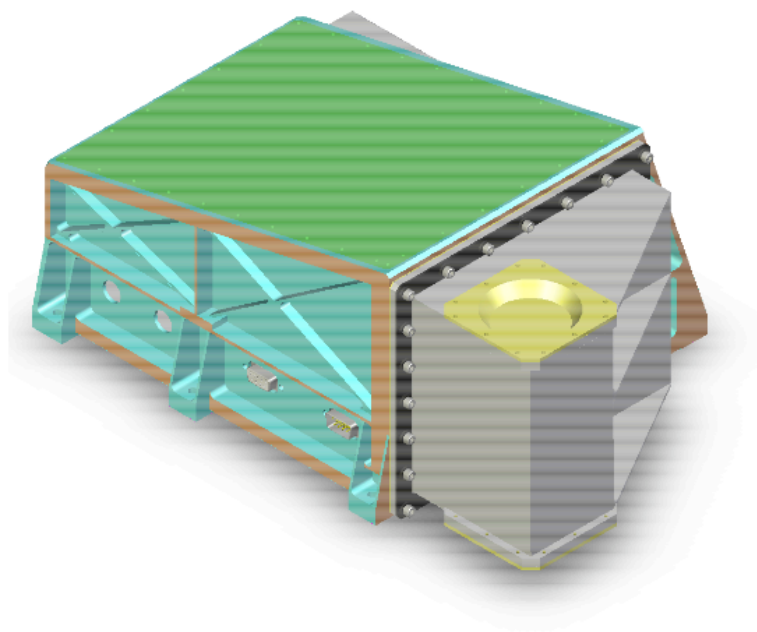
Grounded work areas

- Receiving, Bond, Assembly, Inspection, Integration, Test
- ESD Safe Tote Boxes

## Contamination Control

## Dedicated Shipping Containers

*Cosmic RAY Telescope for the Effects of Radiation*



*Cosmic RAY Telescope for the Effects of RADIATION*