

Rev.	ECO	Description	Author	Approved	Date
A	32-128	Initial Release	B. Klatt		5/18/06

CRaTER
Hazard Verification and Tracking

Dwg. No. 32-04014

Revision A

May 18, 2006

Hazard Verification and Tracking

Hazard Analysis of the CRaTER Instrument has identified three (3) potential hazards. Hazard Analysis Reports have been generated and submitted to GSFC as follows:

CR 01 Pressure Vessel *a dry nitrogen purge bottle*

CR 02 High Voltage *detector bias voltage*

CR 03 Ionizing Radiation *radioactive source*

All three hazards could be present during:

- Fabrication and Test at MIT
- Spacecraft Integration And Test at GSFC
- Launch Site Integration And Test

Each Hazard is explored for the three individual stages leading to launch and flight. These hazards are verified and tracked by Mission Assurance. Verification and Tracking methodology employs monitoring and witnessing of design, fabrication, integration, and test activities.

PRESSURE VESSEL

Fabrication and Test at MIT

The detectors in the CRaTER telescope have .001-inch aluminum bond wires between the bare silicon detector and the printed circuit board. The detectors are not sealed and are unprotected from the atmosphere. During fabrication of the Telescope, the detector boards are kept in a clean room. When the CRaTER Instrument is removed from the clean room, it is purged with dry nitrogen.

The dry nitrogen used for detector purge is supplied by Airgas Corporation and is supplied in stainless steel cylinders. These cylinders are periodically tested and approved in accordance with US DOT and OSHA approved Standards.

A final purge of the CRaTER Instrument is performed at MIT and the Instrument is then bagged, purged with dry nitrogen and sealed. The CRaTER Instrument is delivered to GSFC without a purge bottle.

CRaTER Mission Assurance witnesses or monitors all activities relating to system safety and hazards.

Spacecraft Integration and Test at GSFC

CRaTER personnel do not touch the CRaTER Instrument after delivery to GSFC. GSFC is responsible for supplying dry nitrogen and performing the purge on the CRaTER Instrument after delivery to GSFC.

Launch Site Integration and Test

CRaTER personnel do not touch the CRaTER Instrument after delivery to GSFC. GSFC is responsible for supplying dry nitrogen and performing the purge on the CRaTER Instrument after delivery to GSFC.

HIGH VOLTAGE

Fabrication and Test at MIT

The digital printed circuit board within the electronic housing includes a circuit that converts $\pm 5\text{VDC}$ to 75VDC and 225VDC . The high voltage is then routed inside the CRaTER Instrument enclosure to the Detectors.

During board test at MIT, the circuitry is exposed in open bench testing. Only trained personnel are permitted to touch flight hardware. Design Engineers perform the testing. A "**CAUTION - HIGH VOLTAGE**" sign will remind personnel of the hazard. After the boards are found acceptable for flight, they are installed in the CRaTER Instrument enclosure and the covers are installed. After this point, high voltage is not accessible. None of the external connectors or wires contains high voltage.

CRaTER Mission Assurance witnesses or monitors all activities relating to system safety and hazards.

Spacecraft Integration and Test at GSFC

None of the external connectors or wires contains high voltage.

Launch Site Integration and Test

None of the external connectors or wires contains high voltage.

IONIZING RADIATION

Fabrication and Test at MIT

After the CRaTER Telescope and Instrument electronics are integrated, a radioactive source is used to illuminate the detectors within the telescope. The source is Cobalt 60, 5.0 μCi in strength. CRaTER test personnel are trained, certified, and periodically recertified for handling this class of radioactive material. Untrained/uncertified personnel are not allowed to handle the radioactive source.

CRaTER Mission Assurance witnesses or monitors all activities relating to system safety and hazards.

A radioactive source is not provided with CRaTER hardware.

Spacecraft Integration and Test at GSFC

CRaTER testing at GSFC is performed with trained and certified personnel provided by GSFC. In addition, the radioactive source is provided by GSFC.

Launch Site Integration and Test

CRaTER testing at the launch site is performed with trained and certified personnel provided by GSFC. At this time, use of the radioactive source is not planned for launch site testing. If a radioactive source is needed, it will be provided by GSFC.

Hazard Verification and Tracking is Contract Data Requirements List (CDRL), item number 11,