



RADIATION & SURVIVABILITY ENGINEERING SERVICES

With more than six decades of experience, Northrop Grumman's Radiation & Survivability team provides specialized in-house testing and analysis services tailored to meet the unique requirements of customers in the aerospace and defense sectors. Located in Redondo Beach, California, our Radiation & Survivability Center of Excellence studies the impact of natural and nuclear weapon environments on aerospace systems, including:

- Satellite and missile programs
- Airborne platforms
- A broad classified portfolio

RADIATION TEST OPERATIONS

Our dedicated team conducts electronic tests in ionizing/particle radiation environments to assess degradation caused by the impacts of natural space conditions or nuclear weapons in our state-of-the-art Radiation Test Operations (RTO) Laboratory. RTO, which has served customers with its own irradiators since 1968, provides turnkey service solutions and offers cradle-to-grave test development, execution, and logistics.

NATURAL SPACE RADIATION & SURVIVABILITY TEST AND ANALYSIS

- Total Ionizing Dose, including Enhanced Low Dose Rate Sensitivity (ELDRS), and Displacement Damage
- Single Event Effect Criticality Analyses and Rate Calculations: Upsets, Latchup, Burnout, Transients, Functional Interrupts, Gate Ruptures
- Material Survivability Effects: Micrometeoroids & Orbital Debris, Atomic Oxygen, UV Degradation, etc.

NUCLEAR HARDNESS & SURVIVABILITY TEST AND ANALYSIS

Exo-and Endo- atmospheric threats:

- Transient Radiation Effects in Electronics (TREE) from Prompt Dose Photocurrents, High Dose Rate Total Ionizing Dose (HDR TID), and Neutron Displacement Damage
- Neutron Single Event Effects
- Electromagnetic Pulse (EMP) effects, such as High-Altitude (HEMP), Cable System Generated EMP (SGEMP), 'Box' Internal EMP (IEMP), etc.

RADIATION SIMULATION TOOL EXPERTISE

- Space and Hostile Radiation & Survivability Environment Calculations: AE9/AP9, OMERE, etc.
- Space Radiation Transport Modeling and Shielding Recommendations: FASTRAD, MCNP, NOVICE, etc.
- Hostile Effect Modeling: MCNP, THTK, SIRE, Redbook, etc.

RADIATION TEST OPERATIONS (RTO)

TESTING TO MIL-STD-883, MIL-STD-750, JESD57, & ASTM F1192 REQUIREMENTS



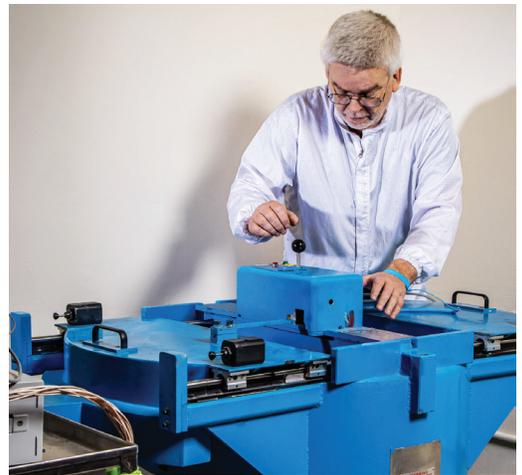
Beacon ELDRS Room Irradiators



Febetron 705 Flash X-Ray Machine



Gammacell 220 HDR TID Irradiators



J.L. Shepherd Model 142 ELDRS Irradiator



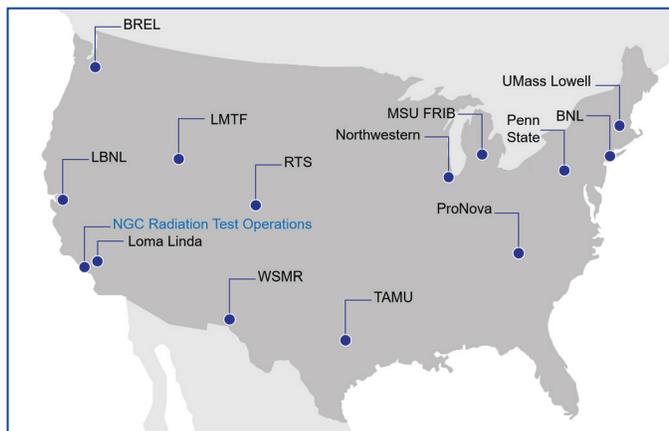
Hopewell DS20 ELDRS Room Irradiator

SERVICES WE PROVIDE

- Turnkey Test Development and Execution
- Irradiator Rentals
- Proposal Support and Consultation
- Environmental Modeling and Simulation
- Design Analysis and Support
- International Test and Analysis and Support

ACCESS & EXPERIENCE AT TEST FACILITIES

- Neutrons (1MeV, 14MeV): Penn State, U.Mass Lowell, WSMR, RTS, etc.
- Heavy Ions: TAMU, BNL, LBNL, MSU FRIB
- Protons: Loma Linda, Northwestern Univ., Mass. Gen. Hospital, ProNova, etc.
- Prompt Dose: WSMR, BREL, LMTF, etc.



Radiation & Survivability Website

ngc.com

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