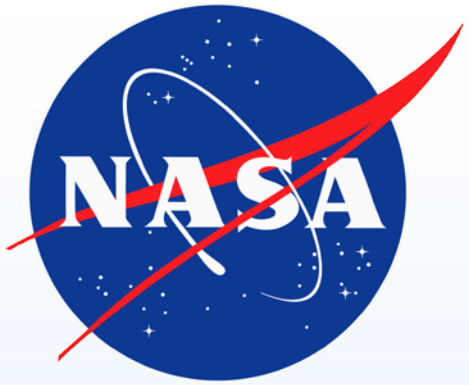

1st NASA Electronic Parts and Packaging (NEPP) Program
Electronic Technology Workshop (ETW)

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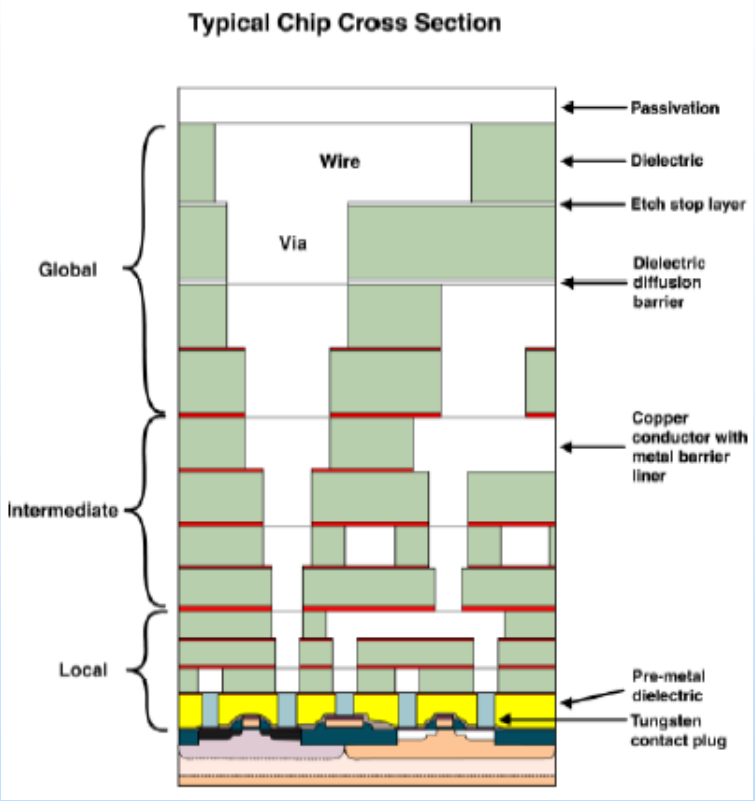
http://nepp.nasa.gov

NEPP Mission

- **To provide guidance to NASA:**
  - **Selection and application of microelectronics technologies**
  - **Improved understanding of risks related to the use of these technologies in the space environment**
  - **Appropriate evaluations to meet NASA mission assurance needs for electronic systems**
- **NEPP evaluates new* and emerging** electronic parts technologies and provides assurance support for technologies in current use in NASA spaceflight systems**



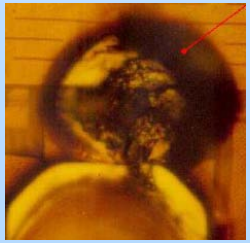
**New – Recently marketed, commercially available*

*** Emerging – Available in limited quantities for evaluation, on path to commercial products*

NEPP Overview

- NEPP supports all of NASA for >20 years
  - 7 NASA Centers and JPL actively participate
- The NEPP Program focuses on the reliability aspects of electronic devices
  - Three prime technical areas: *Parts (die), Packaging, and Radiation*
- Alternately, reliability may be viewed as:
  - Lifetime, inherent failure and design issues related to the electronic parts technology and packaging,
  - Effects of space radiation and the space environment on these technologies, and
  - Creation and maintenance of the assurance support infrastructure required for mission success.

Electrical overstress failure
in a commercial electronic device



NEPP Works Two Sides of the Equation

- **Assurance**
  - ***Issues that are applicable to space systems being designed and built (i.e., currently available technologies)***
  - **Examples**
    - **Cracked capacitors**
    - **DC-DC converter reliability**
    - **Enhanced Low Dose Rate Sensitivity (ELDRS)**
  - **Communication infrastructure via website and working groups**
    - **NASA Electronic Parts Assurance Group (NEPAG)**
  - **Audit and review support**
- **New electronics technology**
  - ***Issues that are applicable to the next generation of space systems in conceptualization or preliminary design***
  - **Examples**
    - **45-90 nm CMOS**
    - **SiGe**
    - **State-of-the-art FPGAs**
  - **Collaboration with manufacturers and government programs for test, evaluation, and modeling**
  - **Development of new predictive performance tools**

1st NEPP ETW

This meeting will focus on the presentation of the work being performed under the NEPP Program for the betterment of NASA and the greater aerospace community. This meeting will describe NEPP tasks that provide critical guidance, qualification methodologies, risk trades, and technology insertion information for current and new electronic technologies. This meeting will be of specific interest to flight project managers, system and design engineers, technologists, parts, packaging, and radiation specialists.

The meeting will be held at NASA/GSFC in Greenbelt, MD on June 22-24, 2010 and open to all US citizens from NASA, other government agencies, industry, and academia.

ETW Format

- **2.5 days of presentations**
  - **Invited talks on NASA and technology, power system architectures, FPGA studies, counterfeit electronics, workmanship, and more**
  - **Oral and poster presentations from task and area leads**
    - **Topical: Ex., Dealing with next generation of device complexity**
    - **Task specific: Ex., On-Going Radiation Effects on FPGAs - Lessons Learned and Plans**
- **Breakout sessions on the last day**
  - **Talk to the experts**
    - **We will have 3 breakout meetings to discuss issues and challenges in specific topic areas**

ETW Program

Tuesday, June 22nd					
Start	**Finish**	**Session**	**Topic**	**Presenter(s)**	**Organization**
8:15 AM	9:00 AM	Overview	NEPP and the Goals of the Workshop, Logistics	Kenneth LaBel Michael Sampson	NASA / GSFC
9:00 AM	9:45 AM	Invited	NESC Report on FPGA Assurance and Activities	George Jackson	NASA / GSFC
9:45 AM	10:00 AM	System Issues - Complex Electronics	The View from 10,000 ft - what is happening and what it means for flight electronics	Kenneth LaBel	NASA / GSFC
10:00 AM	10:30 AM	**Break**			
10:30 AM	11:15 AM	System Issues - Complex Electronics	Dealing with a new generation of device complexity	Douglas Sheldon	JPL
11:15 AM	12:00 PM	System Issues - Complex Electronics	Packaging and embedded electronics for the next generation	Michael Sampson	NASA / GSFC
12:00 PM	1:30 PM	**Lunch**			
1:30 PM	2:15 PM	System Issues - Complex Electronics	Power Electronics for the Next Generation	Jack Shue	NASA/GSFC
2:15 PM	3:00 PM	Invited	Workmanship Issues for Modern Packaged Electronics	Jeannette Plante	NASA/GSFC
3:00 PM	3:30 PM	**Break**			
3:30 PM	4:00 PM	Invited	Counterfeit Electronics - All the World's a Fake	Brian Hughitt	NASA/HQ
4:00 PM	4:30 PM	System Issues - Complex Electronics	Lead-free Electronics - Impact for Space Electronics	Michael Sampson	NASA/GSFC
4:30 PM	5:00 PM	System Issues - Complex Electronics	Working With Consortia - Advanced Packaging Reliability	Jim Blanche	NASA/MSFC
5:00 PM		**Discussion**			

ETW Program

Wednesday, June 23rd					
Start	**Finish**	**Session**	**Topic**	**Presenter(s)**	**Organization**
9:00 AM	9:30 AM	Invited	Overview of NASA's Office of Chief Technologist's Proposed Space Technology Programs	Peter Hughes	NASA/GSFC
9:30 AM	9:45 AM	Systems on a Chip	Overview	Kenneth LaBel	NASA/GSFC
9:45 AM	10:15 AM	Systems on a Chip	SOC Processors - Radiation and Developments	Steve Guertin	JPL
10:15 AM	10:30 AM	**Break**			
10:30 AM	11:30 AM	Systems on a Chip	FPGAs - Overview	Douglas Sheldon	JPL
11:30 AM	12:00 PM	Systems on a Chip	On-Going Radiation Effects on FPGAs - Lessons Learned and Plans	Melanie Berg	MEI Technologies
12:00 PM	1:30 PM	**Lunch**			
1:30 PM	2:00 PM	Systems on a Chip	FPGAs - Working with a Commercial Consortium: Tales of Xilinx Virtex-IV and SIRF Radiation Testing	Greg Allen	JPL
2:00 PM	2:30 PM	Memories	Memory Overview - Technologies and Needs	Kenneth LaBel	NASA/GSFC
2:30 PM	3:00 PM	Memories	Flash Memory Reliability	Jason Heidecker	JPL
3:00 PM	3:30 PM	**Break**			
3:30 PM	4:00 PM	Memories	NVM Radiation Testing and Guidance	Tim Oldham	Dell
4:00 PM	4:30 PM	Building Blocks	Capacitor Test, Evaluation, and Modeling within NEPP	Alexander Teverovsky	Dell
4:30 PM		**Discussion**			

ETW Program

Thursday, June 24th					
Start	**Finish**	**Session**	**Topic**	**Presenter(s)**	**Organization**
8:30 AM	9:00 AM	Advanced Electronics	CMOS Reliability Challenges - The Future of Commercial Digital Electronics and NASA	Steve Guertin	JPL
9:00 AM	9:30 AM	Extreme Environment	Advanced Mixed Signal Technology	Richard Patterson	NASA/GRC
9:30 AM	10:00 AM	Radiation Effects	Predicting SEU Rates for Advanced CMOS Electronics	Robert Reed	Vanderbilt University
10:00 AM	10:15 AM	NEPP Website Overview	NEPP on the Web	Carl Szabo	Dell
10:15 AM	10:30 AM	**Break**			
10:30 AM	11:00 AM	Radiation Effects	Ultra-Scaled CMOS Radiation Performance	Jonathan Pellish	NASA/GSFC
11:00 AM	11:30 AM	Radiation Effects	Power Device Qualification Methods	Leif Scheick	JPL
11:30 AM	12:00 PM	Radiation Effects	Using SiGe Technology in Extreme Environments	John Cressler	Georgia Tech
12:00 PM	1:30 PM	**Lunch**			
1:30 PM	4:00 PM	Roundtable Breakouts	Talk to the NEPP experts - Q&A, next generation needs		
4:00 PM	5:00 PM	**Roundtable Reports**			

ETW Posters

Posters			
Session	**Topic**	**Author(s)**	**Organization**
Fiber Optics	Fiber Optic Qualification Standard: Status	Charles Barnes Melanie Ott	JPL NASA/GSFC
Radiation Effects	Hydrogen and Enhanced Low Dose Rate Sensitivity (ELDRS): Status	Philippe Adell	JPL
Radiation Effects	Ultra-ELDRS Status	Dakai Chen	MEI
Packaging	Micro-coil Columns for Space Electronic Packages: Tech Transfer and NEPP	Adam Gowan	NASA/MSFC
Radiation Effects	Radiation Effects on IR and Visible Sensors: Update	Heidi Becker Cheryl Marshall	JPL NASA/GSFC
Packaging	NASA Packaging Roadmap	Phil Zulueta	JPL

ETW Program - Breakouts

There will be three breakout sessions on Thurs afternoon:

1. **Verifying COTS avionics systems for high reliability applications in the SEE environment: Can system architecture/redundancy combined with software error detection/correction/recovery defeat the need for testing? - Steve Koontz, JSC**
2. **Sample size statistics and qualification – Alexander Teverosky and Ray Ladbury, GSFC**
3. **State-of-the-art semiconductors: the challenges for using in space - Doug Sheldon, JPL**

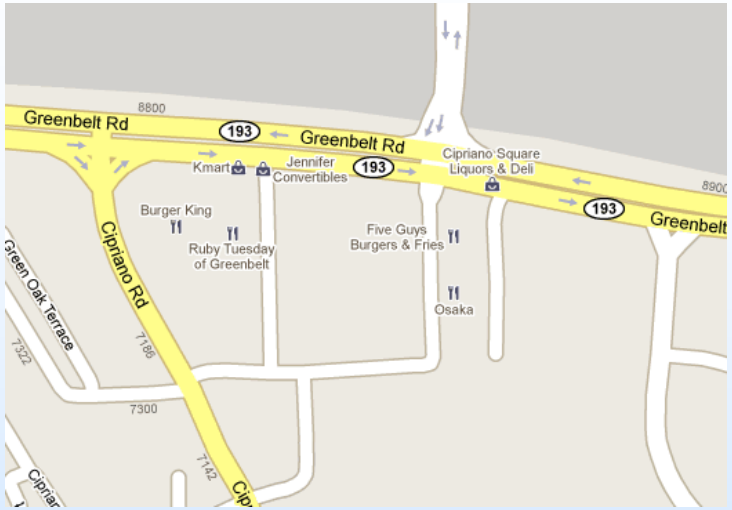
ETW - Logistics

- Emergency Exits
- Restrooms
- Breaks
- On-line feedback
- Wireless Access
- Cell phones/PDAs
  - PLEASE TURN OFF or on SILENT mode
- Lunches

ETW - Lunch

Here on center @ GSFC:

- Bldg. 21 Cafeteria
- Bldg 34 Café (limited menu, limited seating)
- ~~Bldg. 1 Cafeteria (CLOSED)~~



Directly across the street from NASA/GSFC:

- (K-Mart shopping center)
- 5 Guys – Hamburgers/Fries - American
- Osaka – Sushi
- Papa John's Pizza – (no seating)
- Chicken Rico - Peruvian-style charcoal broiled (limited seating)
- Maharaja - Indian Cuisine
- Orion Gourmet Take-Away (Sub/sandwich deli) – limited seating
- Ruby Tuesday – American casual dining
- Burger King – fast food

ETW - Lunch (Cont.)

Greenway Center, *at Greenbelt Road & Hanover Parkway*

Turn right out of NASA/GSFC Main Gate. Travel 2.02 miles

Greenway Center will be on your left.

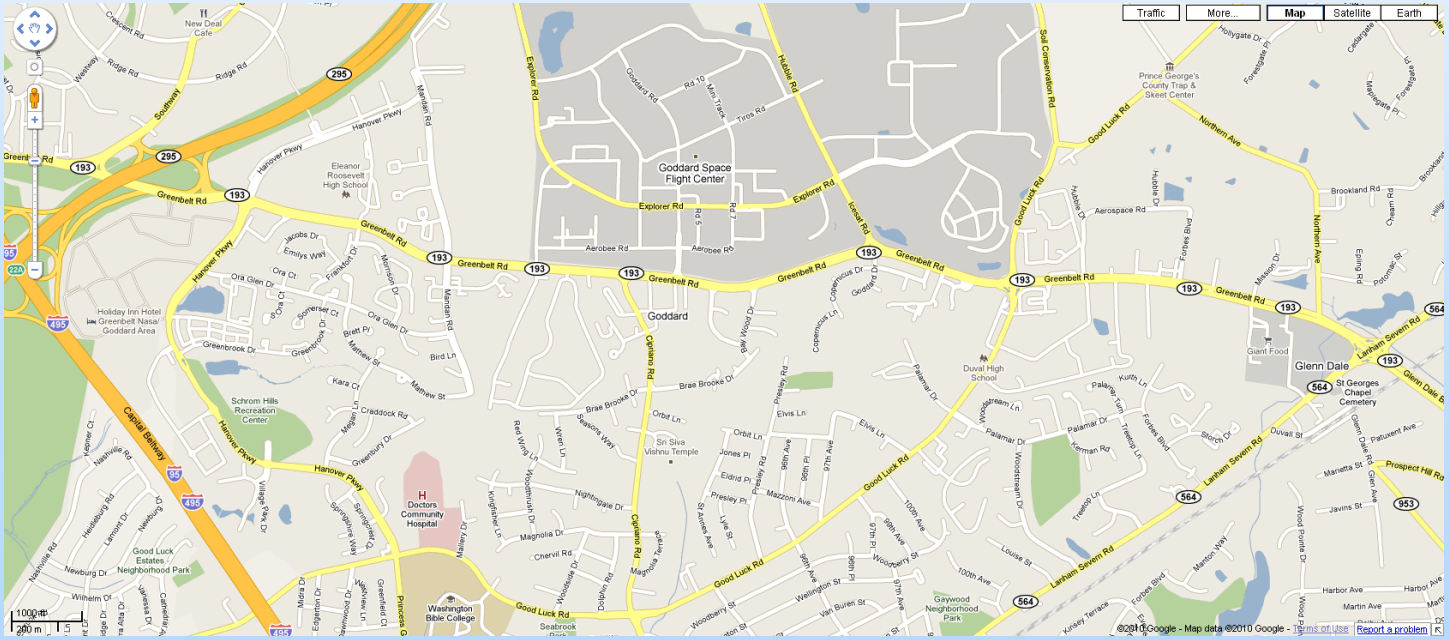
- Chesapeake Bagel Bakery
- Chevy's Fresh Mex Restaurant
- Denny's Restaurant
- Hunan Treasure
- Jasper's
- Starbucks Coffee
- Subway Sandwich Shop
- Wendy's

Eastgate Shopping Center, *at Glenn Dale Rd & Lanham Severn Rd*

Turn left out of Main Gate – approx 1.8 miles,

shopping center on Right.

- Chanan's Buffet (Chinese food – Mongolian Grill)
- Pizza Hut
- McDonalds



QUESTIONS?