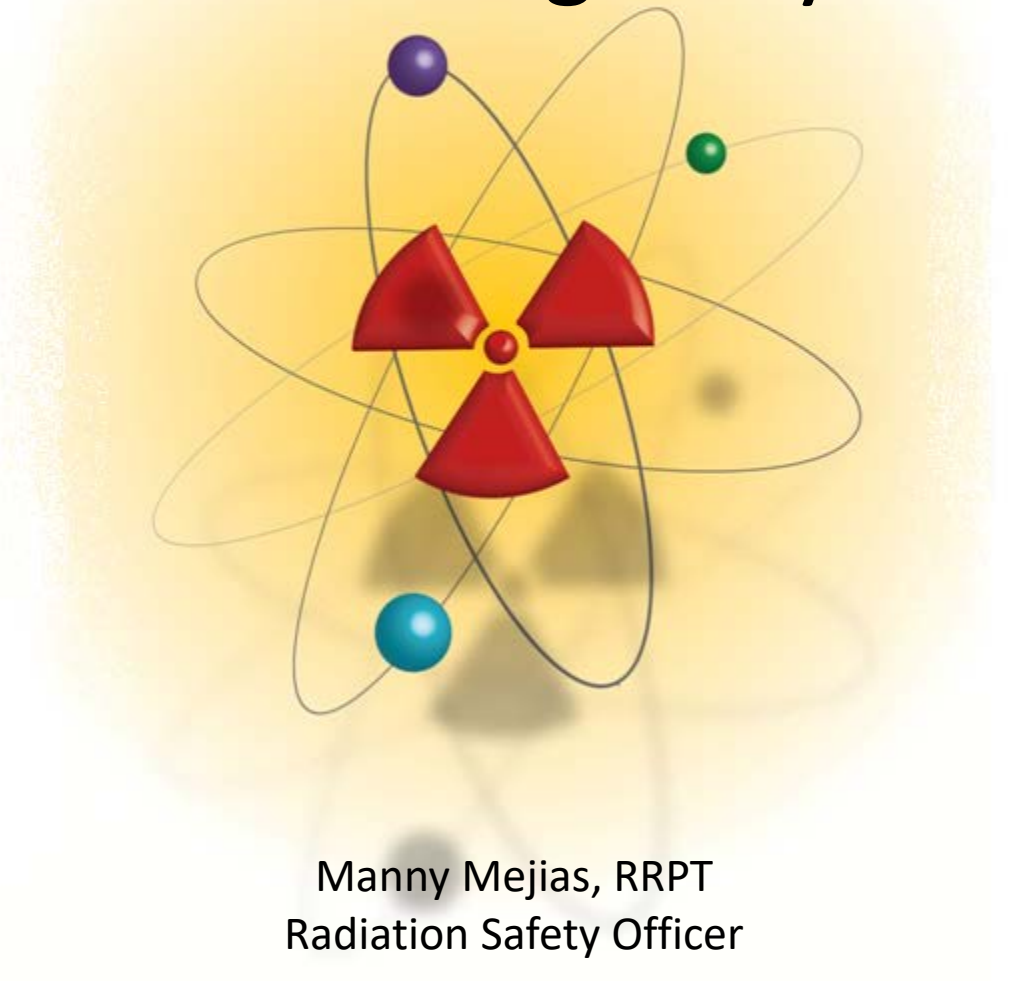
Radiation Safety at NIST
LEPC Meeting - July 2018



Manny Mejias, RRPT
Radiation Safety Officer

Radiation Safety Program Mission & Vision

Mission Statement

Implement and maintain an effective radiation safety program at NIST Gaithersburg that enables the NIST programs to carry out their missions while protecting NIST staff and associates, members of the public, and the environment and that complies with all regulatory requirements as well as the NIST As Low As Reasonably Achievable (ALARA) policy.

Vision Statement

All ionizing radiation source licenses, policies, and procedures are current and integrated into a comprehensive radiation safety program that strengthens the safety posture of the NIST community by effectively incorporating the recognition, evaluation, and control of radiation hazards into the research, service and support activities at NIST Gaithersburg.

Radiation Safety Program Overview

The Gaithersburg Radiation Safety Division, in collaboration with NCNR Health Physics, develops, implements, and manages a program that provides oversight of:

- Sealed and unsealed radioactive materials
- Large source irradiators
- Radiation-producing machines (x-ray devices and particle accelerators)

The program activities support three US Nuclear Regulatory Commission licenses

- Special Nuclear Materials license (broadscope)
- Exempt Distribution license
- Research Reactor license

Radiation Safety Program Numbers

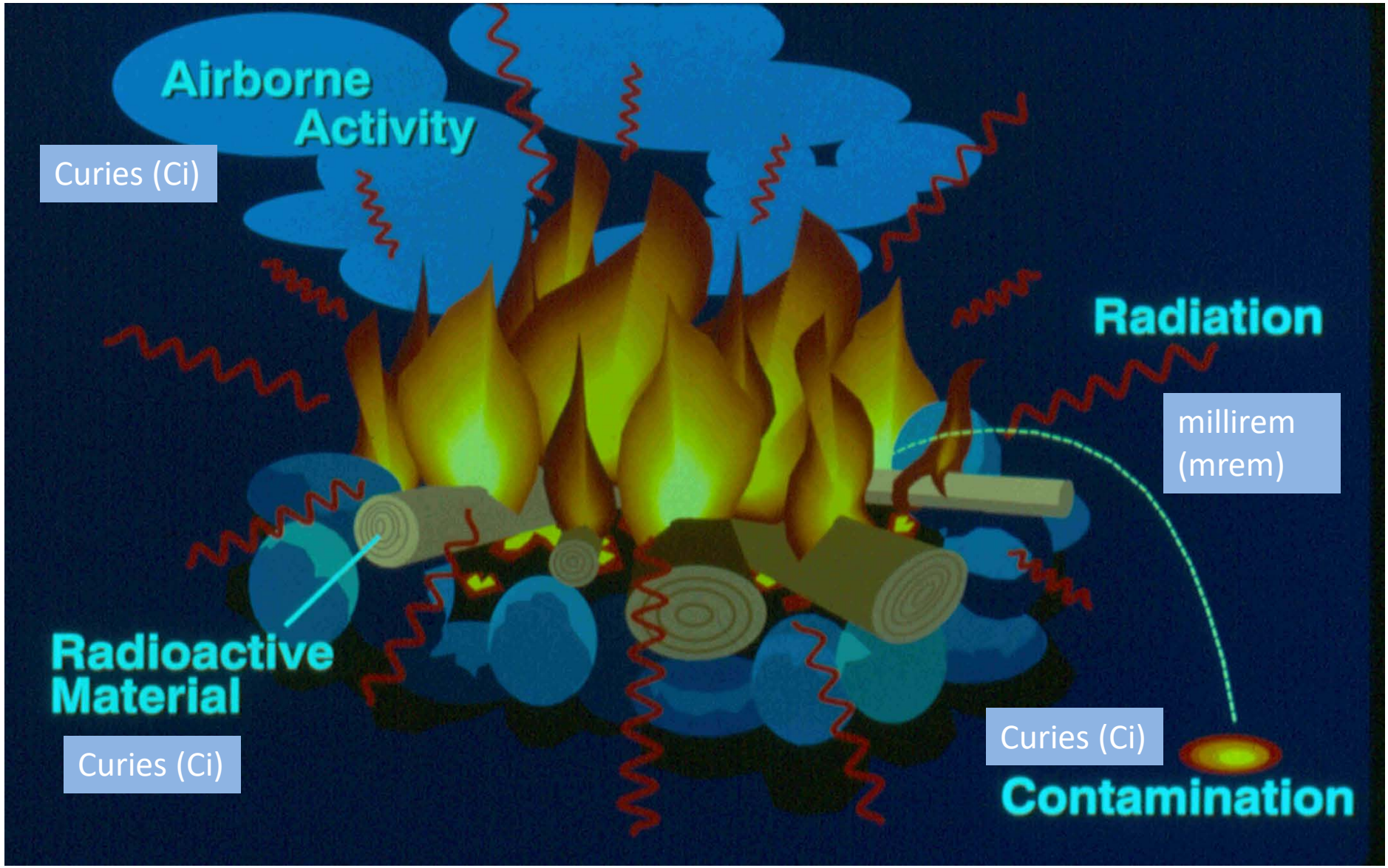
Radioactive Materials Program

- 19 buildings
- 135 radioactive material laboratories
- 1687 radioactive materials (July 2018)
- 503 badged individuals (July 2018)

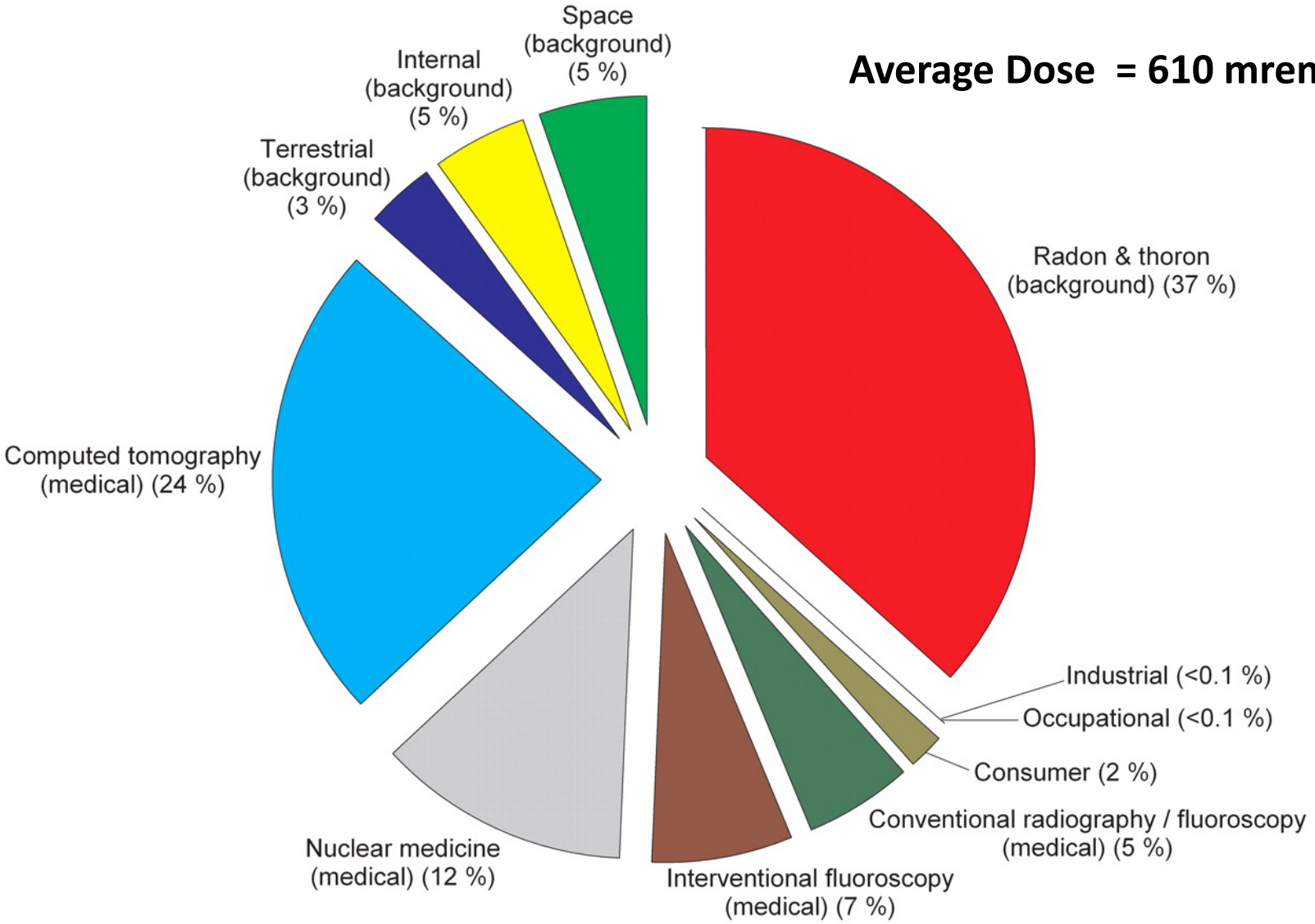
X-Ray Devices Program

- 78 x-ray laboratories
- 89 x-ray devices
- 422 x-ray users

Radiation / Radioactivity / Contamination



U.S. Average Annual Radiation Dose



Average Dose = 610 mrem/year

NIST Doses – Personnel & Environment

All doses to NIST personnel and members of the public were below regulatory limits

All site releases (gaseous and liquid) were below regulatory limits

NIST fence line monitoring demonstrates dose was below regulatory limits

Regulatory limits (annual)

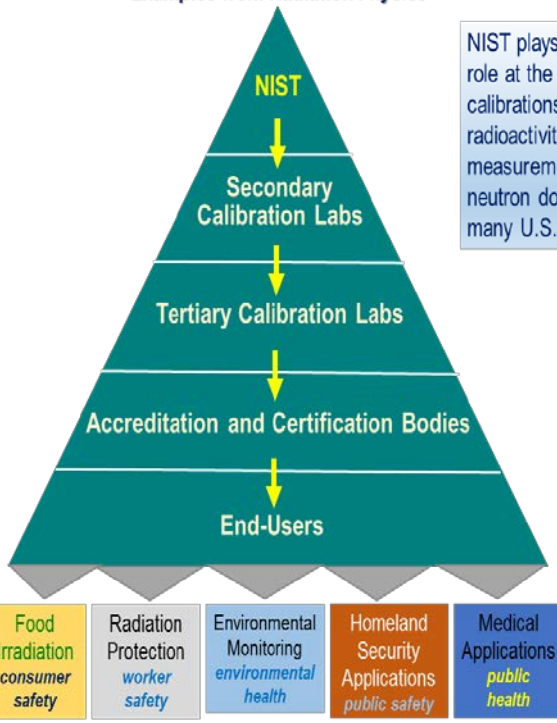
Radiation Worker = 5,000 mrem
Member of Public = 100 mrem


Building 245
Quince Orchard Road
South Drive
West Drive
Center Drive
Research Drive
East Drive
North Drive
Diamond Ave. West
CAMPUS ENTRANCE
Muddy Branch Road
to Frederick
to Gaithersburg and Route 355
I-270 / Washington National Pike
National Institute of Standards and Technology
Gaithersburg, MD
July, 2013

Mission Needs Gap

- Research compromised due to facility *condition*
  - Measurements for new and emerging radionuclides
  - Dosimetry standards for evolving technologies (high dose rate brachytherapy).
  - Continued capability for calibrations (e.g., increasing need in air kerma calibrations)
  - Mission critical precision measurements on material and devices with environmental sensitivity (e.g., optics and space instruments)
- Research compromised due to inadequate or inappropriate *space*
  - High-dose and high-dose-rate dosimetry (for medical device sterilization, polymer processing, food irradiation, blood irradiation)
  - Test methods and standards validation (for radiation detectors and x-ray screening instruments)
  - Standards in medical imaging (nuclear medicine, PET-MRI, *in-vivo* dosimetry, radiolabeled biomarkers)
  - New beamline facility and improvements to the SURF NASA Spectrometer Calibration Facility to meet increasing demands

Work performed in Building 245 has critical impact on multiple sectors of the economy
Examples from Radiation Physics



NIST plays a critical role at the apex of calibrations, radioactivity and dose measurements, and neutron dosimetry for many U.S. industries

Directly Supports

- 38.9 million annual mammography procedures (U.S.)
- 81.2 million annual CT procedures (U.S.)
- A $2 billion brachytherapy (cancer radiation therapy) market (U.S.)
- A $152.3 million global radiation detection, monitoring and safety market (U.S. - 40% market share)
- Irradiation of 120,000 tons of food annually (U.S.)
- Development of 276 Radioactivity Standard Reference Materials (SRMs), 47 % sold to customers outside of the U.S.

Technologies Relying on Traceability to NIST

- Mammography
- External beam therapies (cancer treatment)
- Internal radiation therapies
- PET/CT scans
- Dental and medical x-rays
- Medical fluoroscopy
- Cardio stress tests
- Metabolic studies (gallbladder, kidney, intestines)
- Medical device sterilization
- Innovative public health tec

Summer/Fall 2018 – Structure of B/C Wing addition taking shape

Unplanned Contamination Event – Summer 2017

Summary of Event

- A glass ampoule containing radioactive material ruptured while in storage.
- Late detection of contamination contributed to potential exposures.
- Extensive radiological survey efforts were needed and access to the entire building was restricted to ensure contamination control.
- One person was exposed to internal contamination, but within regulatory limits.
- Need for improvement of equipment, procedures, and training was identified; corrective actions have been implemented.

Contact Information

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