



**Council on Ionizing Radiation
Measurements and Standards**



CIRMS 2026 Introduction to Needs Report

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Mission

The Council on Ionizing Radiation Measurements and Standards (CIRMS) is an independent, non-profit organization that draws together stakeholders from government, industry and academia to discuss, review and assess national needs in the field of ionizing radiation to enhance societal benefits.



Vision

CIRMS seeks to inform the national debate on issues involving ionizing radiation to **make policy recommendations** based on the **interplay** among **fundamental scientific advancement, practical implementation** of ionizing radiation **technologies** and governmental rules and **regulations** to ensure **public safety**.

To achieve these ends, CIRMS seeks to organize expert opinion in focus areas:

- 1) **medical applications,**
- 2) **radiation safety and security, and**
- 3) **industrial applications and materials effects.**



Radiation Subcommittees



Medical Applications

Covers radiobiology and all diagnostic and therapeutic uses of ionizing radiation including nuclear medicine, radiotherapy, proton therapy, x-ray computed tomography, interventional radiology and more

[Read More](#)



Radiation Protection & Homeland Security

Covers calibration and proficiency testing to monitor dose in occupational settings, environmental radiation measurements, and emergency response to radiological incidents, and more

[Read More](#)



Radiation Processing & Material Effects

Covers a diverse area of topics such as food irradiation, medical device sterilization, radiation hardness testing, material effects, space applications, safety at radiation facilities, and more

[Read More](#)

Needs in Ionizing Radiation: Fifth Report on Needs in Ionizing Radiation

Metrology Needs: Each year, each of the subcommittees of the CIRMS Science and Technology Committee prepares a series of **Measurement Program Descriptions (MPDs)**.

These needs are grouped into the 2011 CIRMS focus areas: 1) **medical applications**, 2) **personnel and environmental radiation protection**, 3) **homeland security technologies**, and 4) **industrial applications and materials effects**.

Note: 2 and 3 are merged as **Radiation Protection and Homeland Security**



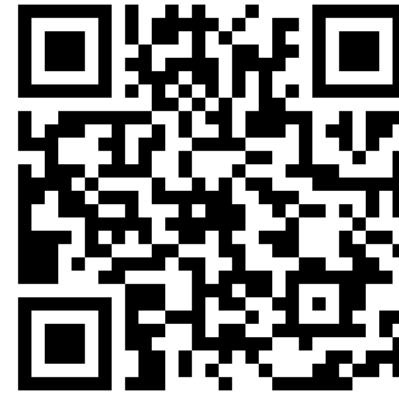
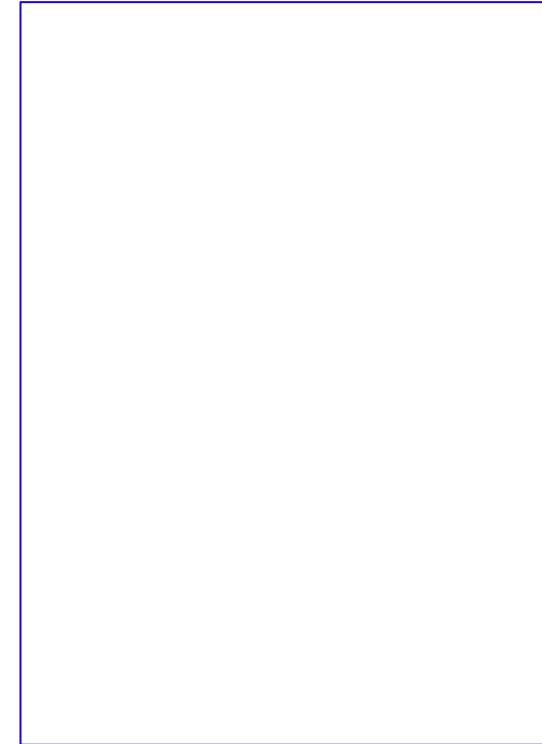
**Fifth Report on
Needs in Ionizing Radiation**

**Prepared by the CIRMS
Science and Technology Committee**

October 2011

Needs in Ionizing Radiation: Transition to Dynamic Needs

- Historical Needs Reports (1994–2011) structured around **Measurement Program Descriptions (MPDs)**
- Periodic updates (multi-year cadence) limited responsiveness to emerging technologies
- Increasing complexity in:
 - measurement systems
 - computational modeling
 - regulatory environments
- Transition to **Dynamic Needs Report (GitHub-based)** enables:
 - continuous updates
 - community-driven contributions
 - cross-domain integration of needs



<https://cirms-org.github.io/needs-report/>



Current measurement needs are increasingly coupled to modeling, validation, and application pathways that were not explicitly captured in

Needs in Ionizing Radiation: Questions/Drivers

1. **Regulatory Gaps:** Areas in which federal regulations are insufficient to deal with rapidly evolving technologies;
2. **Research Opportunities:** Areas which member companies have identified as fertile areas for academia research which could lead to compelling graduate theses;
3. **Funding Alignment:** Areas in which national, state or local funding priorities seems to be mis-prioritized to address the mission of CIRMS;
4. **Infrastructure and Access:** Areas in logistics and critical infrastructure which limit CIRMS and its affiliate labs, companies and academics from having access to traceable measurement standards in fields related to ionizing radiation.



Needs in Ionizing Radiation: What Makes a Strong CIRMS Need?

Clearly defined gap

- Missing measurement, standard, reference material, or validated capability

Identifiable consequence

- Specifies the scientific, regulatory, or operational work that is currently blocked

Actionable pathway

- Enables a defined research direction, standard development effort, or infrastructure investment

Technically scoped

- Narrow enough to be testable, fundable, and implementable

Traceability or validation relevance

- Connects to measurement traceability, benchmarking, or model validation where applicable



CIRMS Needs Report: CIRMS Needs Report Evolution

2011 ☐ ??? ☐ 2026

- **2011:** Structured, domain-specific MPDs
- **2011–2026:** Rapid expansion of technologies and applications
- Limited mechanisms for continuous update and cross-domain integration
- **2026:** Community-driven synthesis of current measurement and standards needs

This is why we are here.
We invite active engagement and discussion.



Current measurement needs are increasingly coupled to modeling, validation, and application pathways that were not explicitly captured in prior reports

CIRMS Needs Report



<https://cirms-org.github.io/2026/need/>



CIRMS 2026 — Need
Annual Meeting · April 13–15, 2026

Complete the sentence below to describe **one specific measurement need** in your area. Name the exact standard, reference material, or traceability pathway that is missing, and the specific work it is blocking. Your inputs are **not saved**. This generator only produces a PNG image. Please insert it as the **first content slide** of your deck, it will be used to inform the CIRMS annual needs report.

Progress in

is currently blocked because we lack

which prevents

SLIDE PREVIEW — 1920 × 1080 PX

CIRMS 2026 — Need
Annual Meeting · April 13–15, 2026

Progress in is currently blocked because we lack ,
which prevents .

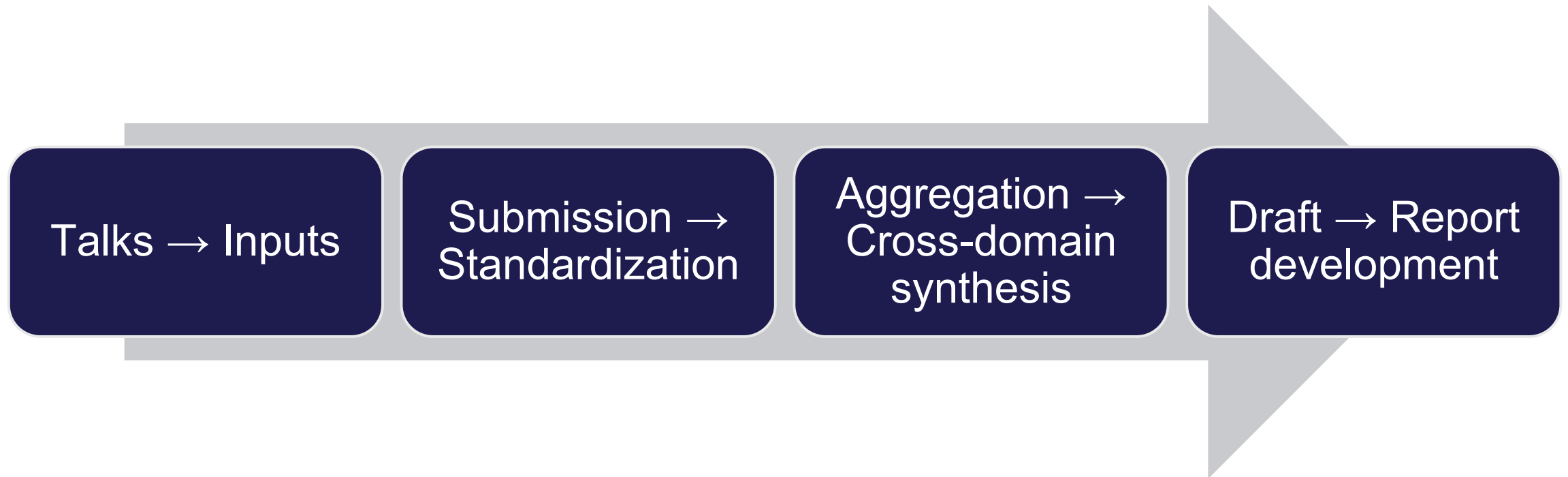
- To advance this year's theme, "**Embracing our purpose: Anticipating radiation measurement needs**," we are asking all speakers to center their presentations around a specific measurement gap.
- This will allow us to update and expand the **CIRMS Annual Needs Report**, which is currently outdated and in need of fresh community input.
- **Be specific:** In the generator, you can name a standard, reference material, traceability pathway, or measurement that is missing, and identify the specific work it is currently blocking.
- **Generate & download:** The tool will produce a **PNG image** for you to insert directly into your presentation.
- **Send us a copy:** ileana.pazos@nist.gov

CIRMS Needs Report



How This Week Works:

From individual contributions to synthesized national needs



Reflections on the 2011 Report



**Fifth Report on
Needs in Ionizing Radiation**

**Prepared by the CIRMS
Science and Technology Committee**

October 2011



2011 Needs Report Policy Recommendations

- US Congress must find ways to better inform the public perception of radiation or risk reducing scientific advantage, economic advantage and domestic job creation.
- The Federal Government and associated Regulatory Agencies should immediately prioritize developing 21st century rules and regulations, informed by the scientific community, to enable progress toward elimination of food-borne pathogens/pests, increase shelf life and inhibit sprouting and maturation, while increasing food safety.
- A virtual national laboratory consortium is needed that can support regulatory, research and development uses and measurement of ionizing radiation to leverage national brick and mortar assets at universities, DoE laboratories and government laboratories.



2011 Needs Report Policy Recommendations

- An independent review panel should be established to evaluate all requests for isotopes that are not now currently available from commercial sources, based on recommendations from CIRMS, the National Academies Nuclear and Radiation Studies Board (NAS NRSB) and the Nuclear Regulatory Commission (NRC).
- National dialog among NIH, NIST, university, and DoE laboratories is needed to better control the supply of the molybdenum-99 isotope.
- A coherent long-term funding mechanism must be found to support maintenance of the mathematical modeling codes implementing the effects of ionizing radiation on materials.



2011 Active & New Strategic Area Needs: Medical Applications

New topics of interest involve the growing use of proton beam therapy for more targeted cancer treatment and a need for enhanced dosimetry systems to quantify exposure levels in computerized tomography scans (CT scans)

Medical Applications -- Active Measurement Program Descriptions (MPDs):

A.3.4 Dose Mapping Systems for 3D Conformal Radiation Therapy and Intensity Modulated Radiation Therapy

A.7.3 Absorbed Dose Standards for Brachytherapy Sources

A.7.3a Low dose-rate photon sources

A.7.3b High dose-rate sources, as iridium-192

A.7.3c Neutron brachytherapy

A.7.4d Electronic brachytherapy



2011 Active & New Strategic Area Needs: Medical Applications

A.8.1 Liquid Based and Micro-Brachytherapy Sources

Medical Applications -- New Measurement Program Descriptions (MPDs):

A.9.0 Dosimetry for Proton Beam Therapy

A.10.0 External Beam Therapy

A.10.0a X-ray beam therapy

A.10.0b Small photon beam therapy

A.10.0c Electron beam therapy

A.11.0 Radionuclides for Imaging

A.12.0 Bone Density Measurements

A.13.0 Enhanced Dosimetry Systems for CT Scans



2011 Active & New Strategic Area Needs: Radiation Protection & Homeland Security

Through the first three CIRMS “Needs Reports” (1994, 1998 and 2001), CIRMS maintained a distinction between its then subcommittees on Public and Environmental Radiation Protection (PERP) and Occupational Radiation Protection (ORP) – **Now RPHS**



Radiation Protection and Homeland Security Active MPDs:

B.7.2 Traceability to NIST for Reference, Monitoring and Service Laboratories

B.8.2 Sorption of Radioactive Elements in Contaminated s and Sediments and Urban Structural and Other Materials

B.9.2 Atom-Counting Measurement Techniques for Environmental Monitoring

C.3.4 Intercomparison Transfer Standards for Neutron Source Calibrations

C.4.4 Improvements in In-Vivo Radionuclide Metrology

C.17.3 Improved Radiation Measurement Infrastructure for Occupational Radiation Protection

C.20.2 Implementation of Support for Personnel Dosimetry Proficiency Testing per ANSI N13.11

E.1.1 Emergency Radiological Response Metrology Infrastructure

2011 Active & New Strategic Area Needs: Radiation Protection & Homeland Security

Radiation Protection and Homeland Security New MPDs:

**E.4.0 Traceability for High Energy Photon Dosimetry for Non-Intrusive Inspection
Systems**

E.5.0 Traceability of Neutron Cross Sections, Measurements, and Detector Development



2011 Active Strategic Area Needs: **Industrial Applications & Materials** **Effects**

The CIRMS Industrial Applications and Materials Effects (IAME) subcommittee deals with diverse uses of ionizing radiation in a myriad of industrial processes. For the most part, these are high speed, energy efficient processes.

Industrial Applications and Material Effects – active MPDs:

D.3.4 Radiation Hardness Testing and Mixed-Field Radiation Effects

D.4.4 Neutron Dosimetry for Reactor Pressure Vessel Surveillance

D.5.3 Medical Device Sterilization

D.6.1 Pollution Prevention (P2)

D.7.3 Food Irradiation

D.8.1 Low-voltage Electron Beam Dosimetry



Strategic Area Needs – **Proposed MPDs as of October 2012**: Industrial Applications & Materials Effects

- I. High-energy Electron Beam Dosimetry (> 300 KeV).
- I. Fast Neutron Reactor Research and Development.
- I. Reprocessing of Used Nuclear Fuel.
- I. Link Absorbed Dose and Irradiation Temperature to Properties of Polymeric Materials.
- I. Positronium Production



2011 Active Strategic Area Needs: Computational

- The use of mathematical modeling underlies many of the diverse uses involving ionizing radiation.
- The Ionizing Radiation Division in the Physics Laboratory at the National Institute of Standards and Technology (NIST) has been a pioneer in the development of codes widely used in such modeling.
- These codes are used in medical, industrial and radiation-protection applications

MPD: Improvements to Computational Methods for Radiation Dosimetry



Needs Report Success Stories: Medical Applications – Completed MPDs

A.1.0 National Air-Kerma Standards for Mammography (see Appendix E)

A.2.3 Radioactivity Standards and Techniques for Nuclear Medicine

A.4.1 Absorbed-Dose-to-Water Standards for Photon External Beam Radiation Therapy

A.5.0 Air Kerma National Standards for Diagnostic X-ray Beams

A.6.0 National Air Kerma Strength Standards for Photon Brachytherapy Sources



Needs Report Success Stories:

Industrial Applications - MPD 09.04

Resource Gammacell 220 Irradiators

Objective: Establish a roadmap to resource Gammacell 220 irradiators.

Actions

I. Develop agreements, contracts or indemnification documents such as liability waivers from at least NIST and preferably from other national labs to Nordion (or some other corporate entity) to enable resourcing (replenishing) of Gammacell 220 irradiators, which serve as a critical piece of the US primary standards process and help maintain traceability standards;



Needs Report Success Stories:

Industrial Applications MPD 09.04

Resource Gammacell 220 Irradiators

Objective: Establish a roadmap to resource Gammacell 220 irradiators.

Actions

II. Provide a national strategy to update US infrastructure in regards to self-contained gamma irradiators;

III. At a minimum, provide a reasonable protocol for academia, labs and industry for the disposal of partially depleted cobalt-60 sources in existing Gammacell 220 irradiators



Needs Report Success Stories:

Industrial Applications MPD 09.04

Resource Gammacell 220 Irradiators

Resolution

The metrology need can be successfully marked as complete, due to initiatives taken at Hopewell Designs, Inc. between 2015 and 2022.

Hopewell Designs, Inc. undertook the endeavor to create, develop, and install the radiation system at the National Institute of Standards and Technology (NIST) that is used to realize the gray (Gy).

