MIRION Connect 26

AMERICAS

Annual Users' Conference

ADVANCING RADIATION SAFETY. EMPOWERING PROGRESS.

M Resort, Henderson, NV | June 15 – June 18

MIRION TECHNOLOGIES

Advancing Radiation Safety.
Empowering Progress.

Operating Fleet Nuclear Power Forum

Confronting Today’s Challenges in Utility-Scale Nuclear Operations

James Parkin

Business Line VP for HP and Defense & Imaging

Kristopher Bauer

Application Support Manager

Mirion Connect | Annual Users’ Conference 2026

Henderson, NV

MIRION Connect 26 AMERICAS

Annual Users’ Conference

Advancing Radiation Safety.
Empowering Progress.

Topics

- Mirion Introduction
- EPRI: Current and Upcoming Projects (Jeff Cady)
- Remote Radiation Monitoring Technologies (Ryan Bonello)
- INPO Status Update (Dan Doggit)
- Panel Discussion
- Closing

Mirion Hosts

James Parkin

- Joined Mirion in November 2021
- Lead of Health Physics, Defense and Security and Imaging business lines since September 2025 having previously led product Strategy in Nuclear Medicine and run Global R&D for Mirion Technologies Group
- 20 Years of experience in the nuclear industry including:
- Health Physics instrument development
- Nuclear I&C system design
- Head of Nuclear and Medical in the UK National Physical Laboratory (NPL)

Kris Bauer

- Joined Mirion Technologies as an Application Support Manager in July 2024.
- 15 years of experience in Radiation Protection including:
  - Corporate radiation protection management
  - Senior evaluator of radiation protection for INPO/WANO
  - Superintendent of radiation protection technical programs
  - ALARA Senior Technician with a specialty in instrumentation and technology implementation

The operating fleet nuclear power forum is an opportunity to share industry challenges, provide updates to guidelines and to foster collaboration among NPP stakeholders to drive progress.

To join, go to: ahaslides.com/5NEJU

AhaSlides

Where do you see the application of AI as most potential benefit to you?

Get Feedback

Presentation selected for PowerPoint

7

Group into themes

0 0

EPRI Update

Jeff Cady

EPRI Principal Technical Leader

- Principal Technical Leader at the Electric Power Research Institute (EPRI)
- Joined EPRI in 2024 as a member of the Radiation Safety team within the nuclear sector.
- Prior to EPRI, Jeff was the Senior Manager of Radiation Protection for the Braidwood Clean Energy Center
- Over thirty years of experience, primarily as a radiation safety subject matter expert with experience in nuclear power, mixed transuranic waste processing, and the US Naval Nuclear Propulsion Program
- Selected as the Radiation Protection Professional of the Year for 2022 by the International Symposium of Occupational Exposure (ISOE) North American Technical Center

EPRI Radiation Safety Program

2026 Updates

Jeffrey J CADY, MS, CHP, RRPT
Principal Technical Leader
EPRI Radiation Safety

Mirion Connect 2026
2026-06-17

Chemistry-Radiation Safety Program

"Empowering the future of nuclear energy through innovative chemistry and radiation practices"

Chemistry

Mitigation of Material Degradation and Fuel Performance

Radiological Environmental

Environmental Stewardship

Low and Intermediate Level Waste

Optimize Waste Generation and Storage

Radiation Management

Source Term and Dose Reduction

Collaboration

- Global network of peers
- Technical exchange and benchmarking
- Leveraged R&D

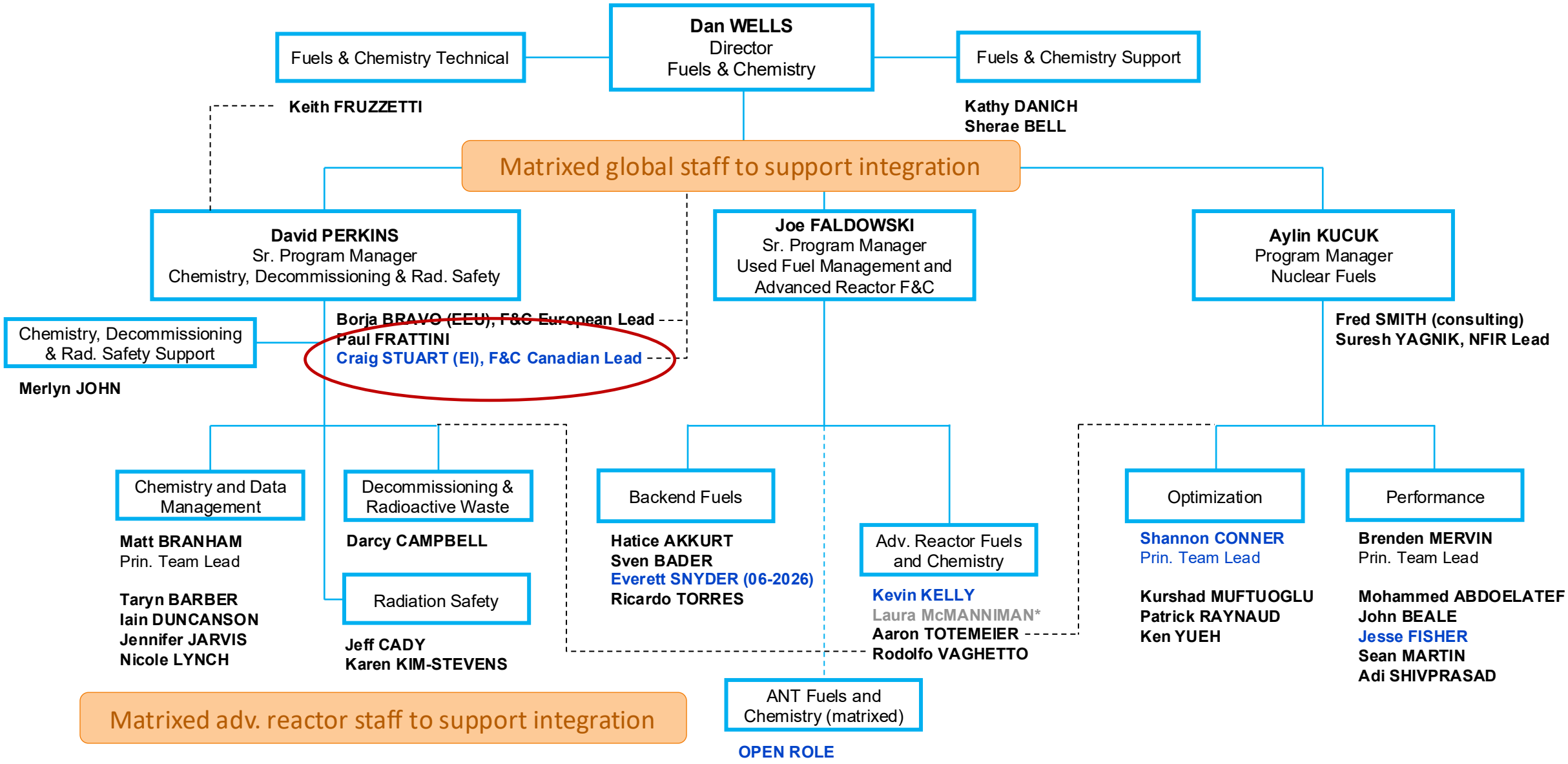
Cumulative Expertise

- Knowledge of control history
- New technology development for tomorrow
- More than 20 years of plant data

Credibility

- Technically based and objective guidance
- Widely applied Guidelines
- Identify and apply best options

Fuels & Chemistry Matrixed Organization (May 2026)



EEU: EPRI Europe, EI: EPRI International

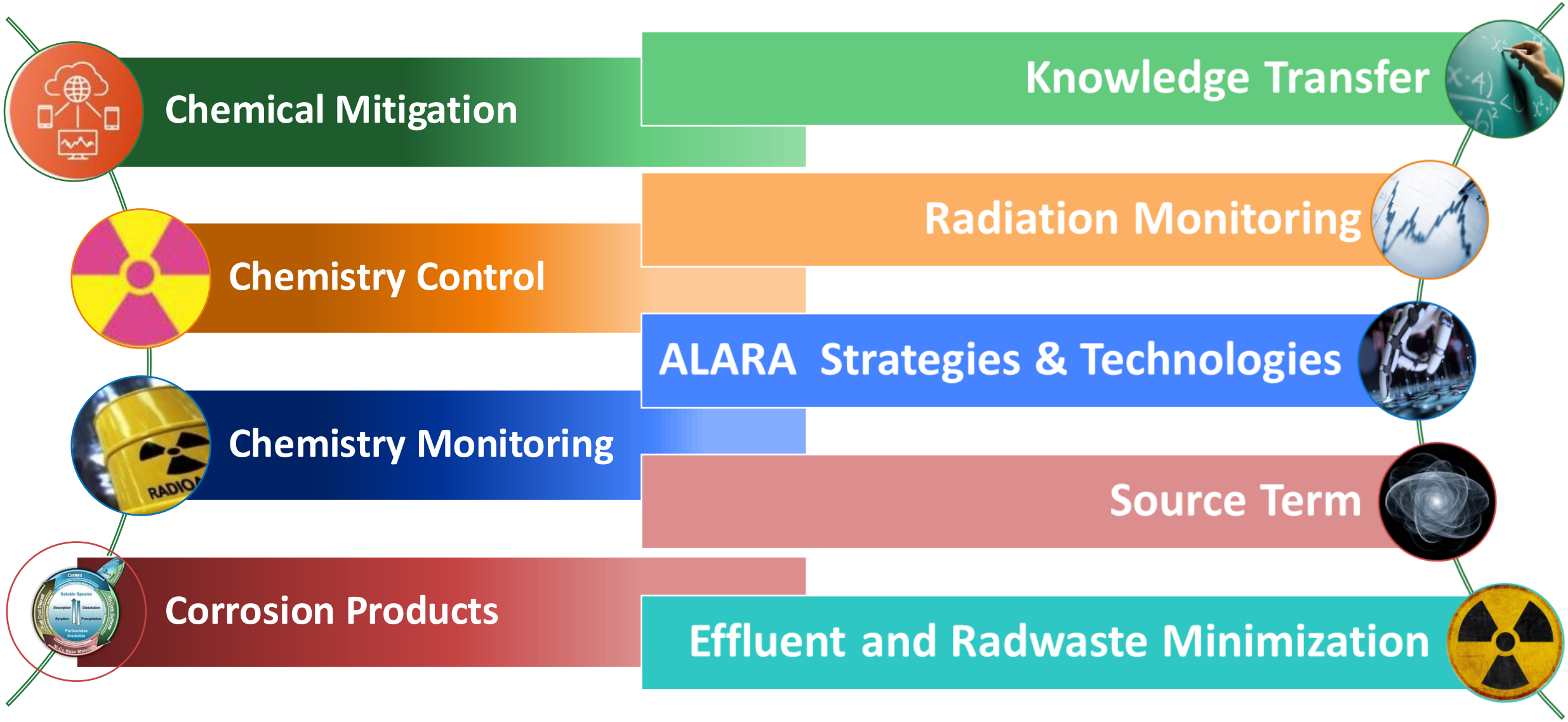
*Departing EPRI June 2026

Longer-Term Standardized Research Planning Approach

- The EPRI Nuclear Power Sector has standardized its research planning and prioritization processes
- All research portfolio planning is now on an N+2 planning cycle
- All work will be grouped into Research Focus Areas (RFA)
- The Chemistry and Radiation Safety Programs have been using this approach since 2015

April	May	June	August
N+2 Prioritization package sent to global membership	Prioritization input due back to EPRI	EPRI program integrates feedback with other information to formulate portfolio • Funding • Strategic goals • Industry issues	N+2 Portfolio presented to Research Integration Committee for endorsement

2027 Chemistry-Radiation Safety Research Focus Areas

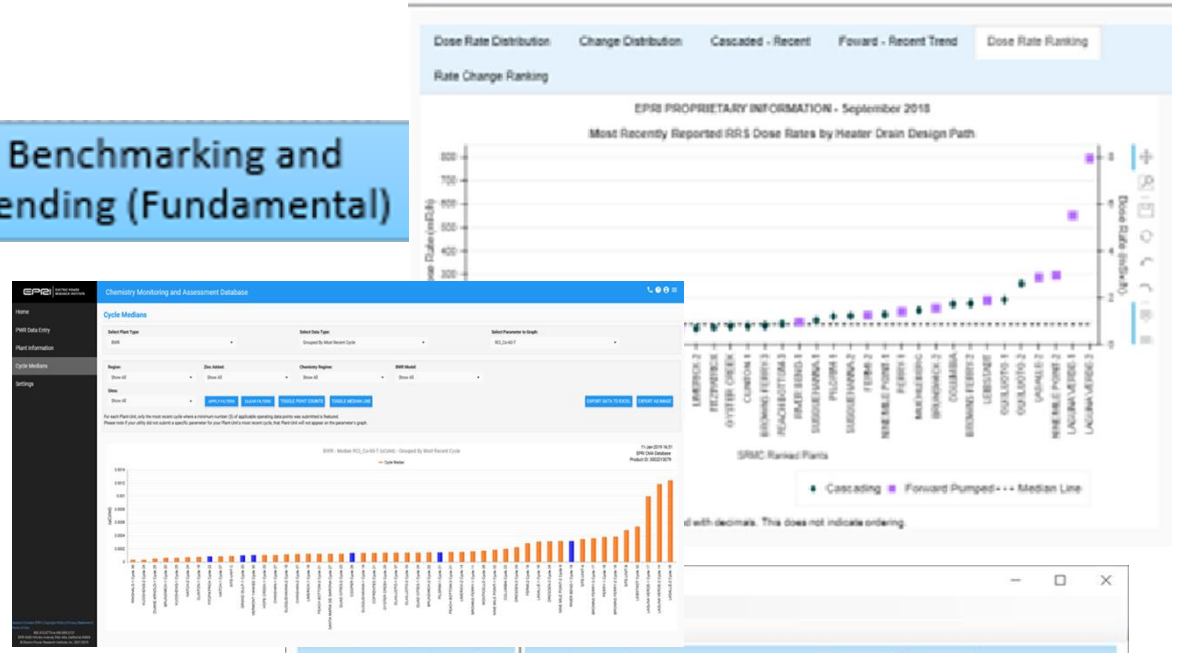


Chemistry-Radiation Safety Fundamental Research

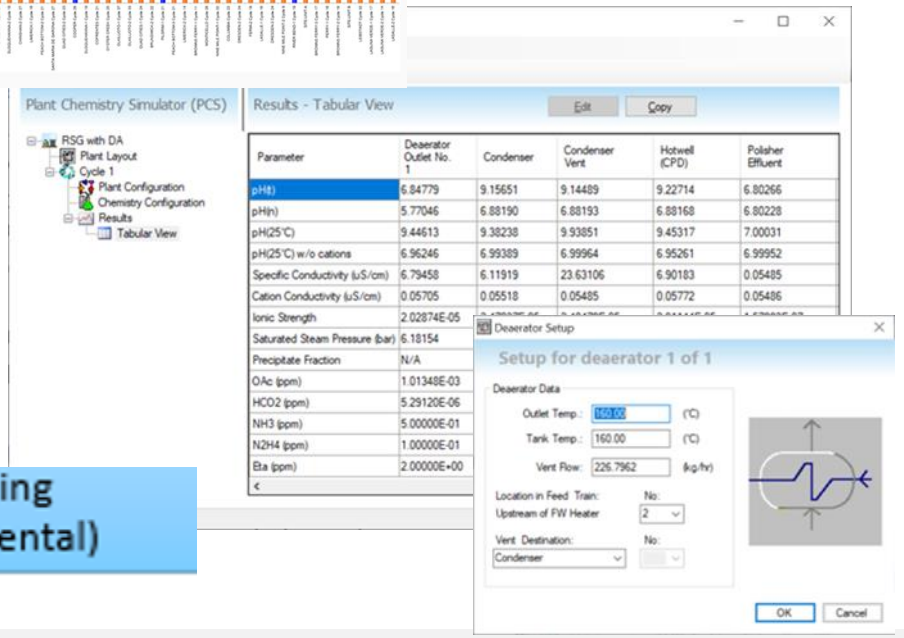
Guidelines Maintenance RFA – *Committee Prioritization*

Fundamental Research Not Prioritized

Benchmarking and Trending (Fundamental)



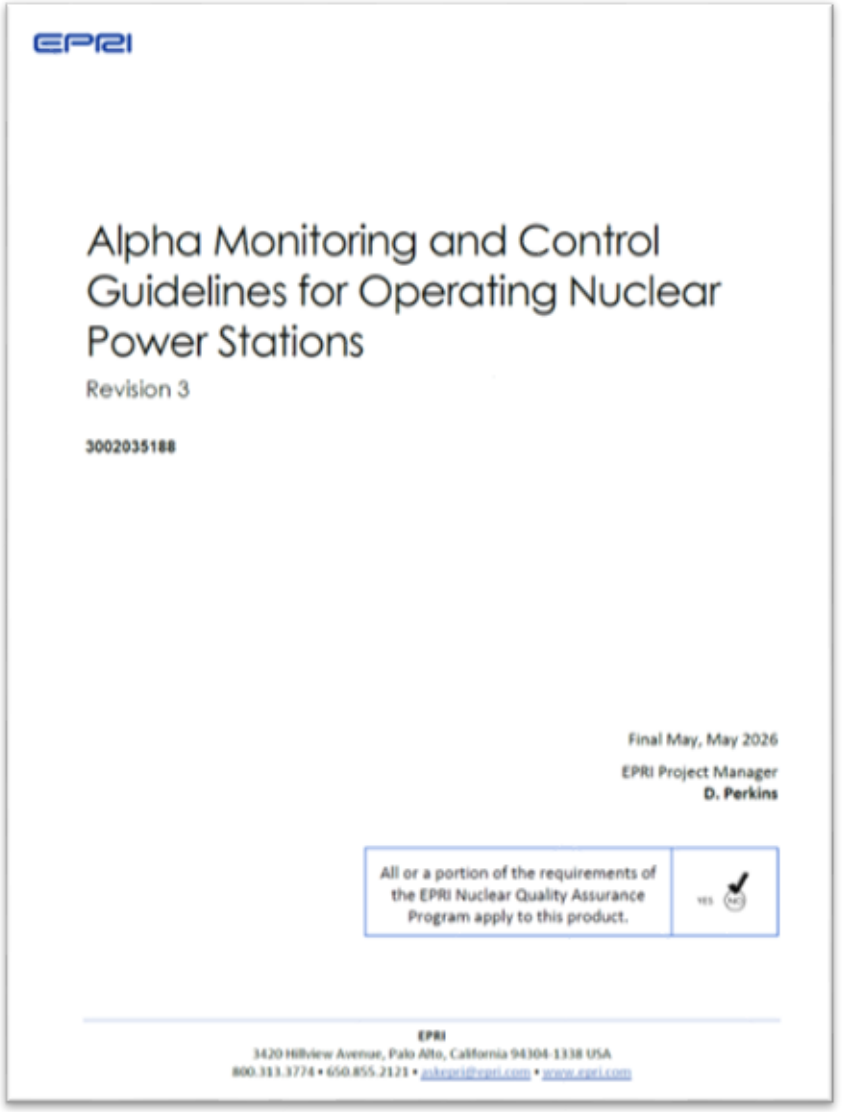
Modeling (Fundamental)



Alpha Monitoring and Control Guidelines for Operating Nuclear Power Stations, Revision 3, 3002035188

- The classification of alpha areas is changing from a system primarily based on ratios of smears and derived air concentration (fDAC) values to one based on the alpha contamination and alpha airborne activity values present in the areas.
- Criteria for when to obtain alpha smears and air samples have been simplified to ensure that samples are obtained in a consistent manner.
- A more defined risk-based approach to work planning in alpha areas was developed, along with corresponding recommendations for the protective measures to be implemented based on the classification of the area.
- Example instruments used in the industry are provided as a reference for sites when considering the instrument to use to perform alpha analysis.

	Non-Alpha Area (dpm/100 cm^2)	Level 1 (dpm/100 cm^2)	Level 2 (dpm/100 cm^2)	Level 3 (dpm/100 cm^2)
Removable surface alpha contamination	<20 (<0.04 Bq/cm^2)	20 to 200 (0.04 to 0.4 Bq/cm^2)	>200 to 2,000 (>0.4 to 4.0 Bq/cm^2)	>2,000 (>4.0 Bq/cm^2)
Airborne alpha activity	N/A	and <0.3 fDAC	or 0.3 fDAC to 3 fDAC	or >3 fDAC


EPRI

Alpha Monitoring and Control Guidelines for Operating Nuclear Power Stations

Revision 3

3002035188

Final May, May 2026

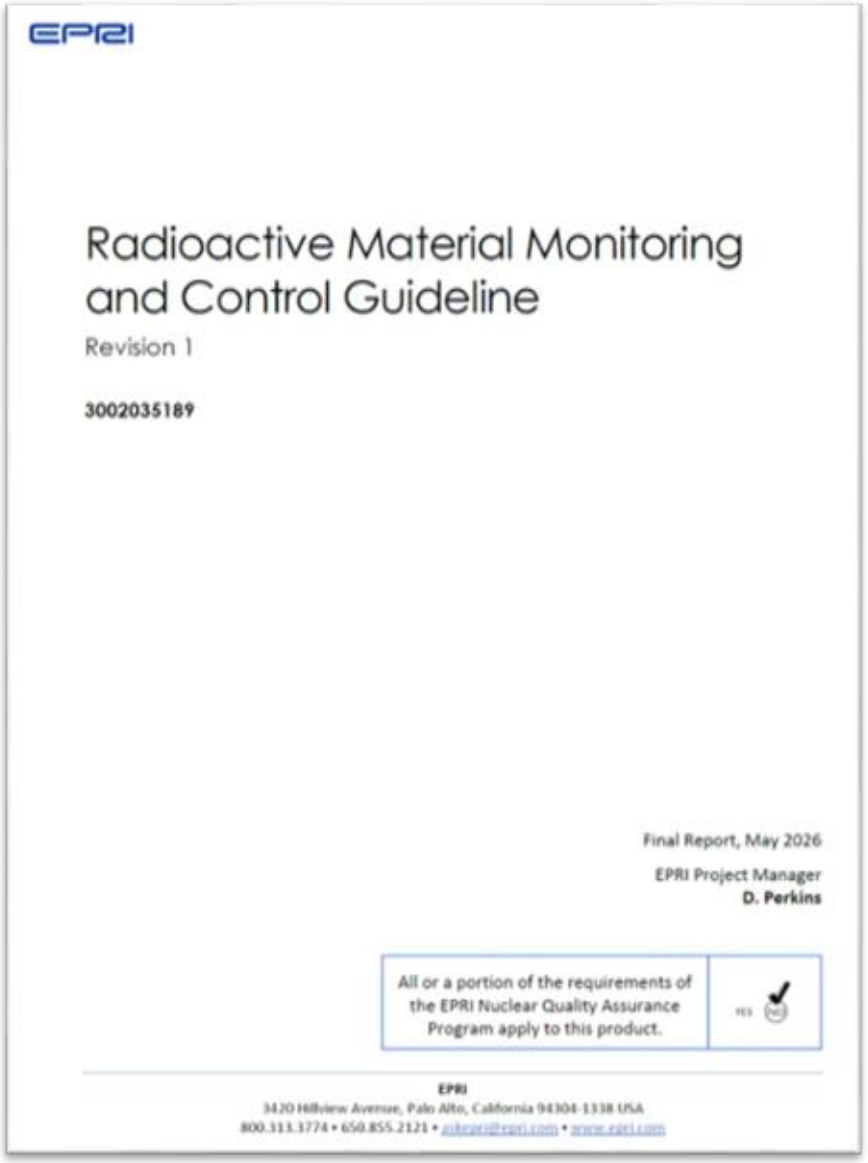
EPRI Project Manager
D. Perkins

All or a portion of the requirements of the EPRI Nuclear Quality Assurance Program apply to this product.

EPRI
3420 Hillview Avenue, Palo Alto, California 94304-1338 USA
800.313.3774 • 650.855.2121 • askepri@epri.com • www.epri.com

Radioactive Material Monitoring and Control Guideline, Revision , 3002035189

- These guidelines provide a technically sound approach to the monitoring of personnel, equipment, and materials for unrestricted release from RCAs, satellite RCAs, RMAs, and restricted areas/PAs at nuclear power plants.
- The report provides guidance and recommendations for the unconditional release of tools, equipment, volumetric and nonvolumetric materials, small quantity materials, nonradioactive shipment vehicles, and personal items.
- The report provides guidance and recommendations for the monitoring of personnel for contamination at the exits from contaminated areas, RCAs, satellite RCAs, RMAs, and restricted areas/PAs using various types of automated and nonautomated instruments.
- The report provides guidelines for the calibration and performance checking of each instrument type.


EPRI

Radioactive Material Monitoring and Control Guideline

Revision 1

3002035189

Final Report, May 2026

EPRI Project Manager
D. Perkins

All or a portion of the requirements of the EPRI Nuclear Quality Assurance Program apply to this product.

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Occupational Air Sampling Sourcebook

Key Research Idea

No consolidated reference exists for when, where, or how to collect and analyze radiological air samples for occupational radiation protection.

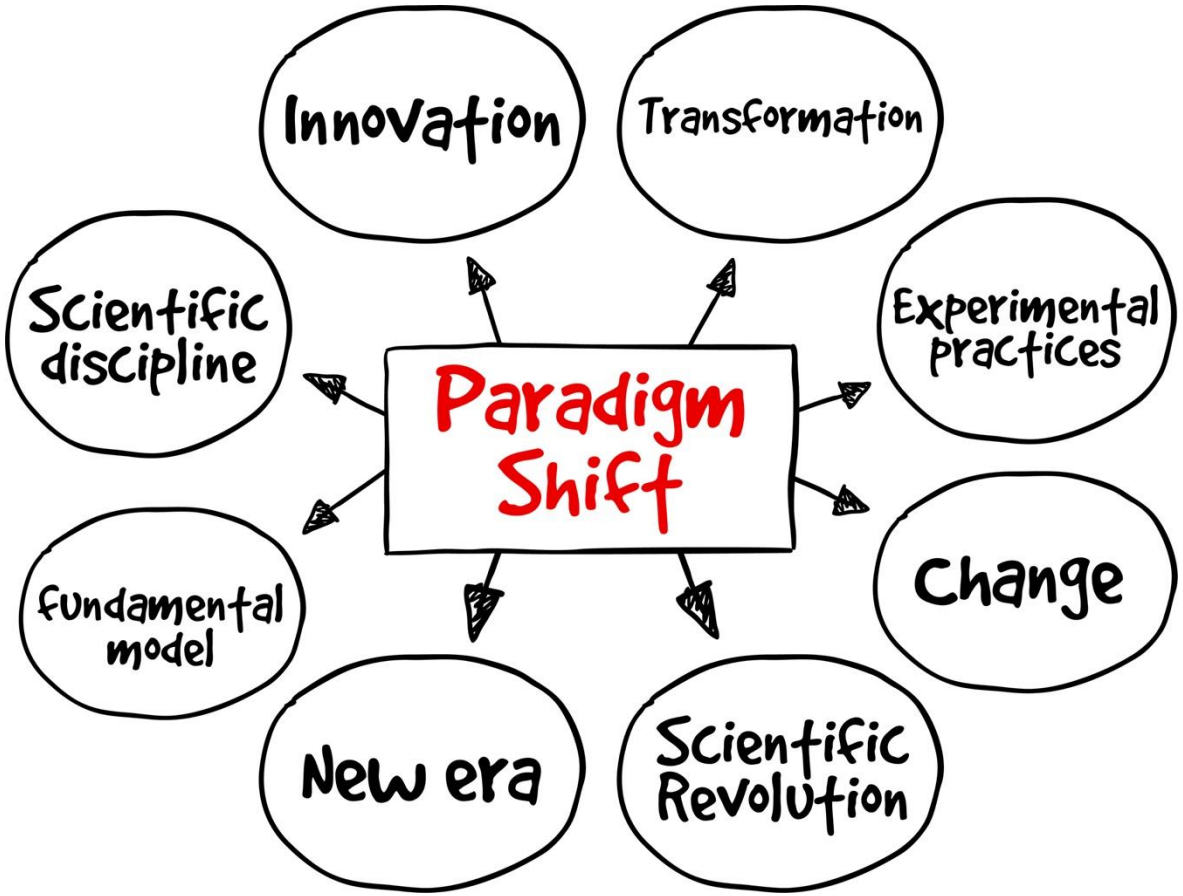
Utilities have each developed their own programs and there are large differences in protocols from one utility to another.

Research Objective

The objective of this project is to develop recommendations for developing and administering an occupational radiological air sampling program as well as training and reference material.

Research Value

- A common set of recommendations would aid in normalizing utilities technical basis for air sampling.
- This would allow for better and more consistent understanding and implementation of air sampling programs.
- Reduces regulatory scrutiny and optimizes staff time commitment to management of the programs.



Approach

- The following tasks will be performed to meet the stated objective.
- Develop an industry working committee of air sampling experts to support sourcebook development.
- Benchmark a minimum of ten radiological air sampling programs including members from multiple countries.
- Industry working committee to review benchmark data to identify best practices, recommended program elements, and structure.
- Develop sourcebook based on the research of programs and best practices.

Timeline

2026 & 2027

1. **Form Industry Committee**
   2026-06-01
2. **Develop Benchmark Template**
   2026-07-03
3. **Identify Benchmark Targets**
   2026-08-03
4. **Complete Benchmark Evaluations**
   2026-12-31
5. **Develop Draft Report**
   2027-04-30
6. **Industry Committee Review & Comments**
   2027-06-30
7. **Finalize Draft and Technical Review**
   2027-09-30
8. **Publish Final Document**
   2027-11-30

Related (Past) EPRI Research

Product ID	Title or Description	Pub. Date
3002031477	Estimating Derived Air Concentration Fractions (fDAC) from Removable Contamination Measurements	2025-04-01
3002015955	Experiences with Industrial and Radiological Safety During Decommissioning of Nuclear Power Plants	2019-09-30
3002008164	EPRI Pressurized Water Reactor Steam Generator Dose Reduction: Maintenance and Inspection Activities	2016-11-30
3002008165	2016 Reactor Pressure Vessel Head Set Optimization Report: Minimizing Dose and Ensuring Quality Execution	2016-11-17
3002008584	LaSalle Nuclear Generating Station Iodine Volatility Study	2016-06-02
3002005479	Reactor Cavity Decontamination Sourcebook	2015-11-30
3002000409	EPRI Alpha Monitoring and Control Guidelines for Operating Nuclear Power Stations, Revision 2	2013-08-29
1019226	Review of Methods and Tools for Estimating Atmospheric Deposition of Tritium at Nuclear Power Plants	2009-12-08

EPRI Supplemental Program:

Radiation Management and Source Term (RMST) Technical Strategy Group (TSG)

2026 Activities

Event Details

EPRI Radiation Management and Source Term (RMST) Workshop - January 2026

January 28 - January 30, 2026

EPRI

1325 G Street Northwest
Washington, District of Columbia 20005
USA

RMST TSG Workshop
January 28, 29, & 30
Washington, DC

RMST TSG Workshop January 28, 29, & 30 Washington, DC

- Fuel Failure Causes
- FRED Database Demonstration
- Radiological Impacts of Failed Fuel
- Plant OE for Failed Fuel Impacts
- Cold Spray and Laser Ablation Research (EPRI WRTC)
- CMA/SRMC Database Enhancement Project
- BWR VIP-190 (RP Focus)
- PWR Post-Peroxide Activity & FP Cleanup to Dose Impacts – Demo
- ALARA Case Studies
- LaSalle Case Studies
- PWR Silver Management: Industry OE & Best Practices
- Re-Evaluation of the Effect of Zinc on PWR Dose Rates
- Colloidal Material and Particulates and Impacts upon Radiation Source Term
- Advanced Reactors Chemistry and Radiation Safety Knowledge Capture

Evaluation of Alpha Self-absorption in Various Survey Media

- Alpha radiation is subject to self-absorption in survey media. Significant differences between air sample media and also between smear media likely exists however. Various stations have adopted assumed numbers for self-absorption based on air sampling studies associated with specific air sampling media.

- Seeking two or more stations with reliably detectable alpha activity to participate in the data collection and study during this Fall outage season.

GM vs Ion Chamber Instrument Dose Rate Response in NPPs

- Commercial NPP's do not have a common philosophy regarding the acceptable use of GM based dose rate meters vs ion chamber dose rate meters.
- An industry benchmark survey in September, 2025 resulted in polarized perspectives.
- This project will objectively compare and contrasts the two technologies for various use cases at NPPs. Limitations and recommended use cases will also be addressed.
- Seeking station experiences where they have observed a notable and repeatable difference in survey results based on a comparison of the two instrument types.

Study of mrad/hr to dpm Conversion Factors

- Commercial NPP's do not have a common philosophy or values on how to convert ion chamber mrad/hr readings on smear media to to equivalent surface contamination values in terms of dpm/100cm^2. An industry poll resulted in conversion factors ranging from 25,000 dpm/1mrad/h to 110,000 dpm/1mrad/h. Results also suggested that the generic factors were applied to entire fleets despite different technologies and source terms.
- This project would collect and analyze smear data from 10 or more stations, including both PWR and BWR technologies, and present the findings of the data for further consideration.
- Seeking as many stations as possible to participate by collecting requested data during this Fall outage season.

Requested Data

Analysis	Notes
Three smears per evaluation.	Three smears allows for validation of consistency of the radionuclide mixture.
Each smear should preferably be measured on the highest frisker scale but not overrange the instrument.	Record the average of the needle variation versus the needle peak.
Measure the open window reading with an ion chamber.	Also need to record the background.
Measure the closed window reading with an ion chamber.	
Measure for alpha activity	If using a alpha and beta capable scaler (e.g., Ludlum 3030P) include both the beta result and alpha result. If you save any smears with measurable alpha above 200 dpm, EPRI may pay for additional analysis (similar to a Part 61 sample evaluation)
Conduct an isotopic analysis of each of the smears.	

Primary system breaches, Rad Waste, SFP, Cavity Decon, In-core Drive Boxes…

2026 EPRI RMST Internal Dosimetry Workshop

- 2026 Radiation Management and Source Term (RMST) Technical Strategy Group (TSG) Internal Dosimetry Training Workshop. This is a second offering of the internal dosimetry workshop that was conducted in June of 2025. The workshop will focus on internal dosimetry concepts and practical calculations for early career technical specialists, radiological engineers, and staff.

- This meeting will be in person only. Vendors will be invited to have a booth at this workshop.

WHEN:
August 17, 2026, 08:00
August 21, 2026, 12:00 EST

WHERE:
EPRI - Charlotte, Building 3
1200 West WT Harris Blvd.
Charlotte, NC 28262

Registration is Open!

2027 – 2028 Work Plan Proposals
Chemistry-Radiation Safety Program Portfolio Development

(The following only represent proposals related to Radiation Safety related R&D. Chemistry proposals are not included.)

RadBench v5.0

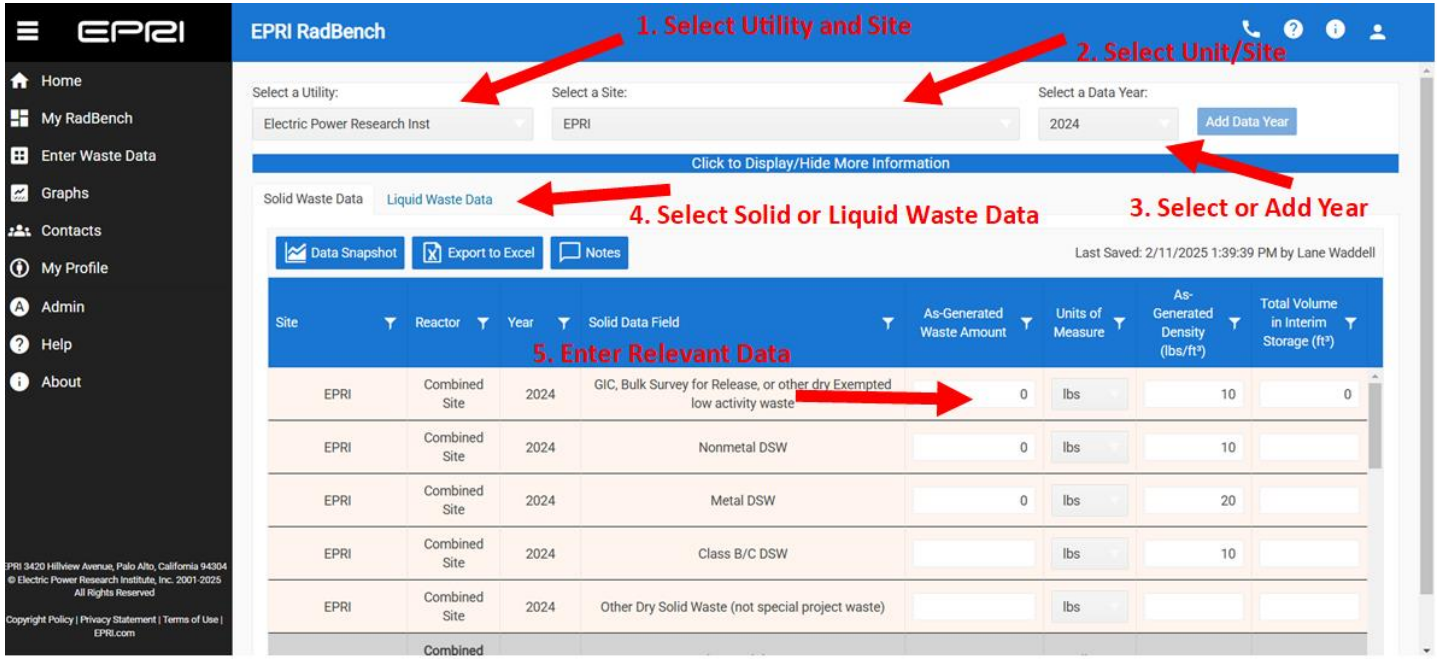
Darcy Campbell – Technical Executive
DACampbell@epri.com

Nicole Lynch – Engineer IV
NLynch@epri.com

What is RadBench ?

D. Campbell

- EPRI database to collect solid radwaste data, liquid radwaste data, and liquid radwaste processing system information
- Benchmarking Tool - Utility members can generate customized graphs and reports of site-specific, fleet-wide, or industry-wide data
- Also contains member directory for networking/benchmarking



https://radbench.epri.com

RadBench v5.0

D. Campbell

- Update to RadBench to **incorporate feedback from Members**
- Proposed Changes:
  - Add entry fields for:
    - Waste stream radionuclide activity
    - Liquid and gaseous effluent data
    - Pressurized Heavy Water Reactor-specific fields
  - Include a **data import capability** from offsite labs or other vendors
  - Expand download file type options
  - Create a **Sandbox for Advanced Reactor** waste and effluent volume estimation
  - Reincorporate historical waste data (operational and decommissioning)

EPRI Guidelines for the Use of Handheld Field Spectrometers for Characterization

Darcy Campbell – Technical Executive
DACampbell@epri.com

EPRI Guidelines for the Use of Handheld Field Spectrometers for Characterization

D. Campbell

RESEARCH QUESTIONS

- Use of handheld spectrometers remains mainly qualitative due to lack of standards
- Limited confidence for quantitative decision-making:
  - Waste characterization
  - Radioactive shipment classification
  - Material / area release (classification, release, shipment)

Source: WMG, Inc.

APPROACH

- Define minimum technical requirements (performance, calibration, QA/QC)
- Develop standardized methodologies and programmatic guidance
- Deliver a practical EPRI guideline for industry implementation

VALUE

- Enable quantitative and defensible use of handheld spectrometers
- Enhance consistency and regulatory confidence
- Support fleet-wide standardization and cost optimization

Source: H3D

Techniques for Characterization of Argon Isotopes in Gaseous Effluents

Karen Kim-Stevens – Technical Leader, Sr. Principal
kkim@epri.com

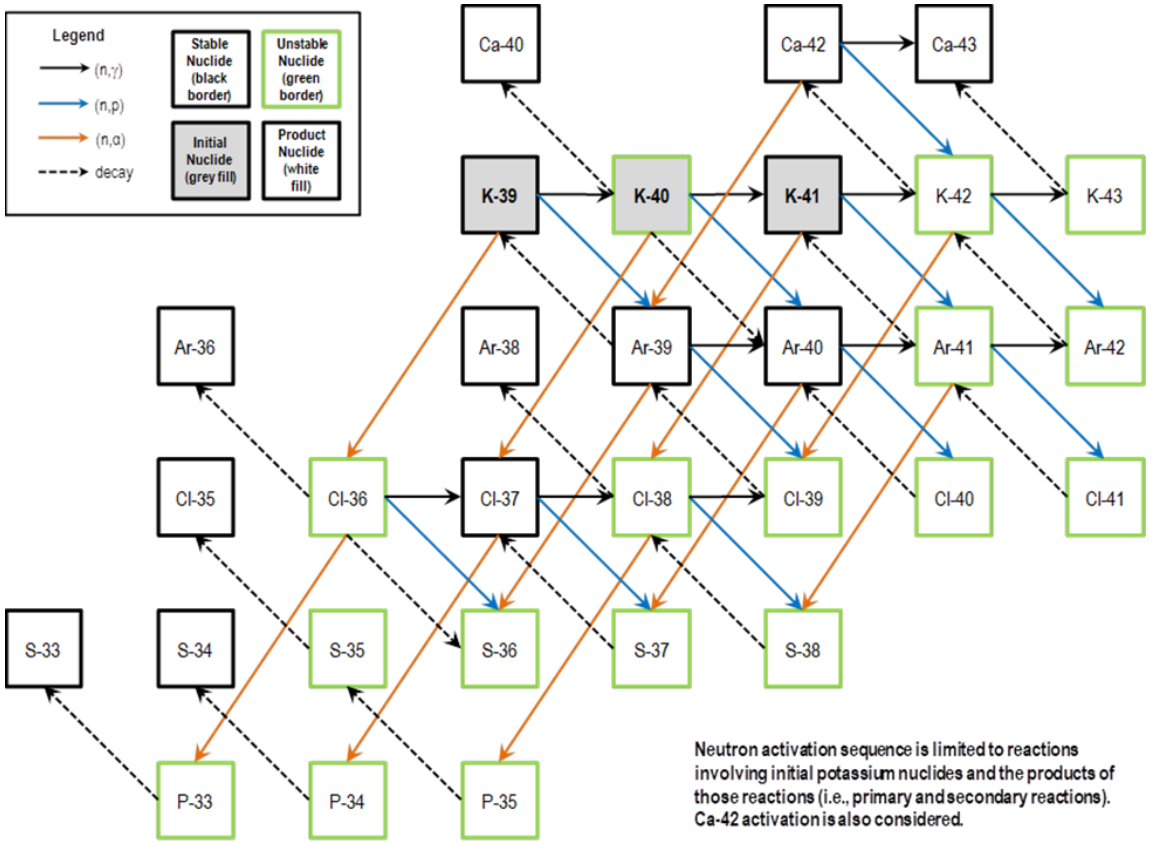
Techniques for Characterization of Argon Isotopes in Gaseous Effluents

K. Kim-Stevens

Research Need:

- Ar-39 and 42 will be generated due to Potassium Hydroxide (KOH) implementation
- Ar-39 and 42 are hard-to-detect and relatively long lived
- The argon isotopes are noble gases and will be released primarily through the gaseous effluent pathway
- ***Methods are needed to quantify Ar-39 and 42 in gaseous effluents for plants implementing KOH.***

	Half Life	Decay Mode	Product
Ar-39	268 yr	β^- (HTD*)	K-39 (stable)
Ar-42	32.9 yr	β^- (HTD)	K-42



Techniques for Characterization of Argon Isotopes in Gaseous Effluents

K. Kim-Stevens

Image Generated with CoPilot

- ***Approach:***
  - Explore direct measurement techniques
    - From other science disciplines such as geology
    - Evaluate feasibility of application to nuclear power plant effluents
  - Explore engineering calculations
    - Example: Carbon-14 estimation method per effective full power year
    - Leverage research conducted to date on KOH generation of Argon and evaluate if simplified, site-specific method is possible
    - If feasible, then develop methodology for application
- ***Duration:*** 18 months
- ***Deliverable:*** Technical Report

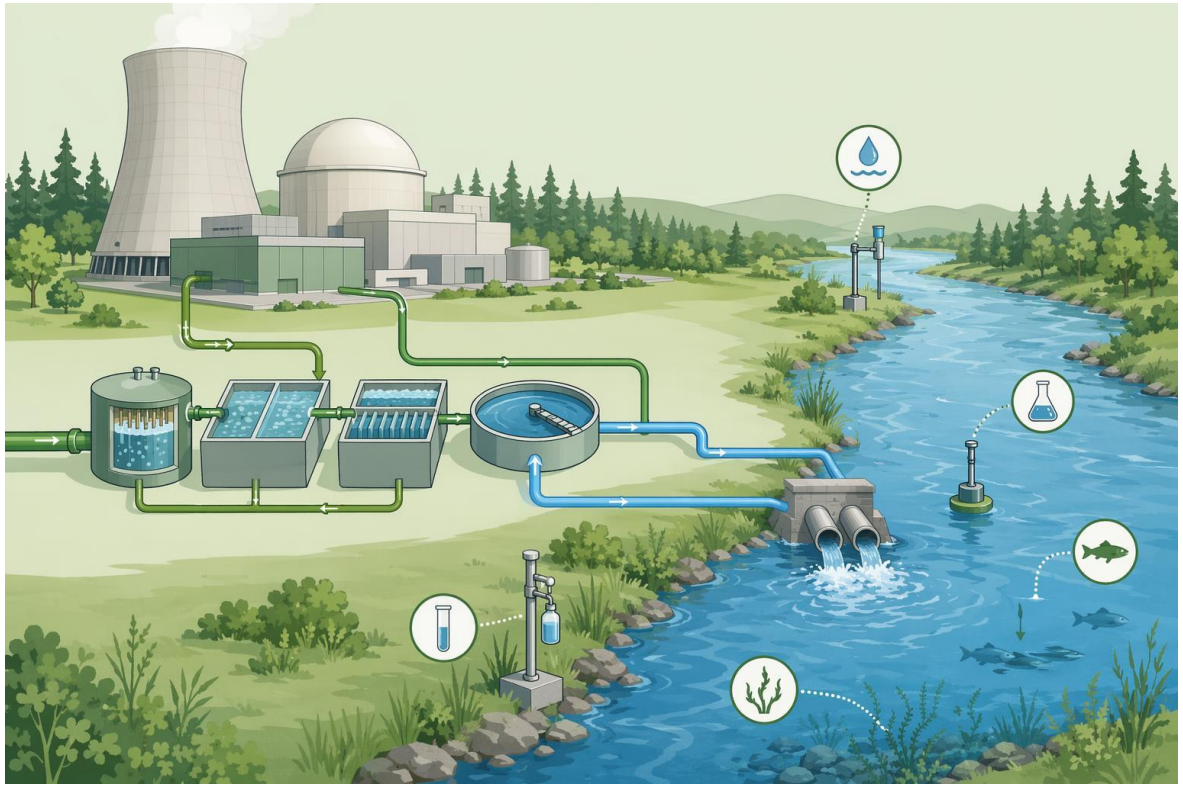
Effluents and Advanced Reactors

Rodolfo Vaghetto – Technical Leader, Principal
rvaghetto@epri.com

Radiological Effluent Management Strategies in Advanced Reactors

R. Vaghetto

- Current Technical Questions to be Explore:
  - What will be the waste forms (atmospheric and liquid) that will be released from the plants?
  - What radionuclides that will be released?
  - What will be the environmental behaviors and dose pathways associated with the effluent forms and radionuclides?
  - Are there dose conversion factors and dose calculation methodologies available? Will they need to be developed?
  - Will there be environmental monitoring strategies needed for new effluent forms or radioactivity?
  - What regulatory requirements and commitments will apply to the advanced reactors?



CoPilot generated image

Radiological Effluent Management Strategies in Advanced Reactors

R. Vaghetto

Motivation

- Atmospheric and liquid effluents must be controlled and monitored to protect public and environmental health and safety, ensuring compliance with regulatory limits.
- The current fleet of reactors implement strategies to continuously reduce releases, calculate doses to the members of the public, and monitor the environment for radiological impacts.
- Advanced reactors span diverse non-aqueous coolants, fuels, and operating conditions, and may require different effluent management strategies which should be considered within the design phase and operations phase.

Objectives

- Collect information and data currently available regarding the design of advanced reactors to understand the potential radiological effluents from their operation.
- Identify technical and knowledge gaps in effluent management for AR, defining a research plan to close these gaps

Value

- This project will Leverage current activities on AR radwaste characterization (project started in 2026 on HTGR) and will follow similar methodology
- Anticipate radiological effluents in advanced reactors and needs for customized management strategies
- Direct and focus R&D to address and close technical gaps
- Continued protection of the health and safety of the public

Zr-MOF-808 for Characterization of ^{129}I and ^{99}Tc in Wastewater

Paul Frattini – Technical Executive, Senior

pfrattini@epri.com

Using Zr-MOF-808 for Characterization of ^{129}I and ^{99}Tc in Wastewater

P. Frattini

- Test selectivity of iodate (^{129}I) over pertechnetate (^{99}Tc) for radwaste water characterization
- Design concentrator skid that would attempt to achieve 100x concentration of nominal radwaste water physical concentrations of these hard-to-detects (HTD)
- At such concentration factors, it may be possible that LLD would no longer exceed physical concentration of oxyanions that could be flushed into a small liquid analysis sample volume from the MOF concentrator module that was taken off that skid
- Actual wastewater concentrations could be calculated from plant data from MOF concentrator smaller sample volume
- Small analysis volume could be obtained from the MOF in the concentrator module using known MOF regeneration procedures

Possibly Reduce Excessive Conservatism of Reporting LLDs for HTDs

Technical Basis for Bioassay Monitoring using Portal Monitors

Borja Bravo – Technical Leader, Principal
bbravo@epri.com

Technical Basis for Passive Bioassay Monitoring Using Portal Monitors

B. Bravo

RESEARCH QUESTIONS

- Many plants require Whole Body Counters (WBC) for routine internal contamination monitoring, yet some countries already use Portal Monitors (PM) with significant time and efficiency gains.
- A harmonized global approach is needed to address regulatory disparities and build a robust technical basis for widespread PM adoption.

APPROACH

- Review regulatory frameworks and acceptance criteria for PMs across countries.
- Analyze operational data, performance metrics, and existing studies from plants currently using PMs.
- Develop case studies and compile findings into a comprehensive technical justification report.

VALUE

- Provide plants with a validated, efficient alternative to WBCs for routine bioassay monitoring — reducing monitoring time while maintaining high worker safety standards.

Radiation Monitoring Systems (RMS) – Topical Guidance White Papers

Karen Kim-Stevens – Technical Leader, Sr. Principal
kkim@epri.com

Radiation Monitoring Systems (RMS) – Topical Guidance White Papers

K. Kim-Stevens

History

- 15 Findings in the United States in the last 10 years related to Radiation Monitoring System (RMS) Issues
- 9 White Findings
- US NRC Information Notice 2013-13 R.1

EPRI Phase I

- Investigated 15 RMS findings since 2013
  - Analyzed for common themes
  - Identified lessons learned and recommendations
  - Describes WHAT to do; does not include guidance on HOW to do it
  - Findings published in Chem Letter 2023-018.

EPRI Phase II

- Provide technical guidance on HOW to implement recommendations on specific issues related to maintaining and using the RMS
- To date, published 4 White Papers (Dec 2024).
- 3 White Papers pending completion.

Supported by multidisciplinary Working Group.

Visit https://icwiki.epri.com/Main_I%26C/Radiation_Monitors for information and links to completed White Papers.

Radiation Monitoring Systems (RMS) – Topical Guidance White Papers

K. Kim-Stevens

Phase II White Papers & Status

CHEM 2024-006 Radiological Monitoring Topics During Accident Conditions (Related to NUREG-0737*)	**Draft Under Review**
CHEM-2024-007 Vendor Information that Supports Nuclear Power Plant Radiation Monitoring Systems	Complete
CHEM-2024-008 Assessment Plan for Radiation Monitoring System (RMS) Instrumentation and Maintenance	Complete
CHEM-2024-009 Radiation Monitoring System Health Metrics	Complete
CHEM-2024-010 Configuration Control of Radiation Monitoring System Databases	Complete
Radiation Monitor Calibration and Source Utilization: Key Concepts and Definitions	**Draft Under Review**
Radiation Monitor Replacement Change Management	**Draft Under Review**

Tasks to Complete Phase II

- Reconvene Working Group
- Complete remaining three White Papers
- Publish compendium of all White Papers under one Technical Report with EPRI Product ID and post on EPRI.com.
- ***Duration:*** 12 months
- ***Deliverable:*** Technical Report

*Clarification of TMI Action Plan Requirements (US NRC, 1980)

Surface Contamination Techniques

Jeff Cady – Technical Leader, Principal
jcady@epri.com

Surface Contamination Survey Techniques

J. Cady

RESEARCH QUESTIONS

- Contamination survey and interpretation protocols vary across stations, utilities, and countries
- Key sources of variability include:
  - Smear pick-up and self-absorption factors
  - Smear material types
  - Isotopic distributions
  - Conversion methods above GM pancake probe limitations
- Objective: Quantify variability and establish a technical basis to support consistent survey interpretation

Surface Contamination Survey Techniques

J. Cady

- **APPROACH**
- Review existing research addressing contamination survey variability
- Identify gaps impacting commercial nuclear power plant survey protocols
- Collect and analyze field data from multiple stations
- Compile results into a structured reference sourcebook

VALUE

- Provides a technical basis for contamination survey programs
- Supports consistent interpretation of survey results across conditions
- Enhances training and qualification of radiation protection personnel
- Reduces uncertainty in high-contamination and instrument-limited scenarios

Wound Dosimetry

Jeff Cady – Technical Leader, Principal
jcady@epri.com

Wound Dosimetry Quick Guide

J. Cady

RESEARCH QUESTIONS

- How should localized absorbed dose to contaminated wounds be estimated for common radionuclides encountered at nuclear power plants (NPPs)?
- What methods best support screening-level intake estimation and committed dose assessment for wound contamination events?
- What decision thresholds and follow-up actions should be applied during initial response and subsequent dose assessment?

Wound Dosimetry Quick Guide

J. Cady

APPROACH

- Review applicable literature and guidance, including ICRP, NCRP, NCRP/IAEA wound models, and industry practices
- Evaluate representative NPP radionuclides and scenarios (activation products, fission products)
- Assess available dosimetric models and simplifying assumptions for field application
- Develop practical tools (screening methods, lookup tables, decision logic)
- Compile into a concise, field-use quick guide

VALUE

- Provides defensible, consistent approach for wound dose assessment across sites
- Supports timely decision-making during infrequent, high-consequence events
- Reduces variability and uncertainty in intake and dose interpretation
- Enhances regulatory defensibility and documentation of dose assessments
- Improves coordination between radiological protection (RP) and medical response

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Onboarding Process and Applications

Ryan Bonello

Health Physics and Calibration Technician | ALARA Planner

- Ryan Bonello is a Health Physics and Calibration Technician and ALARA Planner supporting Energy Northwest at Columbia Generating Station, specializing in radioactive material shipping, instrument calibration and repair, and ALARA planning for major projects such as the Refuel-28 outage. He brings 18 years of Radiation Protection experience across outages, major component replacements, drywell operations, and radiological diving, and is the cofounder of Honey Badger, LLC. Known for his hands-on problem-solving approach, Ryan combines technical expertise with operational planning and holds an M.S. in Project Management and a B.A. in Marketing and Communications. Outside of work, he enjoys Muay Thai, boxing, snowboarding, and cooking, and values a family-first approach to leadership.

ENERGY NORTHWEST

Onboarding Process and Applications of Mirion Technologies Instrumentation @ Columbia Generating Station (CGS)

Presenter:
Ryan Bonello
Health Physics/Calibration Technician

Topic Overview

Instrumentation that Creates Value for Radiation Protection Operations

– Accuracy
– Efficiency
– Versatility

Main Discussion Points

- Instrument selection
- Onboarding process
- Meter applications at CGS
- Ion Chamber vs Gieger-Müller (G-M)

Instrument Selection at CGS

- CGS selected the RDS-32 host meter due to the interface design and smart-probe versatility
- Instrument capabilities
  - Internal G-M/SD detector
  - Alpha, beta, gamma and neutron
  - Telescopic configurations
  - Area Radiation Monitor (ARM)
- Replacement of outdated/legacy instrumentation
- Future support and adoption
  - Manufacturer support
  - Component supply chain
  - Firmware updates
  - R&D pipeline / future instruments

Onboarding Process Overview

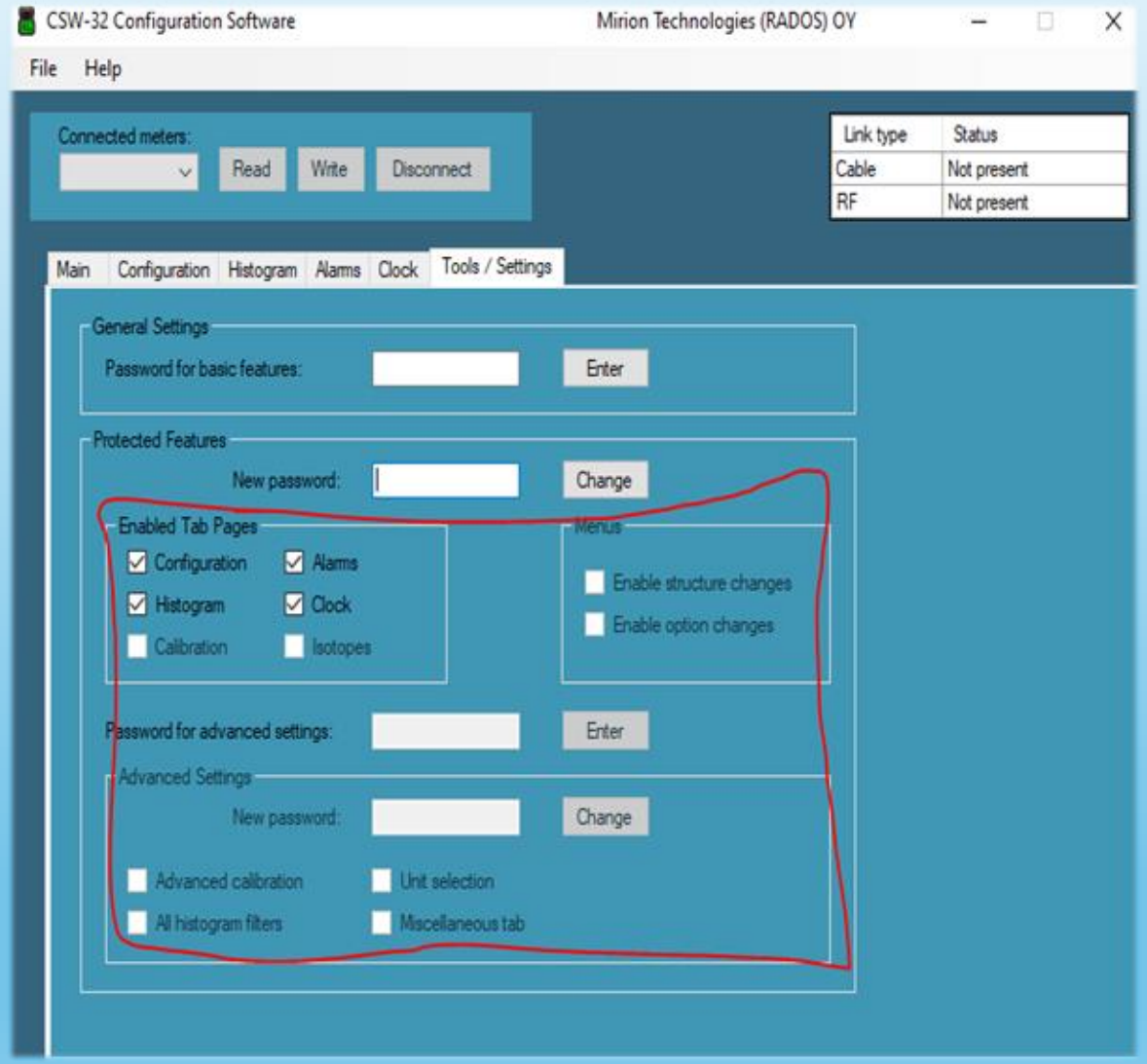
- Meter testing and field evaluation
- Calibration testing and software qualification
- Staff training and qualification
- Implementation and deployment

Field Meter Testing

- Field Meter Testing
- Functionality and performance testing
  – Response time
  – Accuracy
  – Ease of use
- Radiation Protection Technician (RPT) user feedback

Calibration Testing (Part 1)

- Software evaluation and testing
- IT / Cyber Security approval
- Software Quality Assurance (SQA)
- Software learning and validation
  - User manual
  - Hands-on practice



Calibration Testing (Part 2)

- Creating test fixtures
- Geometry alignment measurements
- Programming the Hopewell BX3
  - Attenuation combinations
  - X- and Z-axis positioning
  - Reference value optimization

Calibration Testing (Part 3)

- Writing Calibration and User Procedures
- Industry benchmarking
- Manufacturer consultation and support
- Ensuring ANSI N323AB-2013 compliance
- Creating calibration datasheets or integrating with MET/TEAM / Cal Procedure Writer
- Final management approval and records release

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Training & Qualification

- Training RP staff
- Developing and integrating
  – OJT (on the job training)
  – TPE (task performance evaluation)
  – JITT (just-in-time training) modules
- Incorporating onboarding into cycle-training qualification
- In-person demonstrations of instrument use
- Job aids and video training resources

Implementation / Deployment

- Procure required meters
- Perform quality testing of new equipment
- Generate serial numbers and enter tracking database
- Calibrate instruments
- Deploy meters to the field for operational use

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Meter Applications at CGS

- Overview of meter and probe applications across CGS
- Replacement strategy for aging instrumentation

RDS-32iTx / Alarm Box Applications

- Replacement of Victoreen VAMP for Emergency Center ARM
- Side-by-side performance comparisons
- Integration into Emergency Center Ventilation HVAC system
- Relay retrofit enabling automated ventilation mode actuation

RDS-32iTx / EOF Retrofit Applications

- Retrofit for EOF HVAC
- Performance comparison with prior ARM
- Relay integration for ventilation mode control

GMP12-GSD Probe Installations

- Probe inside insulated housing for Mode 1 outside-air intake
- Mounted probe fixture for Modes 2 and 3
- RAD MODE 2 under lead brick

RDS-32iTx Field Applications

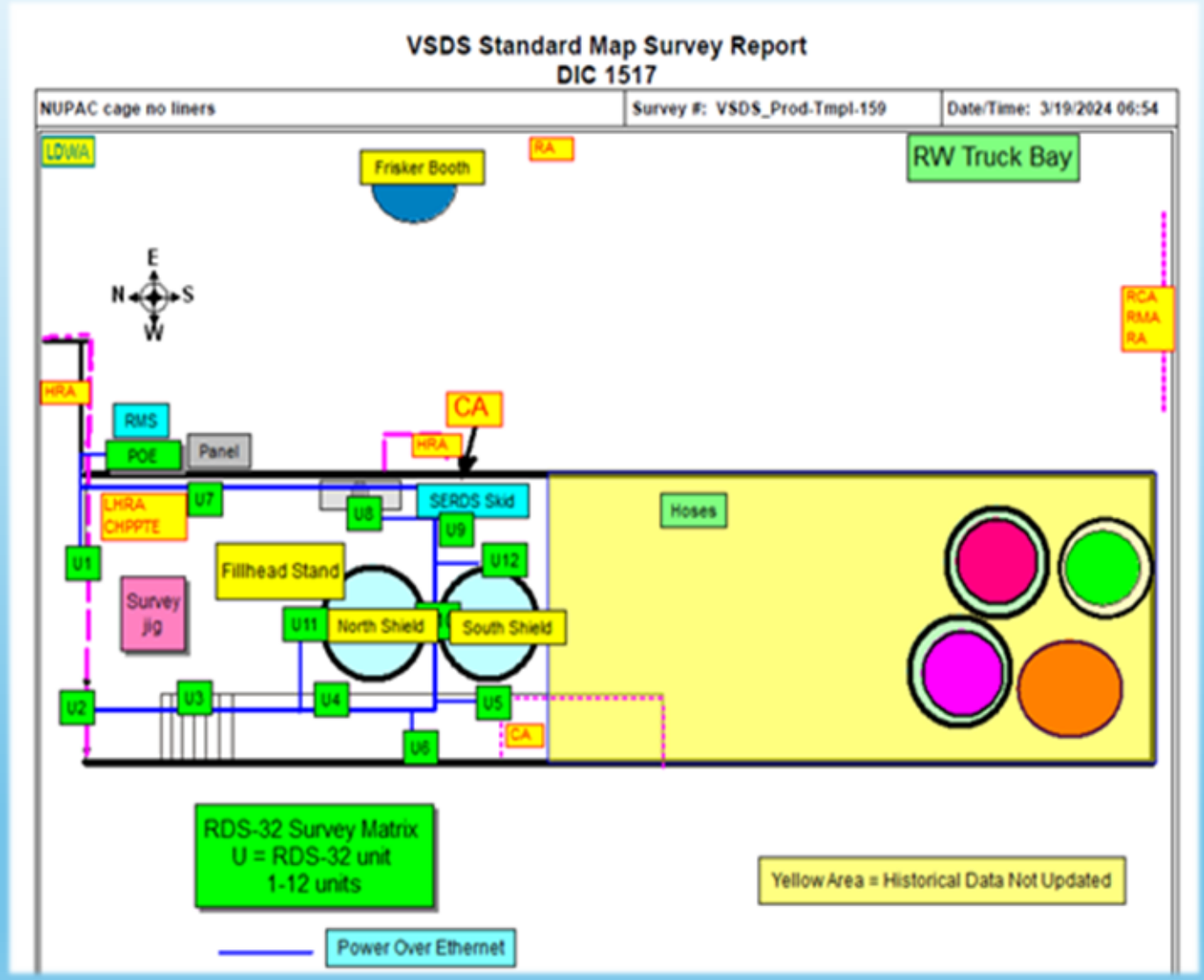
- Use with AC adaptor cradle
- Use with battery-powered cradle
- POE converter for remote or difficult-access areas
- Long-term goal: full POE-powered RDS-32 network

Battery Pack Applications

- Current DMC-2000 linked battery packs
- RDS-32iTx battery cradle usage

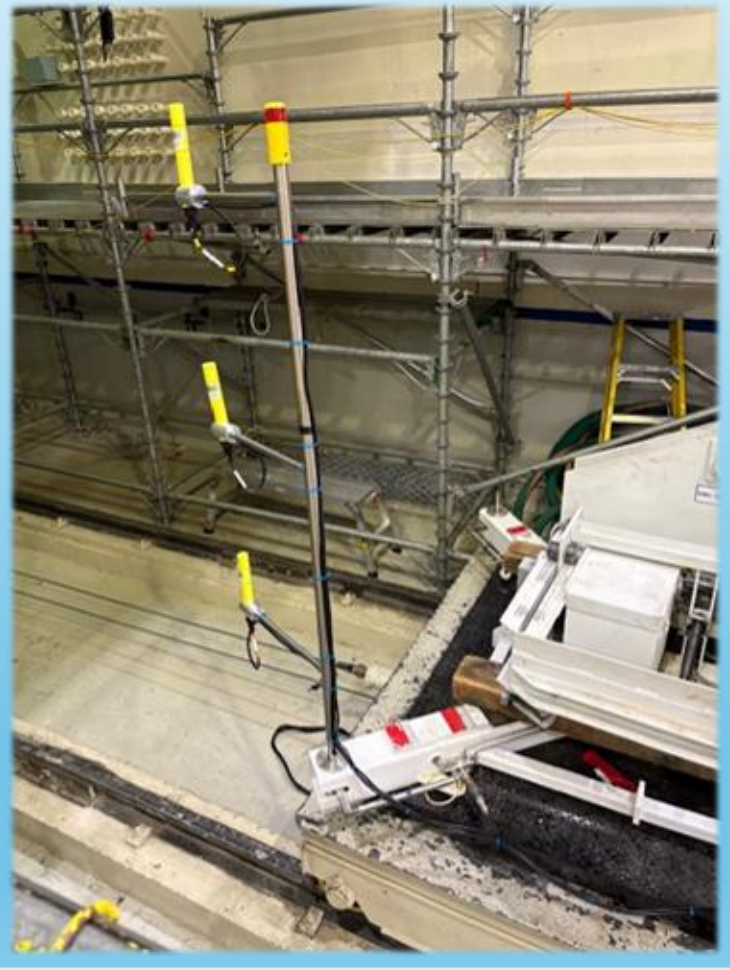
Future RDS-32 Applications

- Fixed RDS-32 monitoring network inside NUPAC cage
- Powered via POE
- Standardization for worker briefing dose-rate surveys
- Survey map overlay for real-time dose rates



DRM-3000 Characterization Fixtures

- Transmission to RMS (DRM-3000 + RDS-32iTx)
- Liner survey jig for DRM-3000
- Smart-probe comparison with Telepole II



DRM-3000 Remote Monitoring Survey Fixture Video

Future DRM-3000 Applications

- Tri-nuke filter characterization using three AMP-100 probes
- Stack monitoring compensatory measures with DRM Smart Probe and AMP-200 (range 10,000 R/hr)
- ARM use in Drywell and high-dose-rate locations
- Strategic locations in the plant with known transient dose rates

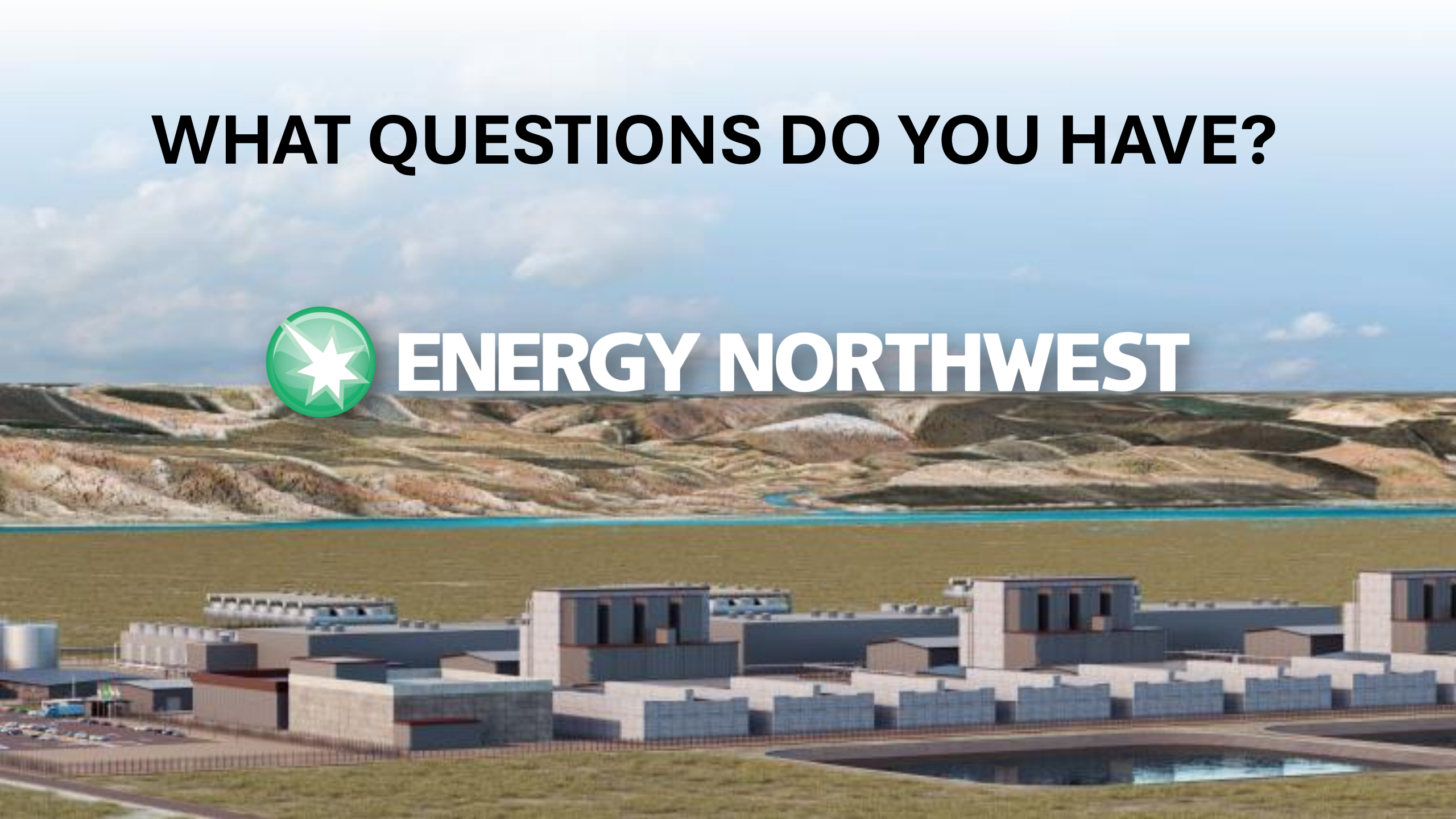
Ion Chamber vs Energy Compensated G-M (ECGM)

- The long-standing industry practice is to rely on ion chambers when establishing work-area dose rates.
- Some utilities permit the use of ECGM-type instruments for survey data under certain conditions.
- Free-air ion chambers are not tissue-equivalent
- ECGM instruments can overrespond significantly in steam-affected areas
- Is there a potential path to common ground by defining controlled conditions where each instrument type is appropriate?
- EPRI has deemed the topic worthy of investigation
- Jeff Cady's proposal ranked # 3 of 18

Ion Chamber vs Energy Compensated G-M (ECGM)

- Perform a comparison study between the IC3 ion chamber and RDS-32 ECGM instruments.
- Conduct side-by-side meter comparisons over time, capturing data using RMS or internal histogram functions (creation of a geometry fixture).
- Collect data across multiple plant locations, such as Radwaste, Reactor Building, and Auxiliary Building, etc., while avoiding steam-affected areas.
- Compare datasets for variance and account for any known operational transients.
- Evaluate the suitability of ECGM-type instruments for use in place of ion chambers under defined conditions.
- Share the study results with industry stakeholders for broader consideration.

WHAT QUESTIONS DO YOU HAVE?



INPO Update

Dan Doggit

Sr. Radiation Protection Evaluator

Daniel L. Doggett is a Senior Evaluator in Radiation Protection and Chemistry at the Institute of Nuclear Power Operations (INPO), supporting nuclear plant performance improvement and industry excellence initiatives.

Mr. Doggett brings extensive experience in radiological protection, emergency preparedness, and industrial safety, with a focus on improving industry radiological performance, strengthening defense-in-depth, and advancing operational rigor. He began his career serving 8 years in the U.S. Navy, followed by 33 years in commercial nuclear power in various leadership roles in radiation protection, training, industrial safety and emergency preparedness. He has served at INPO for over four years.

Known for his disciplined approach and practical field insight, he translates complex technical issues into actionable improvements that enhance nuclear, radiological, and industrial safety.

Panel Discussion

You're Invited

Join Us for a Pre-NECX Open House

Paragon, Certrec, and Mirion Technologies—the companies behind Mirion Nuclear Solutions—invite you to an open house at Paragon's Fort Worth headquarters ahead of the NECX opening reception in Dallas.

Join us for:

- Facility tours showcasing advanced capabilities and innovation, including seismic testing tables, loss-of-coolant accident (LOCA) simulation, electromagnetic interference and radio-frequency interference (EMI/RFI) testing, and a real-time reactor simulation environment
- A hands-on look at solutions supporting today's operating fleet and advanced reactors, including MCCs, plantwide modernization, digital upgrades, HVAC systems, and radiation monitoring technologies
- Insights into I&C repair and reverse engineering as a bridging solution
- Licensing support services
- Conversations with the Mirion Nuclear Solutions team on unified I&C approaches and the future of nuclear operation
- Lunch and refreshments

WHAT	**An Open House before NECX**
WHERE	**Paragon Headquarters** 7410 Pebble Drive, Fort Worth, TX
WHEN	**Monday, August 24** Drop in between 10:00 a.m – 4:00 p.m.
RSVP	Scan QR code to **register by August 7th**

Transportation between the Hilton Anatole (NECX headquarters in Dallas) and Paragon will be available throughout the day.

SHUTTLE SCHEDULE

Departure times from Hilton Anatole to Paragon: 9:30 a.m.; 11:30 a.m.; 1:30 p.m.

Departure times from Paragon to Hilton Anatole: 12:30 p.m.; 2:30 p.m.; 4:00 p.m.

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Thank you