

# **Nuclear Energy**

## Radiological and Environmental Sciences Laboratory (RESL)

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# Scenario

- Think of a radiological emergency
  - RDD, IND, power plant accident, etc.
- Think of the number of samples sent to labs
- Think of the number of labs involved
- Think of the consequences of decisions made based on analytical results
- How do you know the data is any good?



# Radiological and Environmental Sciences Laboratory (RESL)

- Federal Metrology / Radiological Reference Laboratory for the U.S. Department Of Energy/National Institute of Standards and Technology
- Reference laboratory for the Nuclear Regulatory Commission/U.S. Air force/U.S. Navy.
- Provides Performance Testing (PT) material and other radiological materials to evaluate the quality of the analytical results that agencies uses to make important decisions.
  - Environmental
  - Worker protection
  - General Public





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# **Core Mission Capabilities**

### Standards preparation and development

- Radiological
- Inorganic

### Analytical Radiochemistry

- Directly traceable to NIST
- Expertise in difficult analysis of matrices

### Radiation irradiations and calibrations

- Provides Precise, NIST Traceable Irradiations
- X-ray Beam Characterizations
- Gamma/Beta Irradiation Beam Uniformity
- Irradiator Shutter time corrections

## Applied programmatic R&D expertise in Radiological measurements and data quality issues





# **Specialized Facilities**

- Standards preparation laboratories
- Soil, water, vegetation, blending and filter preparation laboratories
- Radiation calibration/irradiation laboratory
- Whole-body/lung/thyroid/phantom counting vault









# **RESL Programs**

**<u>RTP</u>**: NIST Radiological Traceability Program

**DOELAP**: DOE's Laboratory Accreditation Program

**<u>ARMAP</u>**: Air Force Radiological Measurement Assurance Program

**RMAP:** NRC Radiological Measurement Assurance Program

**<u>CRMAP</u>**: NRC Confirmatory Measurement Assurance Program

MAPEP: Mixed Analyte Performance Evaluation Program

**<u>SSPEP</u>**: Site-Specific Performance Evaluation Program

**<u>CRM</u>**: Radiological Certified Reference Material Program

**USGS:** US Geological Survey INL Confirmatory Measurement site-wide samples analyses

**DOE PHANTOM LIBRARY:** DOE's Phantom Lending Program

ACCREDITATIONS: • ISO 17025, General requirements for the competence of testing and calibration laboratories

- ISO 17043, Conformity Assessment General Requirements For Proficiency Testing
- ISO 17034, General requirements for the competence of reference material producers



**Radiological Traceability Program (RTP)** 

- Direct Traceability to NIST
  - RESL prepares PE Materials for confirmatory measurements by NIST
  - RESL analyzes PE Materials prepared by NIST
  - All Matrices are addressed
- No other Federal Agency or Commercial Facility maintains this type of direct traceability to NIST
- Recognized by NIST as a Federal Reference and Expert Laboratory





- Radiation protection programs are required by United States public law 10 CFR 835
  - Whole body and extremity dosimetry
  - Direct and indirect radiobioassay

#### **DOELAP Accreditation Program includes**

- Performance Testing
- On-site Assessments
- Corrective Action Plan Approval
- Recommendation by Program Administrator
- Recommendation by Over-sight Board
  - Independent Technical Experts
- Review & approval by HQ Program Manager

**DOELAP** is the Accreditation Authority for All DOE Facilities





### Air Force Radiological Measurement Assurance Program (ARMAP)

- Assuring quality of Air Force Bioassay laboratory through:
  - Performance Evaluation Program
    - Real World Samples
    - Urine, Fecal, swabs & air filters
  - On-site Assessment
  - Review of Corrective Actions







- Radiological Measurement Assurance Program (RMAP)
- Assuring quality of NRC's labs through:
  - Performance Evaluation Program
    - Real World environmental Samples 6 times a year
  - On-site Assessment and Report to NRC
- Confirmatory Measurements of NRC Licensees (CRMAP)
- NRC's Radiological Reference Laboratory for over 40 years





- Provides DOE confidence in the laboratories analytical data.
- The MAPEP distribution is twice per year:
  - Water (Radiological, Gross Alpha/Beta, Inorganic, Mass Spectrometry)
  - Soil (Radiological, Inorganic)
  - Vegetation (Radiological)
  - Air Filters (Radiological, Gross Alpha/Beta)
  - Special Radiological Matrix
- NIST Traceable Reference Values





### Site Specific Performance Evaluation Program (SSPEP)

- RESL prepares proficiency testing standards based on customer requirements for their contracted laboratories
- Under our SSPEP we have developed many unique Certified Reference Materials (CRMs)
  - Soils, Vegetation, Water, Air Filters
  - Fish, Kelp, Bone, Wheat, Milk, Sausage
  - Chicken, Beef, Dehydrated Eggs, Fruits, Concrete, Asphalt
  - Urine, Feces, Nasal Swabs, Body Phantoms
  - DOE Sites & Federal Agencies: radiological nuclides spiked in vegetation, food, soil, water, biologicals, etc.
  - Matrices & Analytes that are not present in other RESL programs
- RESL evaluates final results of the PE samples and sends final report to customer





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### **Nuclear Energy**

#### • Soil

- Water
- Vegetation
- Filters
- Cement
- Asphalt
- Sludge
- Nasal Swabs
- Meat/Fruits
- Powdered Eggs
- Milk
- Water Soluble Organic



**Certified Reference Materials** 









































# **RESL - A Radiological Resource**

- RESL is willing to collaborate with other agencies to evaluate and improve the quality of radioanalytical measurements.
- RESL is capable of producing radiological PE samples in a variety of matrices.
  - Expertise and Experience
  - Staff
  - Resources



**Websites and Contact Information** 

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