Eckert & Ziegler
Isotope Products

Unbroken Chain, an ISO 17025 Requirement

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Eckert & Ziegler Isotope Products (EZIP)

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PT Provider Workshop-RRMC

isotrak™

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3 ISO17025 Accredited Calibration Laboratories

Valencia/Burbank, USA
Braunschweig, Germany
Atlanta, USA

ilac-MRA

DAkkS
Deutsche
Akkreditierungsstelle

Definition

PE- performance evaluation, PT- proficiency testing

- evaluation of participant performance against pre-established criteria by means of interlaboratory comparisons
- EZIP operates a number of PT programs also known as cross-check programs

Current PT-Programs

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Radiochemical Cross-Check Program (HCC)

- Nuclear Power Plant Effluents (higher activity)

Environmental Radiochemical Cross-Check Program (ECC)

- Broad Range of Environmental Samples

Projects

- Global Fallout Monitoring (mixed fission products)
- Emergency Response Method Proficiency

Cross-Check Program Overview

- Blind samples are distributed four times per year (Quarterly).
- Samples are prepared in customer supplied containers or containers purchased by us.
- Samples are prepared using NIST traceable radionuclide solutions.
- Participants provide measured results to Eckert & Ziegler.
- Customer Summary Report issued.

Effluent Monitoring PT Program

Our Radiochemical Cross-Check Program is designed to provide performance evaluation samples for monitoring all effluent pathways at nuclear power plants as considered acceptable in NRC Reg. Guide 4.15:

1. liquid radioactive waste samples
2. gaseous radioactive waste samples
3. charcoal/silver zeolite cartridges
4. air particulate samples
5. reactor coolant water

Effluent Monitoring PT Program

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Sample Analysis	Form	Activity
Fe-55	20-mL liquid	185 Bq/g
Gross alpha (Am-241)	20-mL liquid	3.7 Bq/g
Gross beta (Cs-137)	20-mL liquid	185 Bq/g
Gamma Isotopic (Ce-141, Co-58, Cr-51, Mn-54, Cs-134, Cs-137, Zn-65, Co-60)	20-mL liquid	3700 Bq/g
Sr-89/Sr-90	20-mL liquid	185 - 1850 Bq/g
Tritium	20-mL liquid	185 Bq/g

Effluent Monitoring PT Program

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Sample Analysis	Form	Activity
Gross alpha (Am-241)	Evaporated Salt (Filter Paper)	185 Bq
Gross beta (Cs-137)	Evaporated Salt (Filter Paper)	185 Bq
Gamma Isotopic (Ce-141, Co-58, Cr-51, Mn-54, Cs-134, Cs-137, Zn-65, Co-60)	Evp. Salt (Filter Paper), Solid (Resin), Simulated Gas	1850 Bq
Sr-89/Sr-90	Evp. Salt (Filter Paper)	185 - 1850 Bq/g
I-131	Solid (Char. Cartridge)	185 Bq
Gamma Whole Body	Solid (Resin)	1.85E5 Bq
Noble Gases	14 cc ampoule	1.85E5 & 3.7E4 Bq
Noble Gases	33 cc sphere	3.7E4 & 2.96E6 Bq

Environmental Monitoring PT Program

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Our Environmental Radiochemical Cross-Check Program provides more media / radionuclides at lower activity levels than the Radiochemical Cross-Check Program:

1. Charcoal cartridges
2. Soil
3. Water
4. Vegetation
5. Air Filters
6. Milk
7. Biota (Fish)

Environmental Monitoring PT Program

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Analysis	Radionuclides	Form	Activity, Bq/L
Alpha/Beta	Am-241, Cs-137	Water, Soil, Filter	0.37 – 11.1
Tritium	H-3	Water	74 - 555
Gamma-ray emitters	Ce-141, Co-58, Cr-51, Mn-54, Cs-134 Cs-137, Zn-65, Co-60	Water, Soil, Filter, Vegetation, Milk	1.85 – 11.1
Radiochemical	I-131, Sr-90	Milk	0.37 – 3.7
Transuranics	Am-241, Pu-238, Pu-239, Np-237, Cm-244	Water, Soil, Filter	0.037 – 0.37
Natural Radioactivity	U-nat, Th-232, Ra-228, Ra-226	Water, Soil, Filter	25-100
Beta Emitters	Sr-89, Sr-90, Tc-99	Water, Soil, Filter	0.925 – 3.7

*Volumes: Liquids / Vegetation / Soils = up to 1 liter

Establishing Traceability

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ISO 17025 QA Program

- 5.6.2: ‘Unbroken Chain of Calibrations Linking to Primary Standards’

NRC Guide 4.15

- QA For Radiological Monitoring-Effluents, Environment

ANSI N42.22-1995

- Traceability to NIST

ANSI N42.22-Traceability of Radioactive Sources To NIST

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Section 6: Unbroken Chain to Primary Standards (NIST)

- Participation in NIST MAP (NRMAP)

6.1.2: Test Requirements (Verification)

- Gammas <250 keV
- Gammas >250 KeV
- Betas <100 keV
- Betas >100 keV
- Total Alphas
- Alphas by alpha spectrometry

6.2: Acceptance criteria

- Difference between NIST value and test value ≤ $3\sqrt{\mu_{NIST}^2 + \mu_{Test}^2}$

2013 NRMAP Program Analytes

- Gammas <250 keV: Xe-133 (81 keV)
- Gammas >250 KeV: Kr-85(514 keV)
- Betas <100 keV: Pu-241, I-129
- Betas >100 keV: Sr-89
- Total Alphas: Np-237 by LSC
- Alphas by alpha spectrometry: Np-237 (for impurities)

2014 NRMAP Program Analytes

- Gammas <250 keV: Cd-109 (88keV)
- Gammas >250 KeV: Cs-137 (661.7 keV)
- Betas <100 keV: H-3
- Betas >100 keV: P-32
- Total Alphas: Pu-239 by LSC
- Alphas by alpha spectrometry: Pu-239 (for impurities)

Conclusions

- EZIP has regularly operating PT Programs
- EZIP participates in a Measurement Assurance Program(MAP) with NIST and other National Metrology Institutes(NMI) to establish traceability as specifically required by ANSI N42.22, establishing ‘an unbroken chain to primary standards globally (ISO 17025) ’
- Decommissioning and security activities may benefit from additions to our established PT programs for training, R&D, method validation and routine work
- We welcome the opportunity to collaborate with you to build next generation PT programs to meet current and future demands