Sample Preservation, Pretreatment and Analysis: What do we really need to do?

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Topics

- Sample requirements for:
  - 10CFR50
  - 10CFR61
  - ODCM
- Myths
  - Sampling
  - Preservation
  - Laboratory Analysis
- Your Responsibility

Sampling Requirements

- Representativeness
  - Of the sample stream, mass or volume
  - Of the routine release from the plant
  - Of the sample in the environment
- Repeatability
  - Sampling plan and process is in a *procedure*
  - Container is *suitable* for radionuclides being sampled
  - Sampling equipment is *calibrated*

Sampling Requirements (continued)

- Training for sampling for RETS/REMP is needed for (RG 4.15)
  - Routine discharges
  - Non-routine discharge points
  - Compensatory samples when sample point is unavailable
  - Filters
  - Resins
  - Other material solid materials from plant components
  - Soils
  - Vegetation
  - Flowing streams
  - Animals

Sampling Myths

1. The laboratory knows the indigenous chemistry of where the sample came from and composition of the sample for native minerals is not necessary information
2. All sample containers are satisfactory for all samples
3. Sampling protocols do not require a written procedure
4. Tritium samples must be stored in glass containers

Sampling Myths (continued)

- A two volume tank recirculation is always satisfactory to ensure representativeness
- Sampling at the same time each week from a routine effluent point always provides a representative sample
- REMP sampling locations don’t change
- Background activity concentrations at REM locations don’t change

Preservation Myths

1. 5 mL of concentrated nitric or hydrochloric acid is always enough
2. The laboratory knows how the sample was preserved
3. Analysis of plant samples for 10CFR61 radionuclides does not require any special preservation or sampling methods

Preservation Myths (continued)

- Soil or solid matrix samples do not require any special preservation
- Refrigeration or icing is not required when samples are sent via express services.

Laboratory Analysis Myths

- The laboratory has validated the matrix you presented for analysis of these radionuclides.
- The laboratory ensures that your measurement quality objectives (MQOs) have been met for radionuclides in your matrix.

By alpha Method	By beta method	By gamma method
$^{239+240}Pu$	^{55}Fe	Gamma emitters < 100 keV
	^{59}Ni	^{129}I
$^{total}U$	^{63}Ni	Parent-Progeny Emitters
$^{isotopic}U$	^{99}Tc	^{140}Ba- ^{140}La
^{241}Am	^{89}Sr	^{106}Ru- ^{106}Rh
	^{90}Sr	^{95}Zr- ^{95}Nb
	^{14}C	Other
	^{241}Pu	^{131}I

Laboratory Analysis Myths (continued)

- The laboratory staff know the needs for analysis of your sample and will select the right method
- For analyses that require a carrier or tracer to be added, a yield of 10% is OK because it properly corrects for losses
- Sample qualifiers will not impact the interpretation of the sample results.

Laboratory Analysis Myths (continued)

- It is satisfactory to perform a matrix spike or LCS at a concentration (100+) times the MDC to ensure that good statistics are obtained.
- A batch duplicate that is not made on your sample is satisfactory for your duplicate analysis requirement
- It is OK for the laboratory to report radionuclide results in the following units
  - "<" or "< (value)"
  - <MDA
  - ND
  - "zero"

Laboratory Analysis Myths (continued)

- Counting uncertainty is the limiting factor in determining combined standard uncertainty
- The reported uncertainty associated with the measurement made is capable of identifying the radionuclide at the necessary detection level