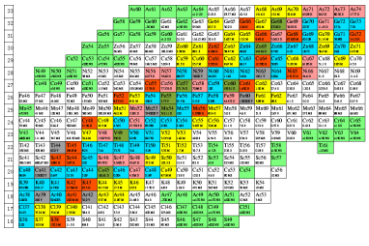
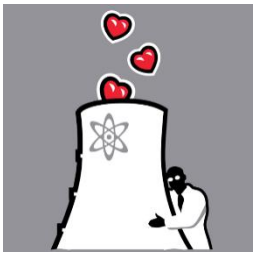
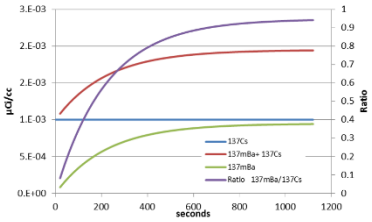
RSI Radiological Solutions Inc.

Radiochemistry and Gamma Spectroscopy







January 8 th through 12th, 2024

St. Lucie Nuclear Plant

Monday through Thursday 8:00 am – 5:00 pm
Friday 8:00 am – 12:00 pm

A class social activity will be held Tuesday evening, so please plan to attend and take advantage of this fantastic networking opportunity!

For questions or to enroll, please contact:

Bob Claes 630.337.2629 rclaes@radiologicalsolutions.com

Course Outline

Chart of the Nuclides; Interactions of Gamma Rays with Matter; Radioactive Decay Equations

- Radiochemistry fundamentals
- Alpha, beta and gamma particles interaction with matter
- Organization of the Chart of the Nuclides and usage
- Identify the three interactions of gamma rays with a detector that cause distinctive features in the gamma ray spectrum
- Find the location of a Compton edge for a gamma ray given a graph of edge location versus gamma ray energy
- Explain how sample background activity changes as function of time
- Describe how beta particle emission gives rise to gamma ray spectrum background

Instrument Calibration, System Components and Detection Interactions; Software Algorithms; Activity, Background and Delayed Counting

- Detector system components and their functions
- Gamma ray detectors - types and analysis of gamma ray peaks
- Detector instrument calibration types and factors of the calibration process
- Efficiency calculation and requirements
- Discuss the functions of several different software algorithms and how they can affect the gamma spectrometric analysis
- Identify and perform calculations using basic decay equations
- Define the following terms:
    - Gamma ray abundance, Abundance factor, Half-life ratio, Key line, Double escape peak, Random sum peak, Single escape peak, Coincidence sum peak, Weighted mean average activity, concentration

Chemistry of Power Operations; Reactor Coolant Radioactivity; Fuel Performance Monitoring

- Reactor Coolant chemistry control of oxygen as it relates to the transport of corrosion products
- Fission types and sources
- Neutron distribution, fission yields, and fission decay chains
- Transuranics activation
- Neutron and proton production in the reactor
- Sampling time and radionuclide sampling
- Fundamental system chemistry environments
- Formation of corrosion products and the transient crud layer
- pH, zinc, hydrogen and noble metal chemistry programs
- Clean Up System flow and components of the system
- Fuel defects, the types of defects and effect on radionuclides

Gamma Spectrometry Data Review; Examples of Review Issues

- Data review process
- Provide specific examples and explanations of gamma spectrometry printouts that contained incorrect information
- Practice problems from actual gamma spectra

Decay Study

- Perform data analysis for a decay study
- Develop example recommendations for results obtained relative to the Radiochemist and the Unit Chemist (what does it all mean?)

Additional Information

- Course Duration: 4.5 days