Nevada Technical associates, Inc.

Radiation Safety for X-ray and Gamma Radiographers

Course Outline

The course starts at 8:00am and ends at 4:30pm each day. It will end at about noon to 1:00pm on Friday. Return flights should be scheduled after 3:00pm on Friday depending on distance from the airport.

1. Introduction
   - Topics covered in this course
   - Certification requirements and Certifying agencies
   - Course objectives
2. Importance of Radiation Safety Training
   - Harmful biological effects
   - History of x-ray and gamma radiography
   - Reasons for overexposures
   - Safety procedures for radiographers
3. Fundamentals and Radioactivity
   - Structure of the atom
   - Atomic number, weight and isotopes
   - X-ray and Gamma production
   - Electromagnetic radiation
   - Interaction of radiation with matter and ionization
   - Production of radioisotopes
   - Kinds of radiation
   - X-ray spectrum
   - Activity and specific activity
   - Half-life
4. Harmful Effects of Radiation
   - Background and medical radiation
   - History of radiation damage
   - Units of exposure and quality factor
   - Sources of regulations
   - Agreement States
   - Somatic ARS effects and delayed effects of cancer
   - Biological effects as a function of dose

- Risks of professions
- Dose limits for workers and general public
- Contamination

5. Controlling Radiation Exposure
   - ALARA
   - Time
   - Distance: Inverse square law
   - Shielding: Kinds, HVL's and TVL's
6. Detection and Measurement of Radiation
   - Kinds of survey meters and required surveys
   - Use and calibration of survey meters
   - Personnel dosimeters; use and calibration
   - Film badges, TLD's and OSL's
   - Alarming rate meters; use and calibration
7. Radiography Equipment
   - Exposure devices or cameras
   - Gamma sources
   - Classes and categories of exposure devices
   - Radiation limits of exposure devices
   - Inspection and maintenance
   - Leak testing
   - X-ray cabinets according to 21CFR1020.40
   - Requirements for permanent installations
8. Federal and State Regulations
   - 10CFR19, 20, 21, 30 and 34
   - Source of x-ray requirements
   - Source of gamma requirements
   - Signs, labels and controls
   - Disposal of Radioactive material
   - Notifications and noncompliance procedures
   - Radiation licenses
   - Two-man rule
   - Records
   - Offshore requirements and reciprocity
9. Operating and Emergency Procedures
   - Thirteen required operating procedures
   - Generalized emergency procedure

10. Transportation of Radioactive materials
    - Exclusive and common carrier
    - Special and normal form
    - Type A and B packages
    - Warning labels for packages and vehicles
    - Shipping manifests
11. Case Histories for x-ray and gamma accidents
12. Individual State Regulations
    - Your individual State
    - Differences from SSRCR
13. Course Review and Final Exam