

## Chapter HFS 157

### APPENDIX S

#### COURSE OUTLINE FOR PORTABLE GAUGE AND XRF DEVICE RADIATION SAFETY TRAINING PROGRAM

The following are areas in which the department considers it important that an individual have expertise for the competent operation of portable gauges and XRF devices using sealed sources of radioactive material. The course shall be at least 8 hours in length.

#### I. PRINCIPLES AND FUNDAMENTALS OF RADIATION SAFETY

##### A. Types and Characteristics of Radiation

1. Alpha, Beta, Gamma, X-ray and Neutron Radiation
2. Exposure: Natural versus Man-made Radiation
3. Irradiation versus Contamination/Internal vs. External
4. Radioactive Material Used in Portable Gauges and XRF Devices

##### B. Units of Radiation Dose and Quantities of Radioactivity

1. Curie, Rad, Rem and Roentgen
2. Prefixes
3. SI Units

##### C. Basic Math and Calculations Related to Radioactivity

1. Radioactive Decay
2. Dose Rates from the sources commonly used
3. Inverse Square Law

##### D. Biological Effects of Radiation

1. Acute, Chronic and Genetic Effects of Exposure
2. Radiation Protection Standards
3. The ALARA Philosophy

##### E. Radiation Levels From Radioactive Sealed Sources

1. Survey Meter Use for Portable Gauge Users, not including XRF devices

##### F. Methods of Controlling Radiation Dose

1. Time
2. Distance
3. Shielding

#### II. STATE AND FEDERAL REGULATIONS

##### A. Chapter HFS 157, Wisconsin Administrative Code

##### B. Title 10, Code of Federal Regulations, US Nuclear Regulatory Commission

##### C. Title 49, Code of Federal Regulations, Transportation

#### III. LICENSING AND INSPECTION

##### A. License Items and Conditions

##### B. Notices, Instructions and Reports to Workers

##### C. Inspections by the Department

#### IV. OPERATING AND EMERGENCY PROCEDURES

##### A. Operating Procedures

1. Training and Supervision
2. Personnel Monitoring
3. Availability of Procedures
4. Security of the Gauges or Devices When Stored and At The Work Location.
5. ALARA Philosophy
6. Transportation of the Gauges or Devices and Security
7. General Rules of Use
8. Posting Requirements
9. Routine Maintenance
10. Radiation Surveys Using Survey Meters at the Work Site for Portable Gauges

##### B. Emergency Procedures

1. Preventive Measures
2. Emergency Response
3. Notification Requirements
4. Case Histories

#### V. TRANSFER/DISPOSAL REQUIREMENTS

##### A. State and NRC Regulations

##### B. Transportation Requirements

#### VI. PRACTICAL TRAINING

##### A. Transport/Storage Containers

##### B. Hands-on Training Specific to the Gauge or Device

1. Proper Use
2. Safe Handling
3. Calibration of XRF Device Including Substrate Corrections
4. Demonstration of Measurements of Various Materials
5. Use of Survey Meters by Portable Gauge Users.

#### VII. Q&A SESSION