X-R-I TESTING
DIVISION OF X-RAY INDUSTRIES, INC.

Radiographic Training--Level 1

Course Outline

1. Introduction
   - NDT Introduction
   - Facility Tour & Method Demonstrations
2. Radiation Origin & History
   - Basic Structure of Matter
   - Radiation Characteristics
   - Ionization/Scatter
   - Origin and Types of Radiation
   - Radiation Discovery and Historical Events
   - Industrial Radiography Beginnings
3. Radiation Safety
   - Radiation/Interactions and Origin Review
   - Units of Radiation Measurement
   - Radiological and Biological Effects
   - Exposure Reductions/ALARA
   - Requirements and Regulations
   - Personnel Monitoring and Monitoring Equipment
   - Equipment Requirements
   - Emergency Response/Employee Notifications
   - Personnel Training and Qualifications
4. Basic CP X-ray Systems & Subsystems
   - Tube Head
   - High Voltage Generators
   - Control Panel
   - Cooler
   - High Voltage Cables
   - Radiation Enclosures
5. Special Radiation Generating Systems
   - High Energy X-Ray
   - Portable X-Ray Systems
   - Mini Focus X-Ray Systems
   - Micro-Focus X-Ray Systems
   - Gamma Radiography

- Special Radiation Generating Systems (Continued)
- Rod Anode
- Neutron Radiography

6. Imaging Modalities

- Film Radiography
- Computed Radiography (CR)
- Digital Radiography (DR)
- Radioscopy/Real Time Imaging
- Computed Tomography (CT)
- Other Imaging Methods

7. Automatic Film Processing

- Operational Overview
- Film Systems
- Darkroom Operations
- Chemistry Systems
- Mechanical Systems
- Controlling Factors/Common Malfunctions
- Discharge Considerations
- Start-Up/Shut Down
- Maintenance

8. Radiographic Quality Process Variables

- Test Specimen Coverage
- Exposure Parameters
- Geometric & Spatial Relationships
- Radiographic Density
- Image Quality
- Scatter Control
- Radiographic Identification
- Radiographic Technique

9. Ed-Lab Exercise: Full Technique Development & CR Comparison

- Students Choose a Test Specimen & Fully Develop an RT Technique(s) IAW/XRI 4004 /ASTM E 1742
- Student Will Develop “CR” Technique for Comparison of Parameters & Imaging Quality Results

10. Procedures & Specifications – History & Applications

* ASTM E-1742 Full Review & Discussion – Open Book Quiz
* Full Review & Discussion, Demonstrations of Process
* Controls, Verifications & Calibrations – Review
* Comprehensive Review Of Unique Customer Requirements

11. Material Processes Training

* OJT XRI 2003 FORMS: Full Review & Discussion of All Checkpoints
* Materials & Processes – Product Forms & Applications
    - Castings & Weldments
        - Investment Casting
        - Sand Casting
        - General Welding
        - TIG Welding

(Materials and Processes instruction supplemented with videos and review of selected sample radiographs)