NATURALLY OCCURRING RADIOACTIVE MATERIAL - LEVEL 2 HSE037

COURSE DESCRIPTION

This 10 Days training course for senior staff is tailored to the particular application and is designed so that the worker develops the necessary skills to work safely. It covers a broad level of knowledge in radiation protection, including training in emergency preparedness and response, as well as training in specific areas of work, e.g. industrial radiography, use of gauges, well logging, radio-tracer studies, decontamination of equipment contaminated with NORM, industrial radiography, use of gauges, well logging, radio-tracer studies and decontamination of NORM-contaminated equipment.

COURSE GOAL

To enhance participants' knowledge, skills, and abilities necessary to supervise effectively the work with radiation, ensure compliance with national rules and regulations and put into effect an appropriate response in the event of an emergency.

COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Differentiate between radioactivity and radiation.
- Understand radiation protection principles.
- Understand basic concepts of occupational radiation protection.
- Be familiar with organizational responsibilities and training in the oil and gas industry.
- Determine sealed radiation sources and radiation generators in the oil and gas industry.
- Be familiar with unsealed radioactive material.
- Use personal protective equipment.
- Apply norm in the oil and gas industry.
- Understand how to monitor radiation in the workplace.
- Plan for emergencies and contingency.
- Plan for decommissioning and activities.

WHO SHOULD ATTEND

- Qualified workers
- Radiation Protection Officers (RPOs)

COURSE DURATION

10 Working Days

COURSE OUTLINES

1. Radioactivity and Radiation
    - Basic Information
        - Atoms, Elements and Isotopes
        - Notation and Prefixes
    - Radioactivity
        - Radioactive Decay and Half-Life
        - Quantities and Units
    - Radiation
        - Alpha Radiation
        - Beta Radiation
        - Gamma Radiation

2. Radiation Protection Principles
    - Relevant Quantities and Units
        - Absorbed Dose
        - Radiation Weighting Factors and Equivalent Dose
        - Tissue Weighting Factors and Effective Dose
        - Committed Equivalent Dose and Committed Effective Dose
        - Operational Quantities
    - Biological Effects
        - Short Term Biological Effects
        - Long Term Biological Effects
    - The System of Radiation Protection
        - Exposure Situations
        - Exposure Categories
        - Principles
        - Justification
        - Optimization
        - Dose Limits
        - Reference Levels
    - Normal Levels of Exposure
        - Natural Background Radiation
        - Artificial Sources of Radiation

3. Basic Concepts of Occupational Radiation Protection

- Occupational Exposure
- Control of Exposure to External Radiation
- Control of The Contamination Hazard
  - Containment
  - External and Internal Personal Contamination
  - Protective Clothing
  - Fixed and Removable Contamination
- Controlled Areas
- Radiation Protection Programmes
- Application of Annual Limits
- Application of The BSS to Natural Sources of Radiation
  - Scope of Regulation
  - Graded Approach to Regulation

4. Organizational Responsibilities and Training in the oil and Gas Industry

- Responsibilities of Regulatory Bodies in Oman
- Responsibilities of Registrants, Licensees and Employers
  - The Operating Organization (Operator)
  - Service Companies
  - Cooperation Between Registrants or Licensees and Employers
- Responsibilities of Workers
  - Protection of The Embryo or Foetus

5. Sealed Radiation Sources and Radiation Generators in the Oil and Gas Industry

- Practices Involving Sealed Sources and Radiation Generators
  - Industrial Radiography
  - Installed Gauges
  - Mobile Gauging Equipment and Articles
  - Well Logging
- Safety of Sealed Sources
  - Radiation Safety During Normal Working Conditions
- Waste Management of Sealed Sources
  - Waste Minimization Strategies
  - Waste Inventories and Characterization

- Waste Storage Facilities
- Pre-Disposal Management of Radioactive Waste
- Disposal Methods
- Transport of Radioactive Waste
- Record Keeping and Reporting

6. **Unsealed Radioactive Material**
   - Practices Involving Unsealed Radioactive Material
     - Radio-tracer and Marker Studies
   - Safety of Unsealed Radioactive Material
     - Preparation of Unsealed Radio-tracers
     - Work with Radiotracers
   - Waste Management
     - Waste Minimization Strategies
     - Waste Inventories and Characterization
     - Waste Storage Facilities
     - Pre-Disposal Management
     - Disposal Methods
     - Transport
     - Record Keeping and Reporting

7. **Special Focus Topic: Personal Protective Equipment**
     - General Considerations
     - Control of Exposure
     - Types of Personal Protective Equipment
     - Selection of Personal Protective Equipment
     - Fitting, Using and Maintaining Personal Protective Equipment
     - Management of a System of Personal Protective Equipment
     - Designated Areas
   - Protective Suits: Choosing a Protective Suit
   - Gloves: Procedure for Removing Contaminated Gloves
   - Footwear: Barrier Procedures for Protective Footwear
   - Respiratory Protective Equipment
     - Types of Equipment
     - Selection of Equipment

- Filtering Face Piece Respirators
  - Half Mask Respirators
  - Full Face Mask Respirators
  - Powered Air Purifying Respirators with Masks
  - Ventilated Visors and Helmets
  - Powered Hoods, Blouses and Suits
  - Fresh Air Hose Breathing Equipment
  - Breathing Equipment with a Compressed Air Line
  - Self-Contained Breathing Apparatus
  - Compressed Air Line with Full Suit
- Other Hazards
- Warning Signs and Notices

8. Norm in the Oil and Gas Industry

- General Aspects of Norm
- Origin and Types of Norm in the Oil and Gas Industry
  - Mobilization from Reservoir Rock and Deposition
  - Main Forms of Appearance
  - Radionuclide Concentrations
- Radiation Protection Aspects of Norm
  - External Exposure
  - Internal Exposure
  - Practical Radiation Protection Measures
- Analytical Aspects of Norm and Norm Waste
  - General Considerations
  - Scales and Sludges
  - Produced Water
- Decontamination and Norm Waste
  - Decontamination
  - Norm Waste Volumes and Activity Concentrations
- Waste Management
  - Waste Management Strategy and Programme
  - Regulatory Approaches
  - Disposal Options

9. Radiation Monitoring in the Workplace
    - Measurement Principles and Instruments
        - Principles
        - Dose Rate Meters
        - Dosimeters
        - Surface Contamination Monitors
        - Contamination Monitors for Airborne Radioactivity
    - Monitoring Strategies
        - Task Monitoring
        - Routine Monitoring
        - Special Monitoring
        - Other Considerations

10. Emergencies and Contingency Planning
    - Accidents Involving Sealed Sources
        - High Exposure and Overexposure to Radiation Sources
        - Lost or Misplaced Sources
        - Retrieval of Disconnected Sources from a Well
        - Physical Damage to Sources, Containers and other Equipment
        - Site Emergencies, Natural Disasters and Strife
    - Emergencies Resulting from Accidents with Unsealed Sources
        - External Overexposures
        - Internal Overexposures
        - Spills
        - Lost Material
    - Emergency/Contingency Plans

11. Case Study: A Ruptured Well Logging Source
    - Background
    - The Incident
    - Surveys
    - The Problems
    - Some Problems Solved
    - Remaining Issues
    - Conclusion

12. Decommissioning Planning and Activities

- Decommissioning Planning
- The Decommissioning Process