



Radiation Safety Training

For Authorized Users with Industrial X-ray Units

2-Hours

SYLLABUS

PRESENTED BY:
Applied Environmental Consulting, Inc.

COURSE OVERVIEW

Radiation History & Fundamentals
Radiation Units and Terminology
Types of Radiation emissions and X-ray production
Radiation exposures & dose effects
Radiation protection factors
Measuring/Monitoring devices
Administrative controls & postings
Handheld devices
Emergency procedures

MATH REVIEW

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Radioactivity
Time, Distance and Shielding

HISTORY OF RADIATION DISCOVERY, HISTORICAL EVENTS & EMERGENCE OF REGULATORY AGENCIES

The Beginning Big Bang Theory
Forming Elements
Discovery of Radiation
 Henri Becquerel
 Wilhelm Roentgen
 Madam Curie
 (Plus others)

Development of Nuclear Technology
Manhattan Project
Albert Einstein
Enrique Fermi

RADIATION FUNDAMENTALS

Energy Spectrum
Ionization
Non-Ionizing

Atomic Structure

Nuclear
Proton

Unstable Atoms

Radiation Protection Principles

Non-Ionization

RADIATION UNITS & TERMINOLOGY

The Bohr Model

Protons

Neutrons

Electrons

Atomic Weight

TYPES OF RADIATION EMISSIONS AND X-RAY PRODUCTION

Types of Radiation

Radiation Protection Principles

Creating X-rays

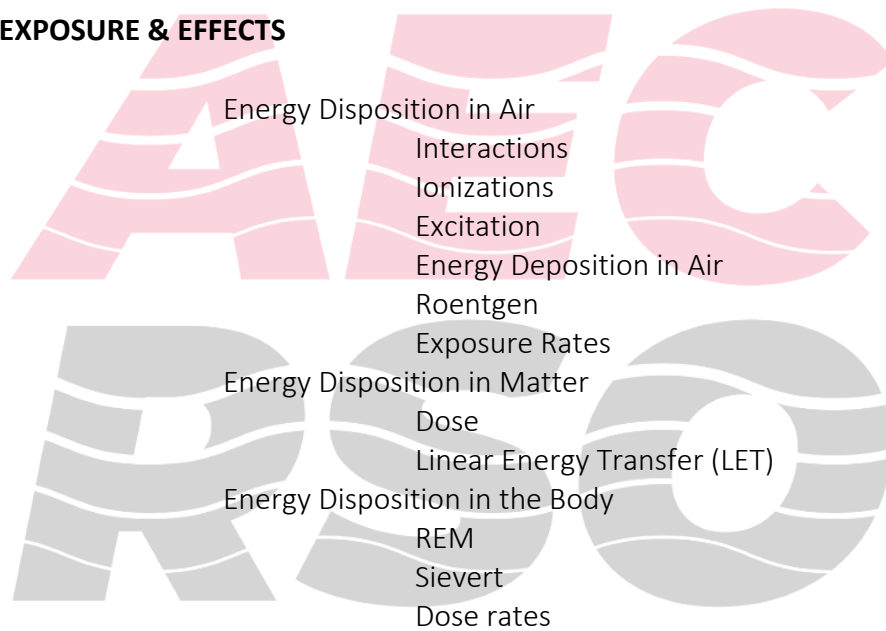
Applications of X-rays

Industrial Applications of X-rays

Units for Disintegrations

- Radioactivity
- Disintegration
- Disintegration per Unit Time (dps, dpm)
- Curie
- Becquerel
- Total Activity
- Specific Activity/Activity Concentration
- Background vs. Contamination

RADIATION EXPOSURE & EFFECTS



Sources of Dose

- External
- Internal
- Man-made and Natural
- Medical Radiation
- Radon

Types of Dose

- Acute
- Fractionated
- Chronic

Types of Dose Effects

- Somatic

Genetic
Teratogenic
Variable in Dose Effects
Amount of Dose
Critical Organ
Type of Radiation
Individual Biological Variations
Radio sensitivity and Radio resistance
Types of biological effects in The Cell
Types of Biological Variations
Radio sensitivity and Radio resistance
Types of Risks
Definition
Comparisons with other types of risks
Causes of dose
Stochastic
Non-Stochastic

RADIATION PROTECTION FACTORS

ALARA As Low As Reasonably Achievable (ALARA)
Time, Distance and Shielding
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Practical Problem

MEASURING RADIATION AND PERSONNEL MONITORING

Types of Portable Survey Meters
Ion Chamber
Geiger Mueller Probes
Scintillation Detectors
Calibration of Radiation Survey Meters
Monitoring External dose
Personnel Monitoring Devices
OSLDs/TLDs/Film Badges



Pocket Dosimeters
Active Monitors (reading real time)
Pocket Ion Chamber
Principles of Exposure Control

ADMINISTRATIVE CONTROLS AND POSTINGS

Radiation Protection Program
Training of New Personnel
Monitoring Options and Procedure
ALARA Radiation Workers
Notice to Employees
Postings
Radiation Detection

HANDHELD X-RAY UNITS

X-ray
Handheld Analyzers
Purpose
Safety Procedures/Features
Radiation Hazards
Precautions

EMERGENCIES

Case Histories of X-ray Accidents
Emergencies Producers