



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

Inverse Square Law
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)

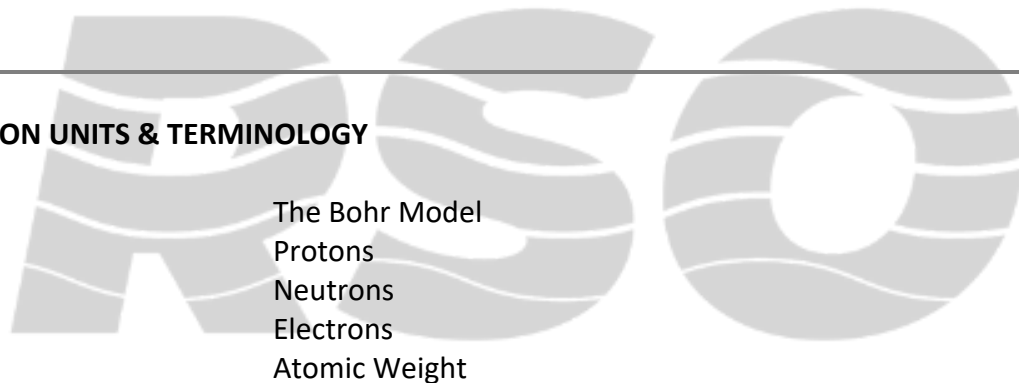
Development of Nuclear Technology
Manhattan Project
Albert Einstein
Enrique Fermi

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

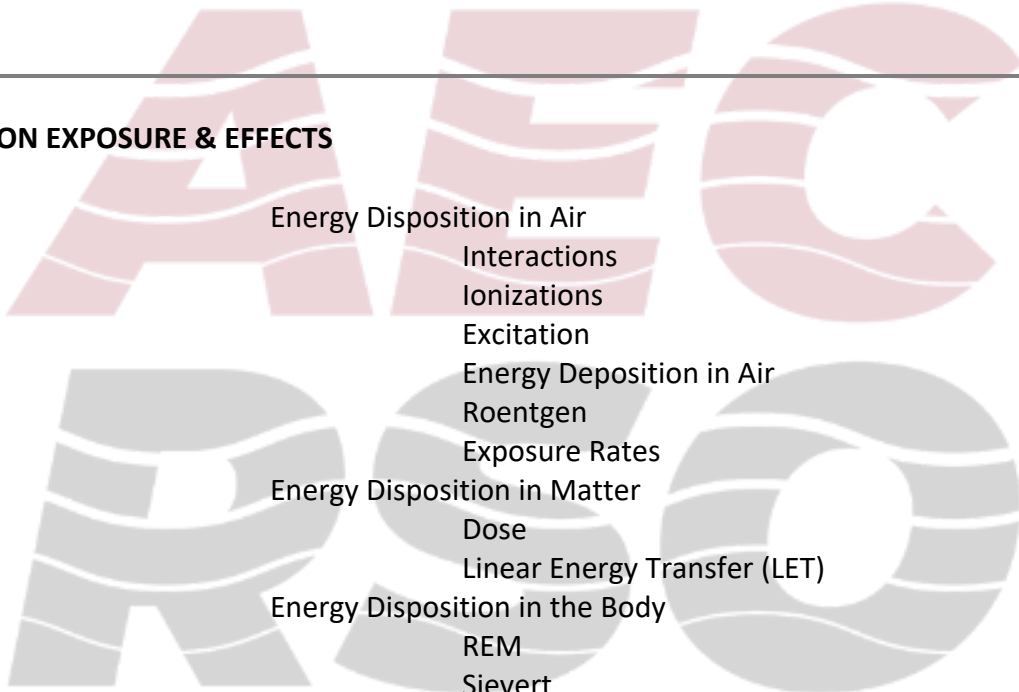
TYPES OF RADIATION EMISSIONS AND X-RAY PRODUCTION

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

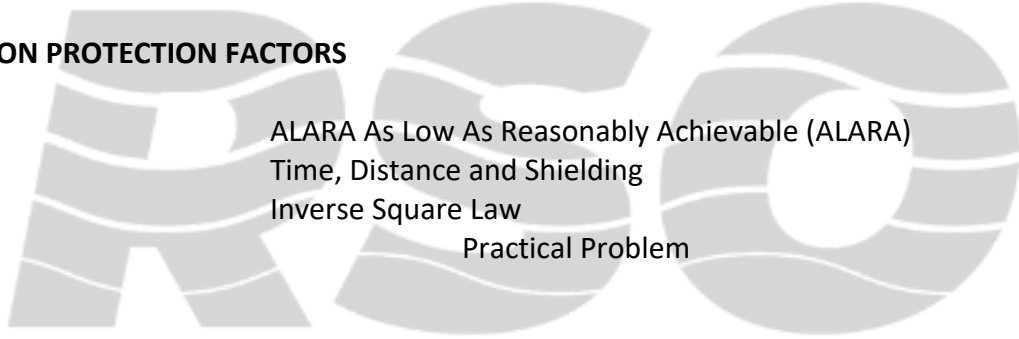
RADIATION EXPOSURE & EFFECTS



- Energy Disposition in Air
 - Interactions
 - Ionizations
 - Excitation
- Energy Deposition in Air
 - Roentgen
 - Exposure Rates
- Energy Disposition in Matter
 - Dose
 - Linear Energy Transfer (LET)
- Energy Disposition in the Body
 - REM
 - Sievert
 - Dose rates
- 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
Inverse Square Law
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