



Radiation Protection for Radiation Safety Officers and Authorized Users Using X-ray Radiography 10-Hours

SYLLABUS

PRESENTED BY:

Applied Environmental Consulting, Inc.

COURSE OVERVIEW

Radiation History & Fundamentals
Radioactivity, Half-life & Production of X-rays
Radiation Biology & Risks
Protection Factors & How to use a Survey Meter
Regulatory Agencies & Compliance
Role of Personnel
What is Industrial Radiography?
Types of Industrial Radiography
Regulatory Requirements
Trainings

HISTORY OF RADIATION SCIENCE

THE BEGINNING

Discovery of Radiation

Henri Becquerel
Wilhelm Roentgen
Madam Curie
(Plus others)

Development of Nuclear Technology

Manhattan Project
Albert Einstein
Enrique Fermi
First Controlled Fission Reaction

Development of the Nautilus
Development of the Atomic Energy Act

RADIATION FUNDAMENTALS

SOURCES OF RADIATION

Natural
Man-Made
External
Internal
Ionization
Non-Ionizing

ATOMIC STRUCTURE

Nuclear
Proton
Neutron
Electron
Photons
Atomic Number
Mass Number
Atomic Weight

EMISSIONS FROM RADIOACTIVE MATERIALS

Alpha
Beta
Gamma
Neutron

X-RAY PRODUCTIONS

EXPOSURE

RADIOACTIVITY AND HALF-LIFE

RADIOACTIVITY

Disintegrations
Disintegration per Unit Time (dps, dpm)
Curie
Becquerel

Total Activity
Specific Activity
Background vs. Contamination

HALF-LIFE

Concepts
Carbon-14 Dating
Exposure

INTERACTION OF RADIATION WITH MATTER

ENERGY DISPOSITION IN MATTER

Dose

ENERGY DISPOSITION IN THE BODY

Absorbed Dose (RAD)
Linear Energy Transfer (LET)
Gamma Radiation
REM
Sievert

RADIATION IN BIOLOGY

SOURCES OF RADIATION

External
Internal
Man-made and Natural
Radon Gas

TYPES OF DOSE

Acute
Fractionated
Chronic

TYPES OF DOSE EFFECTS

Somatic
Genetic
Free Chemical Radicals
Direct and Indirect Damage
Risks
Linear Non-Threshold Model

Stochastic
Non-Stochastic

RADIATION PROTECTION TECHNIQUES

AS LOW AS REASONABLY ACHIEVABLE (ALARA)

Time
Distance
Shielding

INVERSE SQUARE LAW

ADMINISTRATIVE CONTROLS AND LEVELS

Administrative Control
Establishing administrative limits
Setting Up A RCA

RADIATION DOSE LIMITS

Radiation Workers
Members of the Public (MOP) study
Monitoring External dose
Personnel Monitoring Devices
OSLDs/TLDs/Pocket Ion Chambers

CASE STUDY OF AN X-RAY ACCIDENT

PORTABLE SURVEY METERS

TYPES

Geiger-Mueller (GM)
Comparing instrumentation for hazards: BIOLOGICAL,
CHEMICAL and NUCLEAR
Reading Results
CPM vs. DPM
Scales and displays
Radiation Levels
Efficiency and Calibration
Operating a Survey Meter
Battery check/Calibration check/Check source
Establish Background
cpm vs. mR/hour

High to Low scales
Use & Care

IMPLEMENTING A RADIATION PROTECTION PROGRAM

ROLE OF PERSONNEL

Radiation Safety Officer (RSO) Duties

NOTICE TO EMPLOYEES

TRAINING

Training of New Personnel and Refresher

INDUSTRIAL RADIOGRAPHY

TYPES OF INDUSTRIAL RADIOGRAPHY

Shielded Room

Open Air

Cabinet Systems

REQUIREMENTS FOR INDUSTRIAL RADIOGRAPHY

INDUSTRIAL RADIOGRAPHY TRAINING

Site

Classroom
