

ATLB-1230: RADIATION WORKER

Cuyahoga Community College

Viewing: ATLB-1230 : Radiation Worker

Board of Trustees:

2012-11-29

Academic Term:

Spring 2019

Subject Code

ATLB - AIT-Construct/Hazard Material

Course Number:

1230

Title:

Radiation Worker

Catalog Description:

Fundamentals of radiation, how it affects the worker and the importance of recognizing the health hazards associated with it. Methods used to clean contaminated sites and measures that are taken to avoid radiation on jobsites, including energy producing facilities and nuclear plants. Operation, maintenance and repair of respective equipment.

Credit Hour(s):

1

Lecture Hour(s):

1

Requisites

Prerequisite and Corequisite

Departmental approval: admission to the Construction Tending and Hazardous Material Abatement program.

Outcomes

Course Outcome(s):

A. Discuss the history of radiation, describe how it is produced and define the terms related to it.

Objective(s):

1. Discuss the history of radiation and its discovery and identify its 19th century pioneers.
2. Explain the structure of the atom and discuss how radiation is produced relative to nuclear structure.
3. Differentiate between ionizing and non- ionizing radiation and discuss the differences between them.
4. List the different types of ionizing radiation.
5. Define the terms related to radiation and atomic structure.
6. Discuss half-life as related to radiation.
7. Discuss how radiation is used in the construction industry.

Course Outcome(s):

B. Recognize the health hazards associated with radiation and discuss the health effects on the worker.

Objective(s):

1. Explain how radiation can damage human cells throughout the body.
2. List the symptoms of radiation exposure relative to acute and chronic doses.
3. Discuss somatic and heritable mutations.
4. Discuss the potential effects of prenatal doses.

5. Identify the sources of background radiation.
6. Identify the average annual dosages permitted by the regulatory industry.

Course Outcome(s):

C. Demonstrate the ability to work in radioactive areas and perform clean-up operations on contaminated sites.

Objective(s):

1. Identify exposure limits as prescribed by the Nuclear Regulatory Commission (NRC) and the Department of Energy (DOE).
2. Identify the personal protective equipment (PPE) and protective measures, including time, distance, and shielding, that are required for working in radioactive areas.
3. List the various types of dosimetry that are used for monitoring personal radiation exposure.
4. Calibrate monitoring devices used for measuring radiation exposure.
5. Operate monitoring equipment to locate and evaluate radiation producing materials.
6. Demonstrate the ability to safely protect the worker on sites in radioactive environments by properly donning and doffing personal protective clothing.
7. Use monitoring devices to properly frisk the worker and determine radiation contamination levels.

Methods of Evaluation:

1. Quizzes
2. Tests
3. Class participation

Course Content Outline:

1. Radiation
 - a. History
 - i. Discovery
 - ii. Pioneers
 - iii. Early health consequences
 - b. Atomic structure
 - i. Protons
 - ii. Electrons
 - iii. Neutrons
 - c. Ionization versus non-ionization
 - d. Ionization radiation
 - i. Alpha
 - ii. Beta
 - iii. Gamma
 - iv. Neutrons
 - e. Terminology
 - f. Uses
 - i. Energy
 - ii. Medical
 - iii. Destructive
 - iv. Construction
 1. Welding
 2. Compaction tests
 3. Other
2. Health hazards
 - a. Sources of background radiation
 - i. Natural
 - ii. Man made
 - b. Average annual dosage
 - c. Human effects
 - i. Radiation absorbed dose
 - ii. Roentgen equivalent
 - iii. Cellular
 - iv. Human organs

- d. Symptoms
 - i. Acute
 - ii. Chronic
 - e. Mutations
 - i. Somatic
 - ii. Heritable
 - f. Prenatal
3. Radioactive contamination control
- a. Exposure limits
 - i. DOE
 - ii. NRC
 - b. PPE
 - i. Suit
 - ii. Gloves
 - iii. Respiratory
 - iv. Hood
 - c. Protective measures
 - i. Time
 - ii. Distance
 - iii. Shielding
 - d. Dosimetry
 - i. Badges
 - ii. Personal scanners
 - e. Monitor calibration
 - f. Monitor operation
 - i. Locating radiation
 - ii. Evaluation
 - g. Donning and doffing
 - h. Frisk

Resources

LIUNA Training and Education Fund. *"Radiation Worker II"*. Current edition. LIUNA Training and Education Fund: Pomfret Center, CN, 2003.

Department Of Energy Office Of Health, Safety And Security. *"Radiation Protection Programs Guide"*. Current edition. Department Of Energy Office Of Health, Safety And Security: Washington, DC, 2011.

Brookhaven National Laboratory. *"Radiation Safety and Shielding"*. Current edition. Brookhaven National Laboratory: Upton, NY, 2011.

Resources Other

1. "Radiation Protection" www.epa.gov/rpdweb00/ (<http://www.epa.gov/rpdweb00/>)
2. "National Council on Radiation Protection & Measurements" <http://www.ncrponline.org/>

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