The Atomic Energy Act (AEA)

Objectives

Terminal Objective

Given the Environmental Laws and Regulations course manual as a reference, you will be able to:

- **Explain the scope of the Atomic Energy Act (AEA) and its impact on the DOE.**

Objectives

Enabling Objectives

- **Define the following terms: source material, special nuclear material, and by-product material.**

- **Describe the impact on the Atomic Energy Commission and the Energy Research and Development Administration by passage of the Energy Reorganization Act of 1974 and the DOE Organization Act.**

Objectives

Enabling Objectives (continued)

- **Explain how the Resource Conservation and Recovery Act (RCRA), DOE Order 435.1, and "Standards for Remedial Action at Inactive Uranium Processing Sites" (40 CFR Part 192) relate to the Atomic Energy Act.**

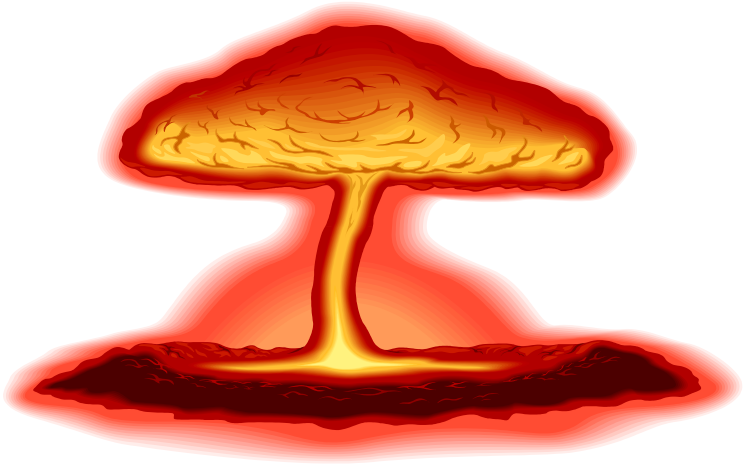
Objectives

Enabling Objectives (continued)

- **Summarize the provisions of the following AEA amendments:**
  - **1954 amendments, 1959 amendments (Section 274), 1964 amendments (PL 88-488), 1988 (PL - PL 100-408, Price-Anderson Amendments), 1988 (Defense Nuclear Facilities Safety Board 100-456)**
- **Describe the waste types for which EM has management responsibility under DOE O 435.1**

Overview

The Atomic Energy Act (AEA) of 1946 was passed to ensure that the development of nuclear knowledge and products was conducted in a manner that was consistent with the security of the United States.



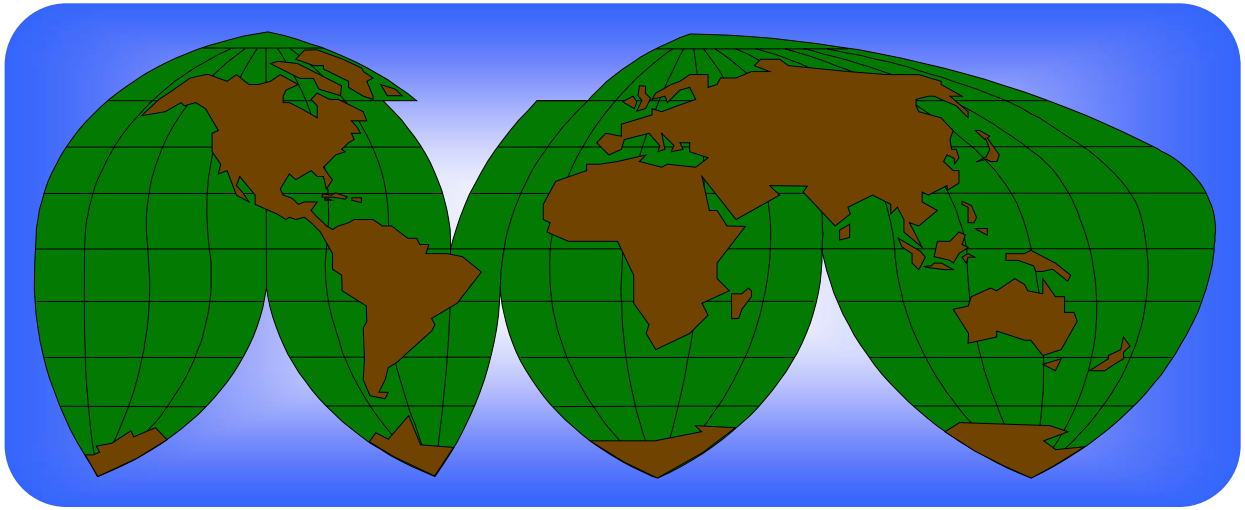
Overview

Congress gave the Federal Government:

- **Control of the production and use of fissionable material**
- **Vested control through the inception of the Atomic Energy Commission (AEC)**

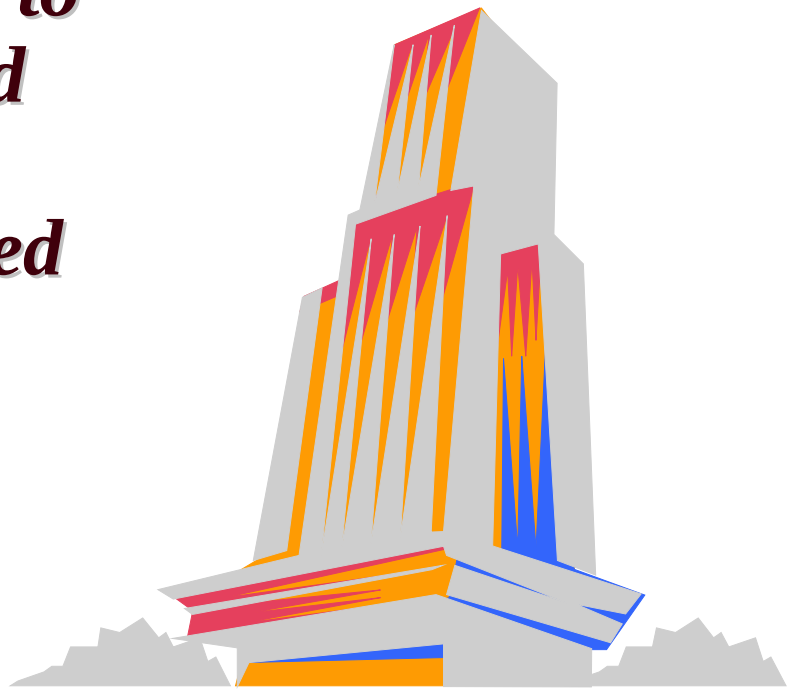
Regulatory History

In 1954, Congress revised the AEA to keep pace with nuclear development in the United States and other countries.



Regulatory History

Prior to 1954, nuclear energy was largely confined to the Federal Government. The amendments made it possible for private commercial firms to enter the nuclear energy field for peaceful purposes, if an operating license was obtained from the AEC.



Regulatory History

Because the amendments did not specify how the States would be involved, this commercial influx presented a conflict between:

- **The amendments and**
- **The historical role the States had undertaken to ensure public health and safety protection**

Regulatory History

Section 274 was added to the amendments in 1959 to grant States:

- **A statutory role and basis under which the Federal Government could relinquish portions of its regulatory authority to them**
- **Authority to license and regulate byproducts, source materials, and small quantities of special nuclear materials as defined by the AEA**

This established the "Agreement State" concept.

Regulatory History

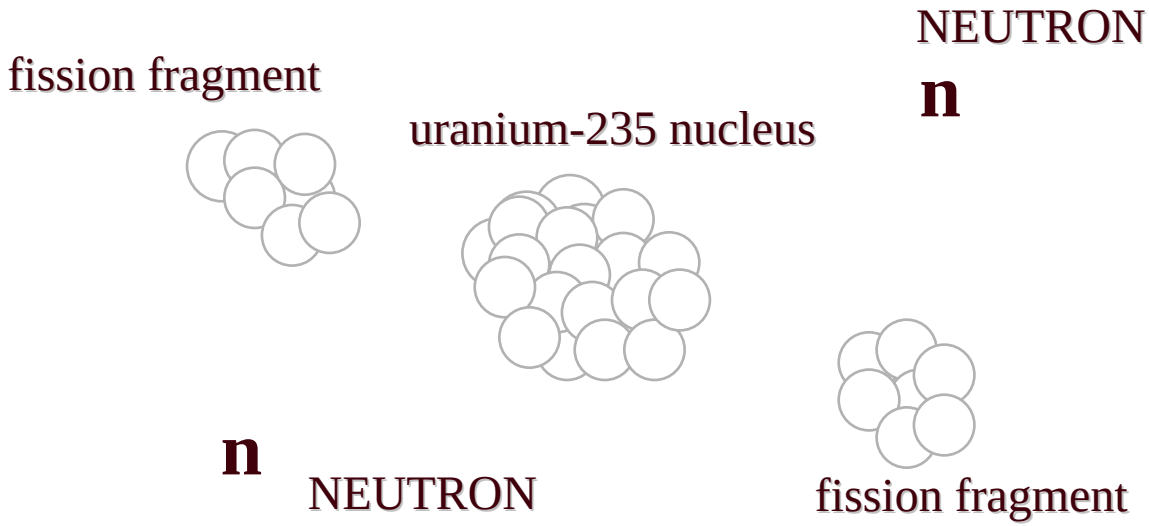
The 1959 Amendments also defined:

- **Source Material**
  - **Ores containing (uranium or thorium) in such concentrations as the Commission may by regulation determine from time to time**

Regulatory History

The 1959 Amendments also defined:

- **Special Nuclear Material**
  - **Plutonium, uranium enriched in the isotope 233 or 235, and any other material which the Commission determines to be special nuclear material, but does not include source material**



Regulatory History

The 1959 Amendments also defined:

- **Byproduct Material**
  - **The tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content**

Regulatory History

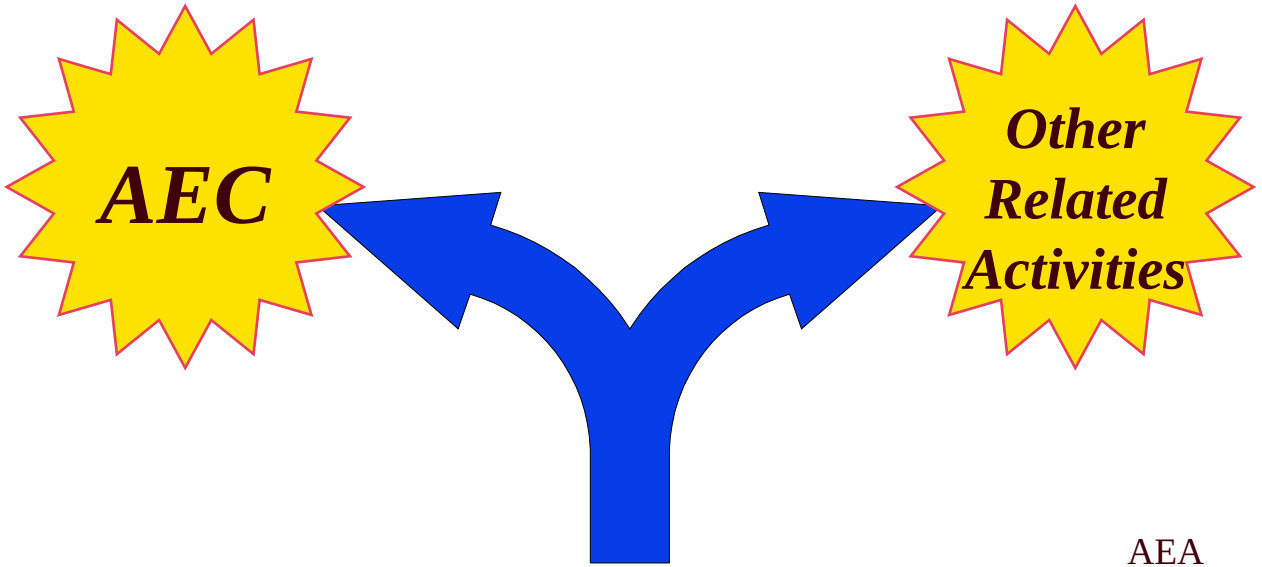
Sections 161, 2, 3, and 41 of the AEA allow the DOE to set radiation protection standards for itself and its contractors.

AEA, ERDA, and DOE

Federal energy efforts were redirected when the Energy Reorganization Act of 1974 was passed. Its intent was to establish efficient energy utilization while enhancing environmental protection.

AEA, ERDA, and DOE

Congress decided that the public's interest would best be served by separating AEC licensing functions from those of energy development and other related activities.



AEA, ERDA, and DOE

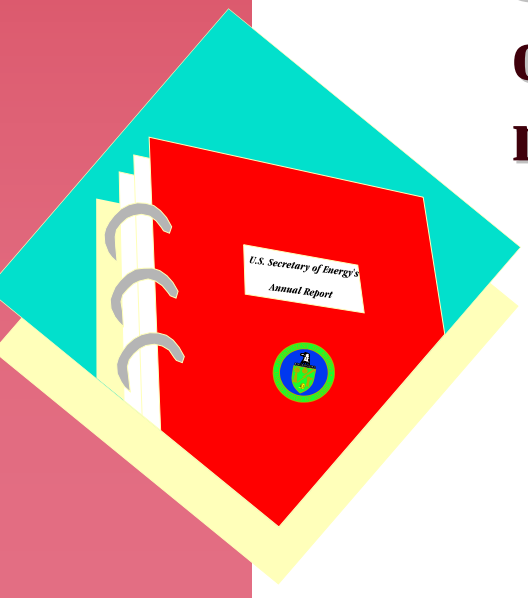
Congress achieved this by abolishing the AEC and replacing it with:

- **The Nuclear Regulatory Commission (NRC)**
- **The Energy Research and Development Administration, which later became the DOE when the Department of Energy Organization Act passed in 1977**

AEA, ERDA, and DOE

Amendments include the following:

- **Public Law 97-415, which authorized the NRC to implement a resident inspector program for quality assurance purposes**
- **Section 148, which requires the Secretary of Energy to prepare a quarterly report on nuclear defense programs**



AEA, ERDA, and DOE

- **The Price-Anderson Amendments Act (Public Law 100-408), which extended the Price-Anderson provisions of the AEA to extend and improve liability and indemnification procedures for nuclear incidents**
- **Public Law 100-456, which established the Defense Nuclear Facilities Safety Board (DNFSB)**

The DNFSB

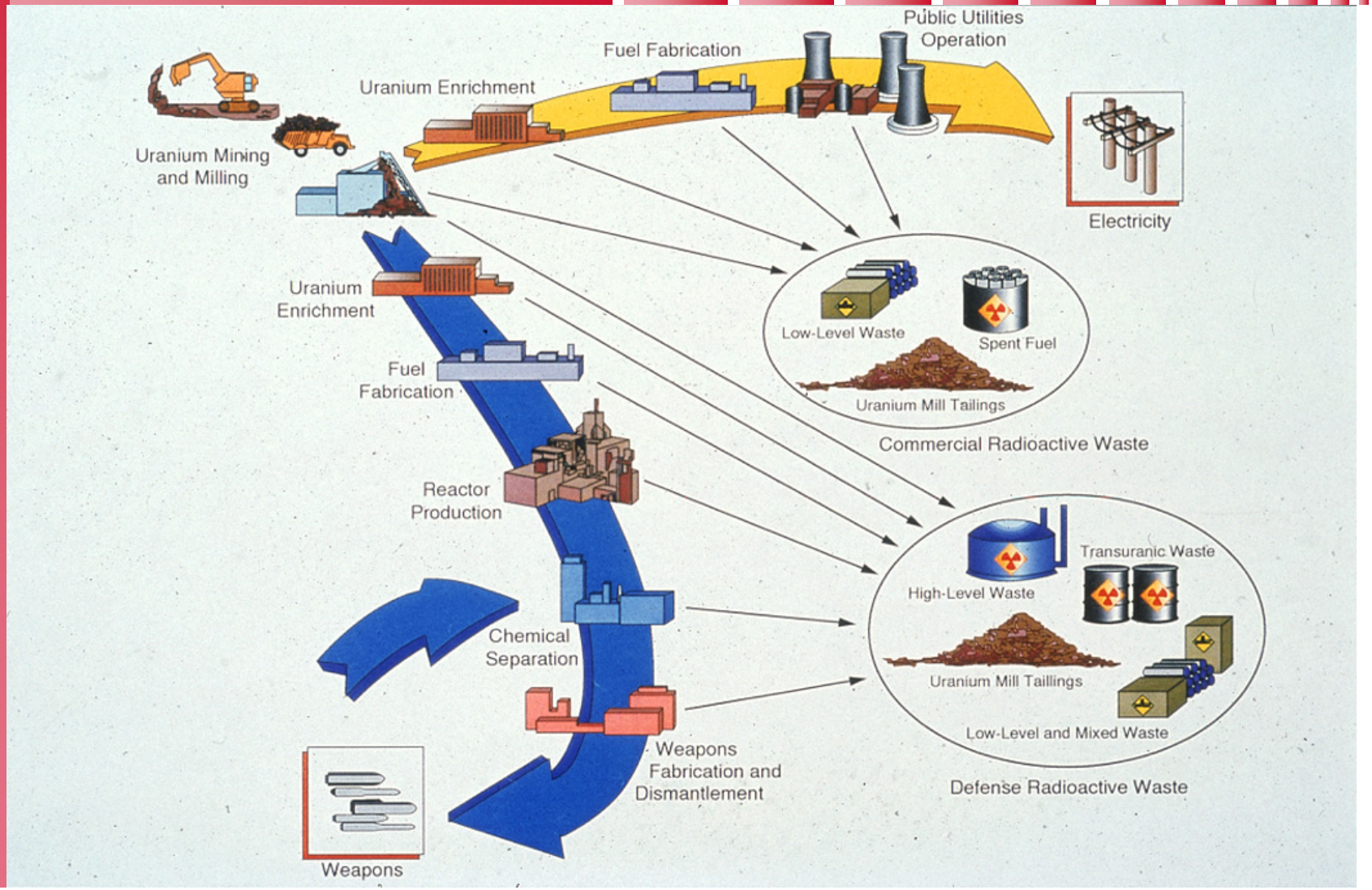
The functions of the DNFSB are as follows:

- **Review and evaluate the standards relating to the design, construction, operation, and decommissioning of DOE's defense nuclear facilities**
- **Investigate any event or practice at a DOE defense nuclear facility that the DNFSB determines had or may adversely affect public health and safety**

The DNFSB

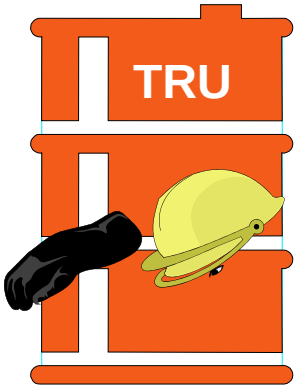
- **Analyze design and operational data**
- **Review new facilities' design and construction**
- **Provide recommendations to the Secretary of Energy that pertain to DOE defense nuclear facilities, including operations of facilities, standards, and research needs**

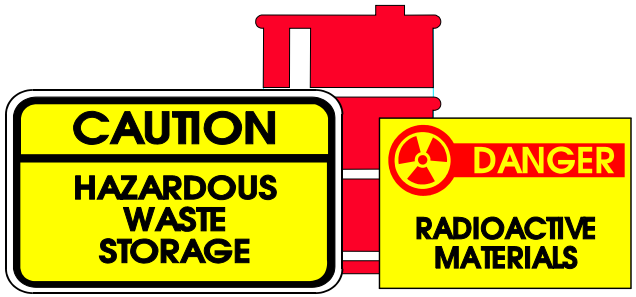
Defense and Commercial Nuclear Activities

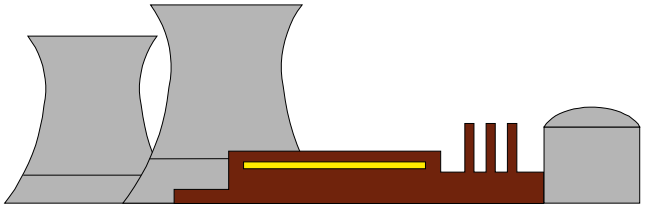


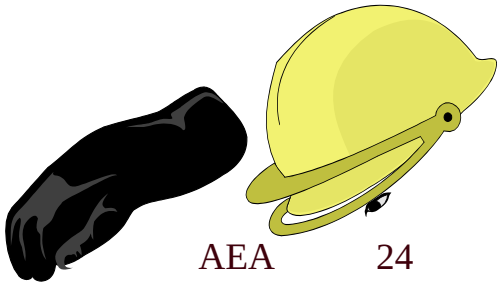
Types of Radioactive Waste

- **Transuranic waste (TRU)**
- **High-level waste (HLW)**
- **Low-level waste (LLW)**
- **Mixed waste (MW)**



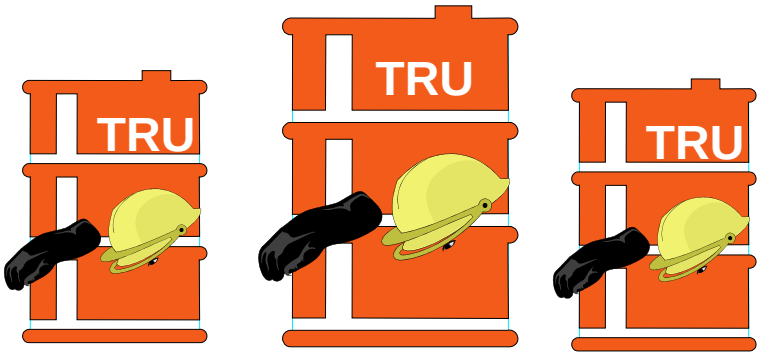






Transuranic Waste

- α emitters with atomic number > 92 and half-life > 20 years
- Concentrations > 100 nCi/gm
- Proposed final disposition at the Waste Isolation Pilot Plant (WIPP) in New Mexico



TRU Waste Containers

Early TRU Waste Storage

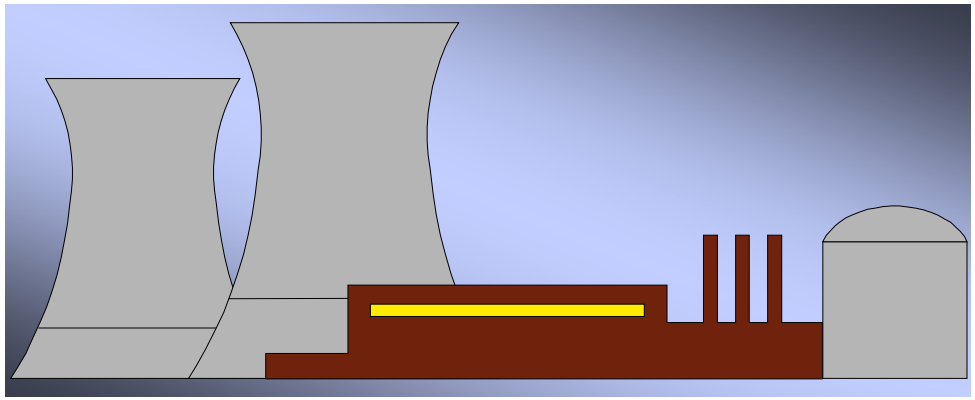
HANFORD

IDAHO - Asphalt Pad

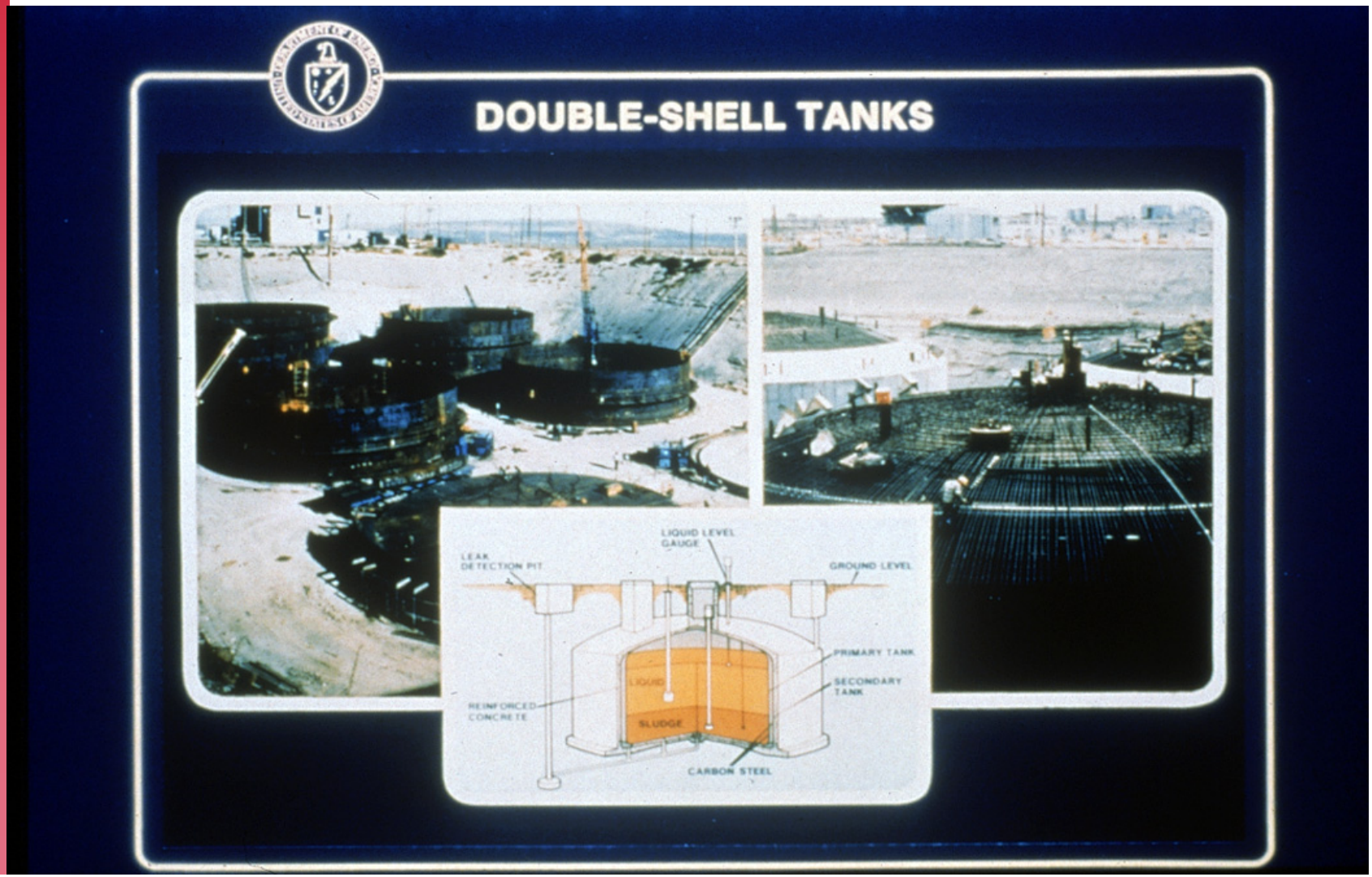
Savannah River Site - Storage Pad

High-Level Waste

High-level waste is highly radioactive material that results from the reprocessing of spent nuclear fuel.



Double-Shell Tanks

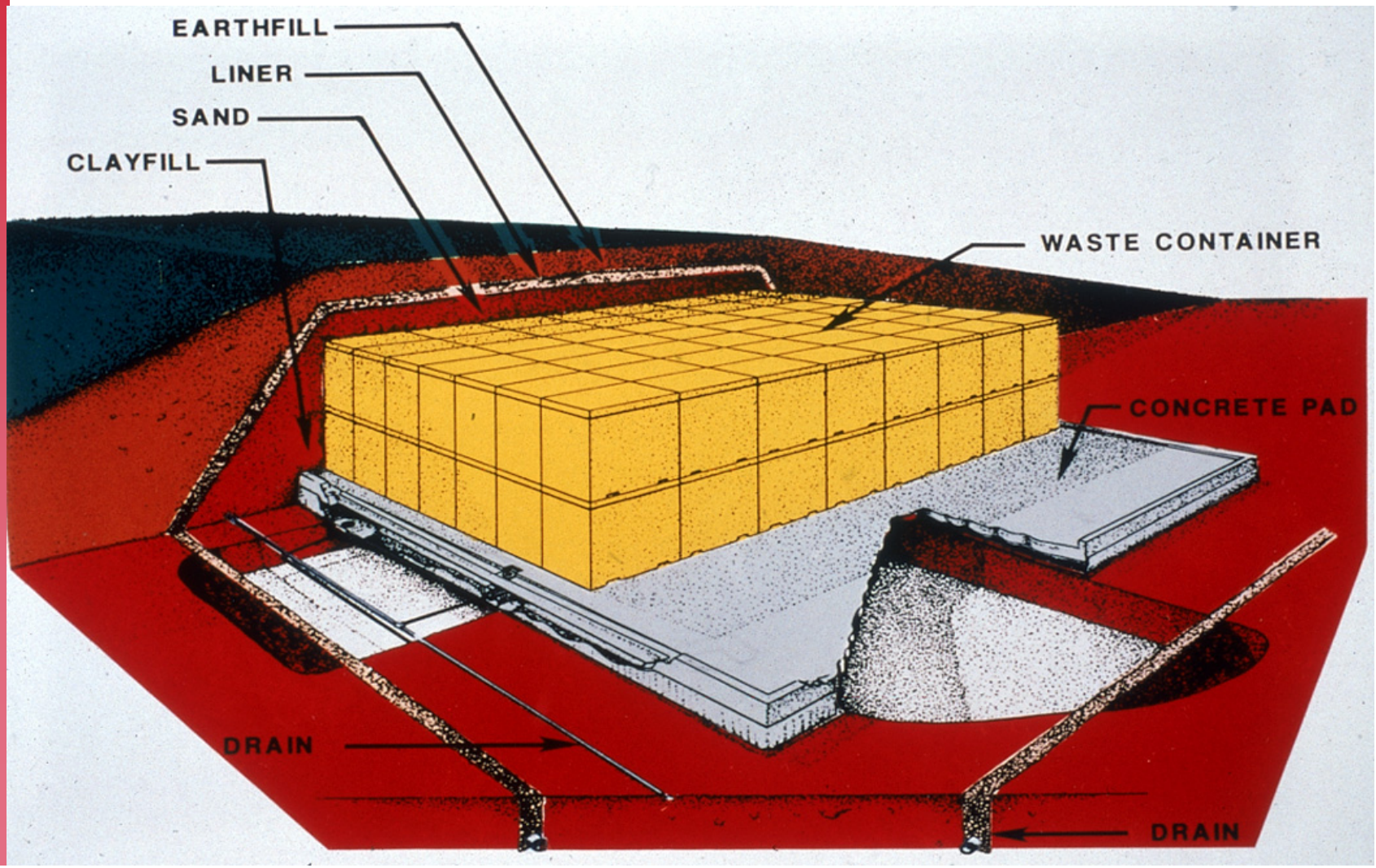


Low-Level Waste

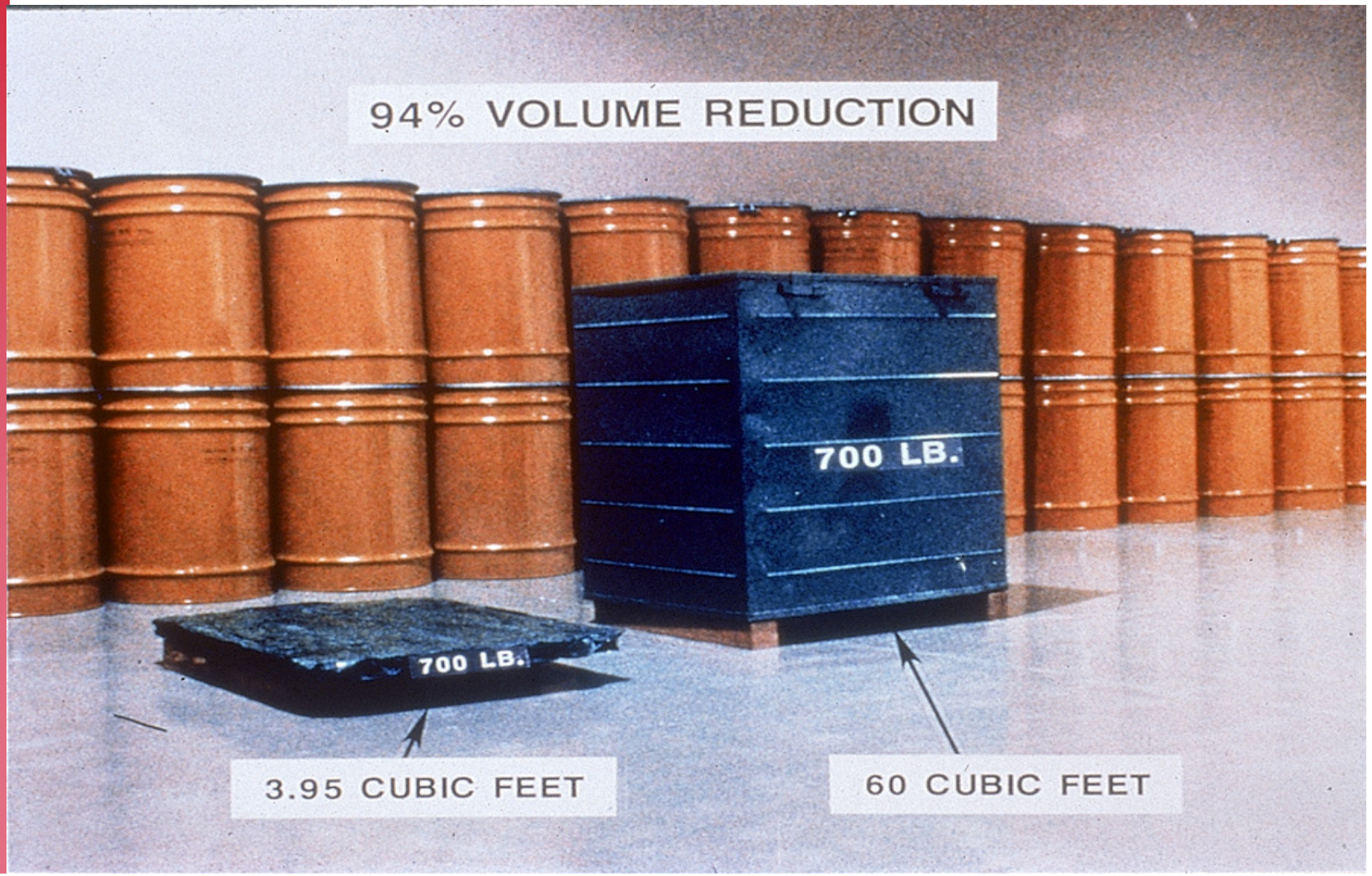
Low-level waste is radioactive waste not classified as high-level waste, TRU waste, spent nuclear fuel, or byproduct material.

Shallow Land Disposal of LLW

Concrete Vault Disposal of LLW

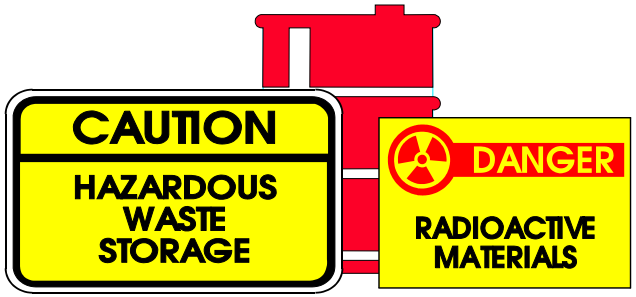


Super Compaction



Radioactive Mixed Waste

- **Contains both radioactive and hazardous components**
- **Hazardous component subject to RCRA**

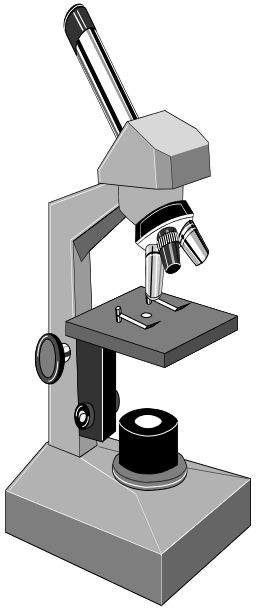


10 CFR 962

In 1987, the DOE issued 10 CFR 962, which defined byproduct material as it applies to DOE-owned or produced radioactive material.

10 CFR 962

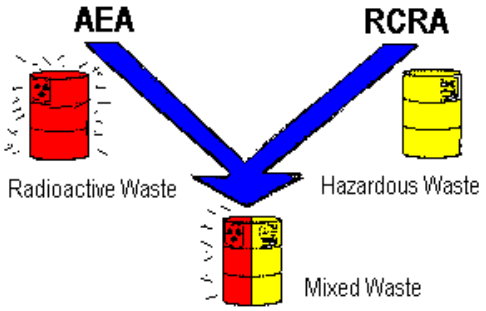
Under 10 CFR 962, radioactive material as described in the first part of the AEA's byproduct material definition refers only to the actual radionuclides suspended or dispersed in the material, not to nonradioactive hazardous components of the waste.



10 CFR 962

This means that although the DOE retains authority for the actual radionuclides in byproduct material, any nonradioactive hazardous component of the material is subject to regulation by:

- **The Environmental Protection Agency (EPA), or**
- **EPS's Agreement States under the Resource Conservation and Recovery Act**



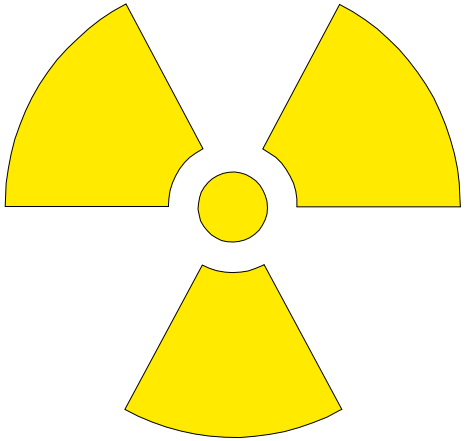
Definition

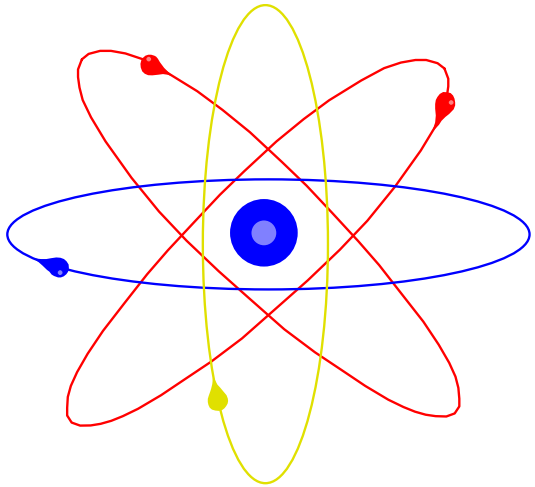
Uranium mill tailings are:

- **Naturally occurring, radioactive, sand-sized particles of crushed rock and soil**
- **By-products of uranium milling operations**

The Problem

Mill tailings contain residual radium and other radioactive elements. Radium produces radon gas when it undergoes radioactive decay.





The Problem

Radon and its decay products:

- **Are believed to increase lung cancer risk**
- **Are harmful to humans after long-term, high concentration exposure**

Responsibilities for Radioactive Waste Management in the United States

Type waste/ Source	Management	Disposal	Regulation of Disposal	Regulation of Transportation	Standards Developments
High-Level Waste and Spent Fuel-Civilian	Industry	DOE	NRC/EPA	DOT/States	EPA
High-Level Wastes-DOE	DOE	DOE	NRC/EPA	DOT/States	EPA
Low-Level Waste	Industry	States	Agreement	DOT/States	EPA
Low-Level Wastes-DOE	DOE	DOE	DOE	DOT/States	EPA

Responsibilities for Radioactive Waste Management in the United States

Type waste/ Source	Management	Disposal	Regulation of Disposal	Regulation of Transportation	Standards Developments
Transuranic Waste-DOE	DOE	DOE	DOE	DOT/States	EPA
Mill Tailings-Civilian	Industry	Industry	NRC/EPA	DOT/States	EPA
Mill Tailings-(Inactive)	DOE	DOE	NRC/EPA	DOT/States	EPA
Mixed Hazardous Waste	DOE	DOE	*	DOT	EPA
Hazardous Wastes	DOE	Industry	*	DOT	EPA

* EPA enforces mixed waste regulations, but can delegate to states if states qualify.

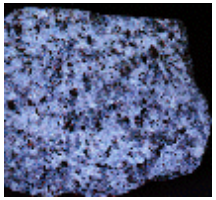
Sources of Radiation

- **Alpha - uranium, plutonium**
- **Beta - fission products, tritium**
- **Gamma - fission products, activated material**
- **Neutron - fission**

Sources of Radiation

We are exposed to naturally occurring radiation from:

- **cosmic radiation (gamma radiation)**
- **rocks and minerals (thorium, uranium, radon)**
- **plants and animals (potassium, carbon)**



Review Questions

1. **The original Atomic Energy Act of 1946 authorized the States to regulate the commercial uses of nuclear materials (the Agreement State concept).**

   a. True

   b. False

Review Questions

2. The Atomic Energy Act of 1946 resulted in the establishment of the Atomic Energy Commission (later DOE) and ensured that the production of nuclear weapons would be conducted under civilian control.

a. True

b. False

Review Questions

3. **The original Atomic Energy Act of 1946 authorized the States to regulate the commercial uses of nuclear materials (the "Agreement State" concept).**

   a. **True**

   b. **False**

Review Questions

4. This independent agency was established by an amendment to the Atomic Energy Act for the purpose of providing external independent oversight for the DOE Weapons complex to the Secretary of Energy. _____