

Radiation 101 and Emergency Response to Radiation Incidents

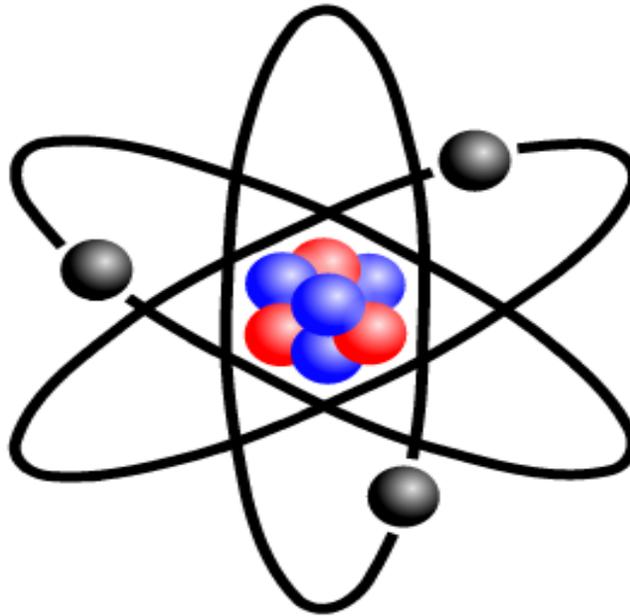
Kansas Radiation Control Program



Background

▶ Atoms

- A unit of matter, the smallest unit of an element
- are comprised of three fundamental particles
 - ❖ Protons
 - ❖ Neutrons
 - ❖ Electrons



Healthy Kansans living in safe and sustainable environments

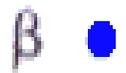
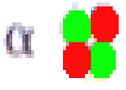
What is Radiation?

- ☢ Energy in the form of particles or waves.
- ☢ Generally falls into two categories:
 - **Ionizing Radiation**– Radiation with enough energy to remove electrons from atoms or molecules. This type of radiation poses the greatest risk to human health.
 - **Non-ionizing Radiation**– Radiation which is not sufficiently energetic to remove electrons from atoms or molecules. Primary health effects are from heat production.



Healthy Kansans living in safe and sustainable environments

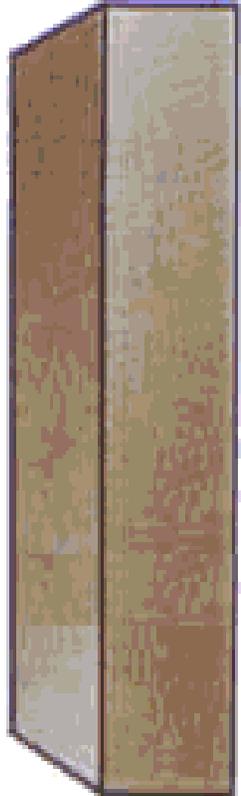
Emissions



paper



aluminium



lead

Our Vision – Healthy Kansans
living in safe and sustainable
environments

Exposure and Contamination

- ▶ Exposure
- ▶ Contamination
 - Internal
 - External



Our Vision – Healthy Kansans
living in safe and sustainable
environments

Health Effects

- ▶ Radiation deposits energy in body tissue
 - Can result in cellular damage or cell death
 - Damage is dependent on
 - Type of radiation absorbed
 - Amount of radiation absorbed
 - Time period in which exposure is received

Affects of Exposure

- ▶ **Less than 25 Rem:** No observable effects
- ▶ **25 to 100 Rem:** Slight blood changes
- ▶ **100 to 200 Rem:** Vomiting. Moderate blood changes.
- ▶ **200–600 Rem:** Vomiting. Loss of hair. Severe blood changes. Hemorrhaging and infection. Death may occur. The recovery period is one month to one year.
- ▶ **Over 600 Rem:** Vomiting. Severe blood changes. Hemorrhage, infection and hair loss. Probability of death is 80 percent (for 600 Rem) within two months.

Detection

- ▶ Radiation cannot be detected by the human senses



Dosimetry

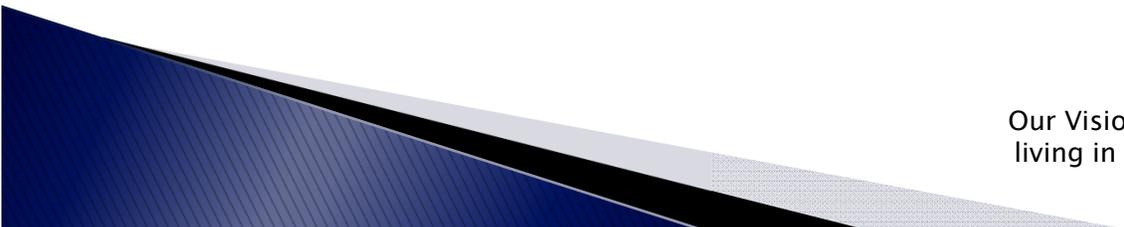
- ▶ Types of dosimetry
- ▶ How dosimetry will be used in response operations
- ▶ Tracking dose of responders



Our Vision – Healthy Kansans
living in safe and sustainable
environments

Protection

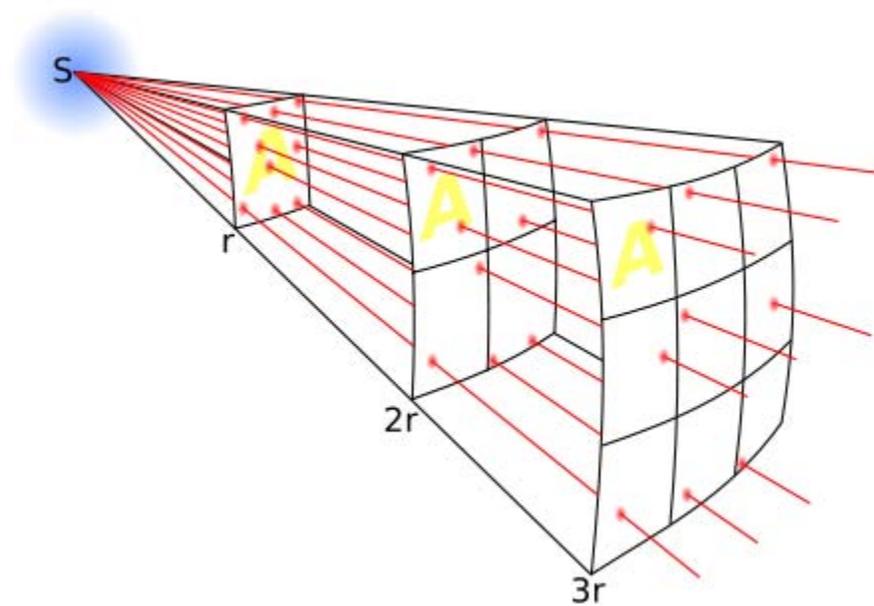
- ▶ As Low As Reasonably Achievable
- ▶ Personal Protective Equipment
- ▶ Area Contamination Control
- ▶ Administrative Dose Limits
- ▶ Dosimetry



Our Vision – Healthy Kansans
living in safe and sustainable
environments

ALARA

- ▶ Time
- ▶ Distance
- ▶ Shielding



Our Vision – Healthy Kansans
living in safe and sustainable
environments

PPE

- ▶ Gloves and booties are a minimum
 - Swap PPE regularly
 - Other barriers may be implemented as needed
 - RSO or other Rad professional will offer recommendations



Potassium Iodide (KI)

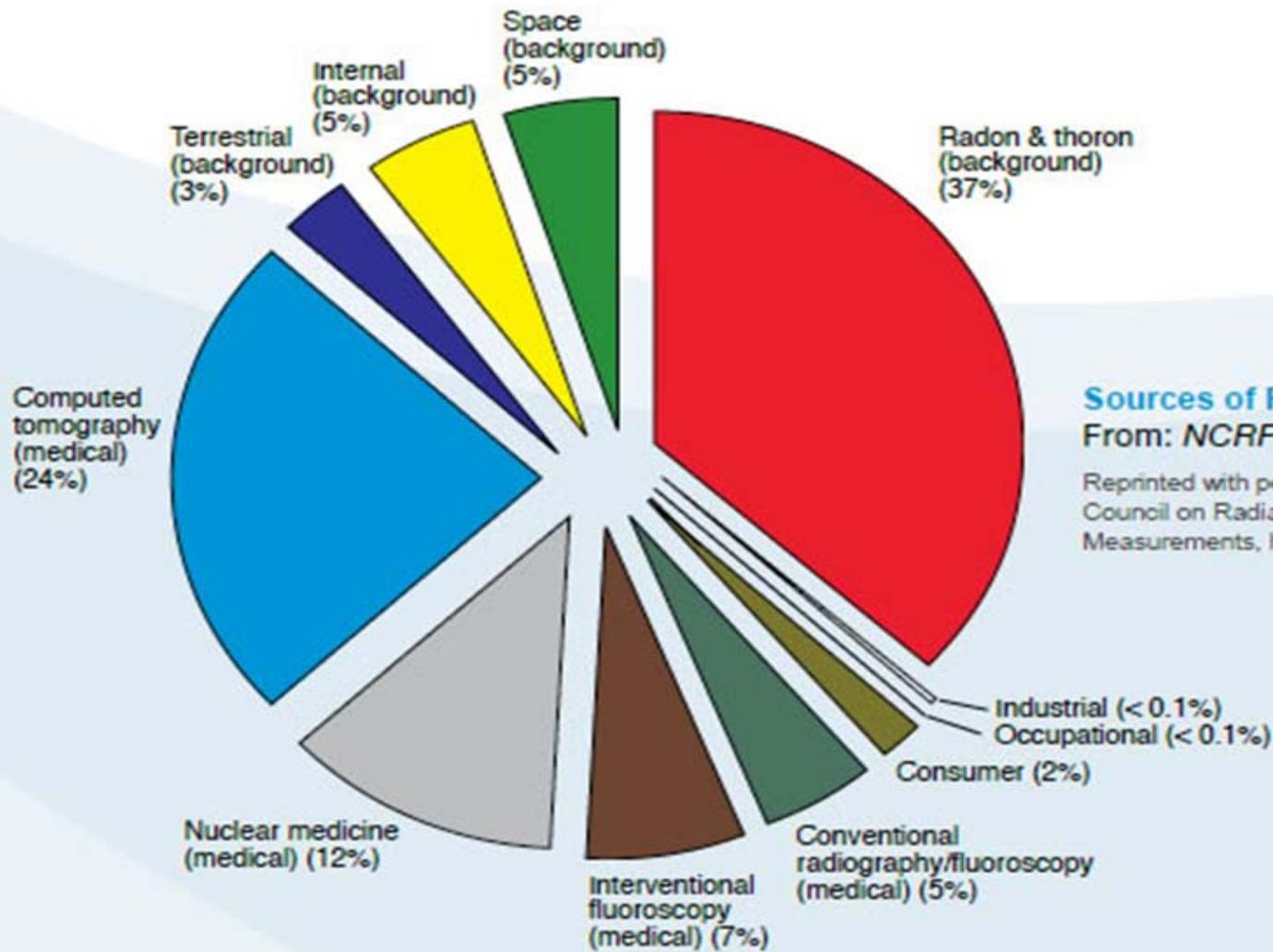


Our Vision – Healthy Kansans
living in safe and sustainable
environments

Area Contamination Control

- ▶ Conduct area surveys of environment, building, items, animals, or people to identify and remove contamination
- ▶ Control foot/vehicle traffic and use routes and floor plans efficiently

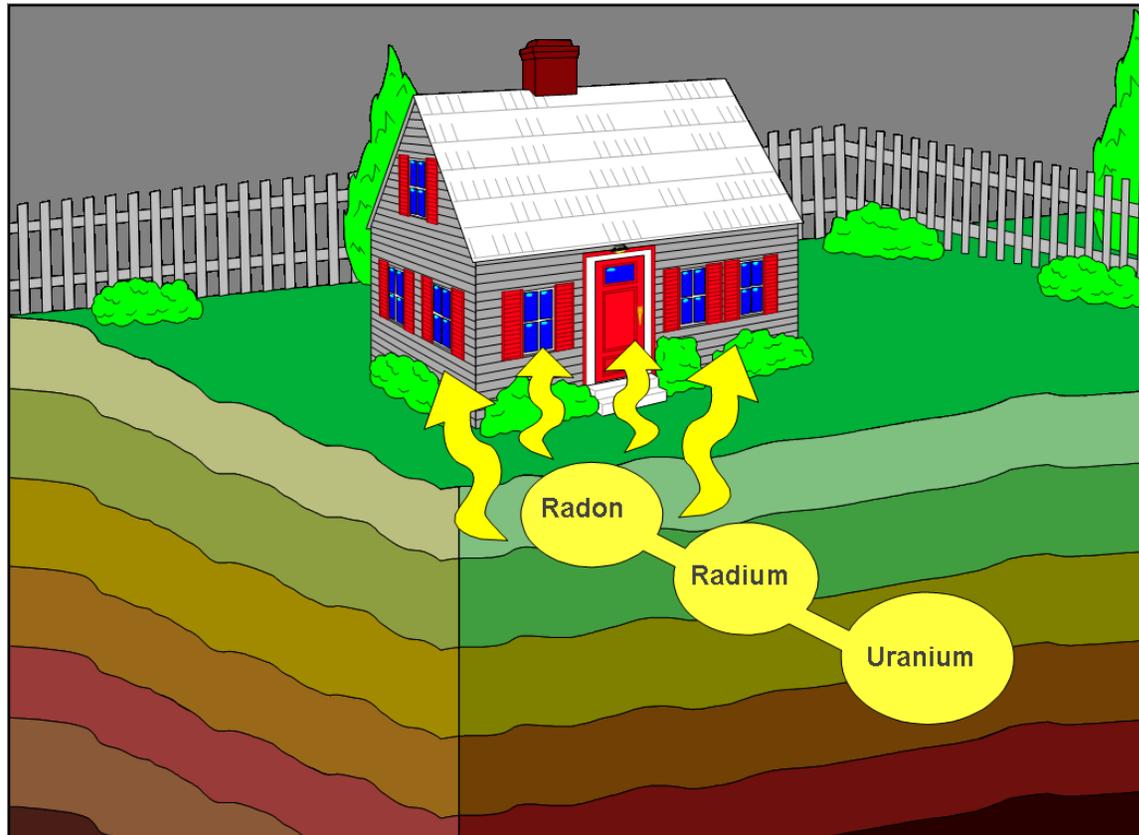
Radiation in perspective



Sources of Radiation Exposure From: NCRP Report No. 160

Reprinted with permission of the National Council on Radiation Protection and Measurements, <http://NCRPonline.org>

Radon causes lung cancer



- ▶ Test
- ▶ Fix
- ▶ Save-a-life

www.kansasradonprogram.org

1-800-693-5343

Healthy Kansans living in safe and sustainable environments



What is RAM?



Healthy Kansans living in safe and sustainable environments

Household Sources

- ▶ Lantern Mantle
- ▶ Fiestaware
- ▶ Cobalt Glass
- ▶ Ceramic Tile
- ▶ Smoke detector



Our Vision – Healthy Kansans
living in safe and sustainable
environments

Medical Sources

- ▶ Therapy Sources
- ▶ Gamma Knife
- ▶ Blood Irradiators
- ▶ Molybdenum Generators
- ▶ Xray Devices



Soil Density Gauge



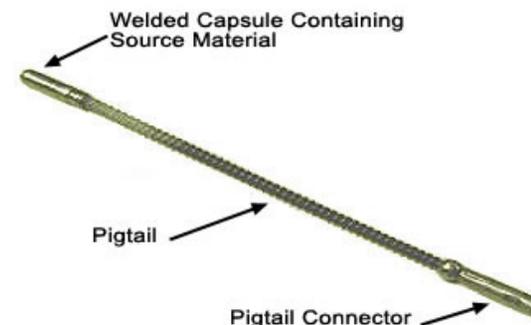
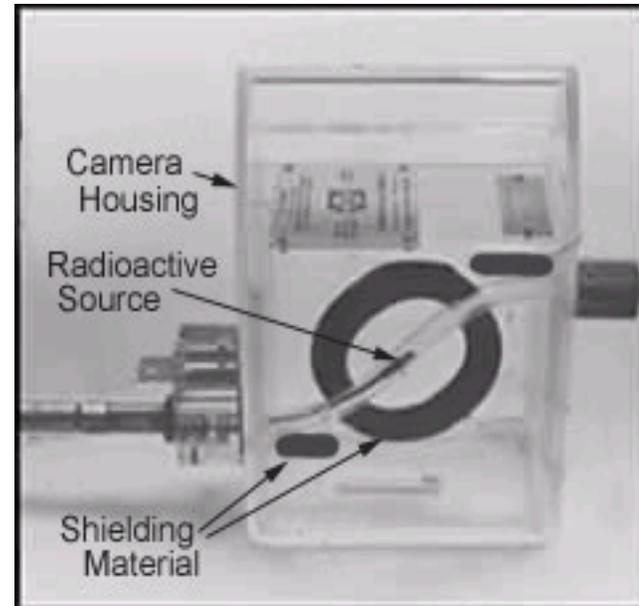
Our Vision – Healthy Kansans
living in safe and sustainable
environments

Radiography



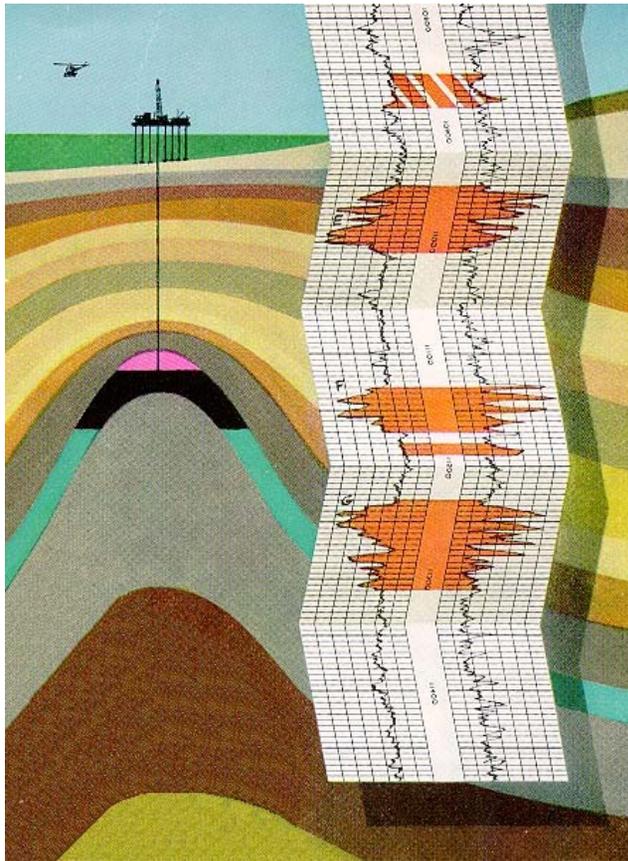
ansans
inable
environments

Radiography Camera and Source



Our Vision – hearty Kansans living in safe and sustainable environments

Well Logging



Our Vision – Healthy Kansans
living in safe and sustainable
environments

Events

- ☢ Nuclear
 - WMD
 - Power plants
- ☢ Terrorism
 - RDD
 - RED
- ☢ Transportation
- ☢ Lost/stolen sources



Our Vision – Healthy Kansans
living in safe and sustainable
environments

Response

- ▶ Local Hazmat teams
- ▶ County Health
- ▶ State Radiation Control
- ▶ Federal agencies
- ▶ Volunteers



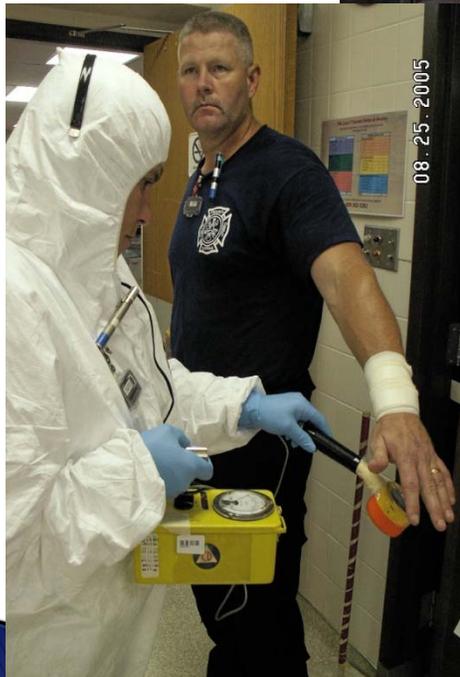
Our Vision – Healthy Kansans
living in safe and sustainable
environments

1st on the scene



living in safe and sustainable environments

Behind the scenes...



Our Vision – Healthy Kansans
living in safe and sustainable
environments

After the event...



isans
living in safe and sustainable
environments

Radiation Response Volunteer Corps



- Established in 2010
- Radiation professionals
- Perform monitoring and decontamination activities
- Initial training
- Advanced training
- Drills and exercises



Healthy Kansans living in safe and sustainable environments

Kansas Community Reception Center

Stations

- ❖ Initial Sorting
- ❖ First Aid
- ❖ Contamination Screening
- ❖ Decontamination
- ❖ Registration
- ❖ Dose Assessment
- ❖ Discharge



Healthy Kansans living in safe and sustainable environments

Lesson Learned

In dealing with the aftermath of any radiation event, the early creation of a mechanism for frequent honest communication and feedback between the “authorities” and the concerned public can help alleviate the prolonged mistrust and anxiety that are integral parts of such an occurrence.



Healthy Kansans living in safe and sustainable environments

Questions?



Radiation Control Program

(785) 296-1560

www.kdheks.gov/radiation/



Healthy Kansans living in safe and sustainable environments