



charles lowe

Chapter 4

What Are the Harmful Effects of Radiation?

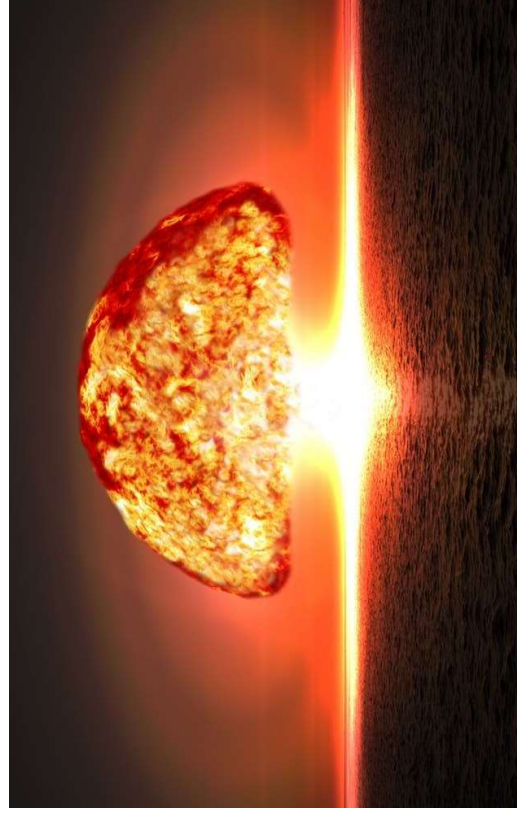
Chapter 4: What Are the Harmful Effects of Radiation?



Preface

- Scientists and their findings.
- Reasons you need safety training.

Chapter 4: What Are the Harmful Effects of Radiation?



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Chapter 4: What Are the Harmful Effects of Radiation?



Prompt Effects of Radiation

- Very large doses of radiation can cause harmful effects within hours or weeks.

Chapter 4: What Are the Harmful Effects of Radiation?



Radiation Burns

- Usually occur receiving high radiation dose to a small part of the body.
- Touching, or almost touching, a source can cause burns.
- Symptoms and treatments.

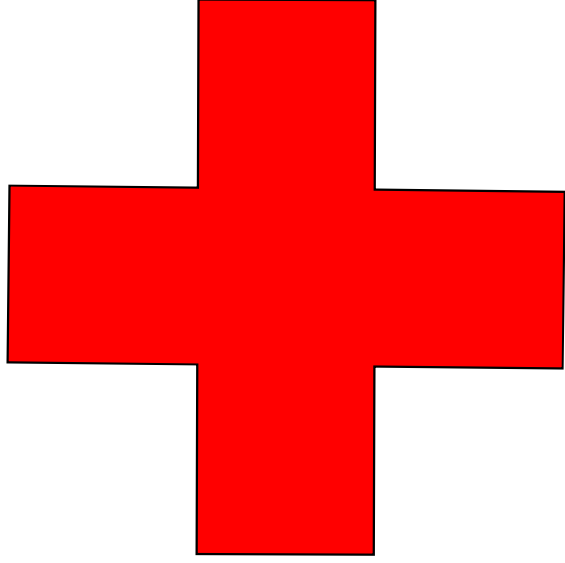
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Radiation Burns

- Similar to 1st degree burn = exceed 600 rem.
- Similar to 2nd degree burn = exceed 1000 rem.
- Similar to scalding or chemical burn = 2000 to 3000 rem.

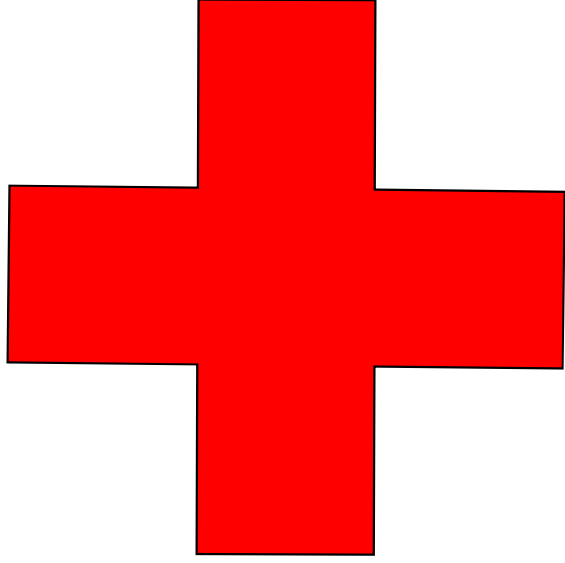
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Severe Radiation Burns

- High doses of radiation to parts of body for an extended period of time.
- Stories from training manual.
- Symptoms and treatments.

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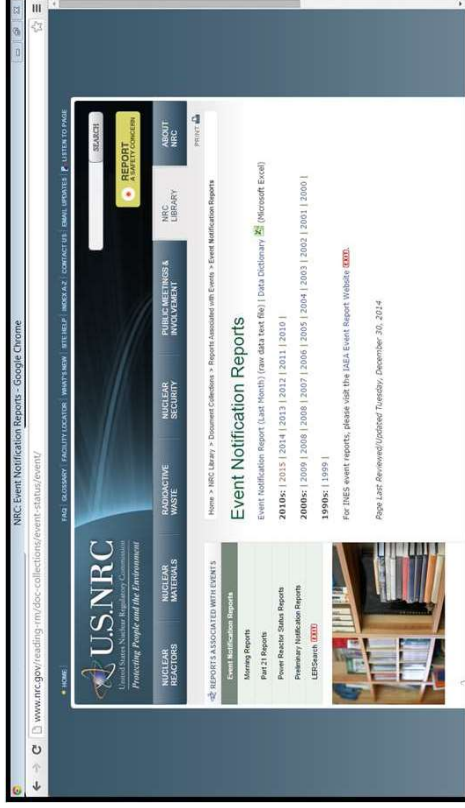
Severe Radiation Burns

- Exceeds 10,000 rem.
- Low activity radiation sources are as dangerous as high activity radiation sources.

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Other examples

- India (1968).
- US NRC event logs (Google it).
- Agreement State event logs.



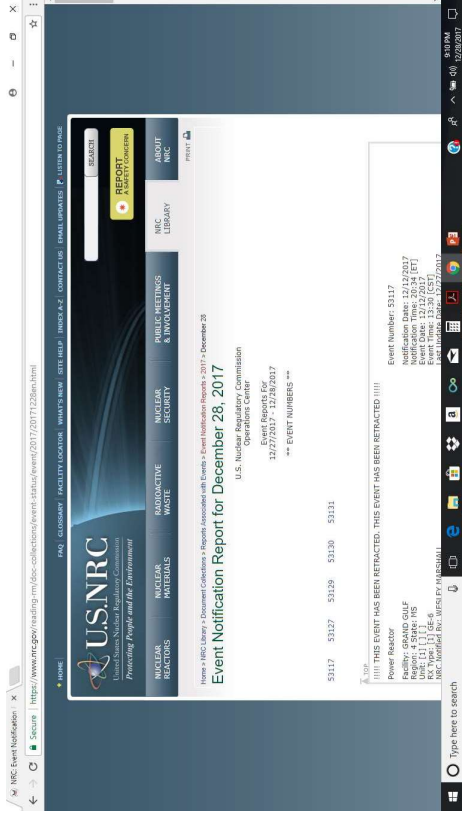
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US NRC Event Logs

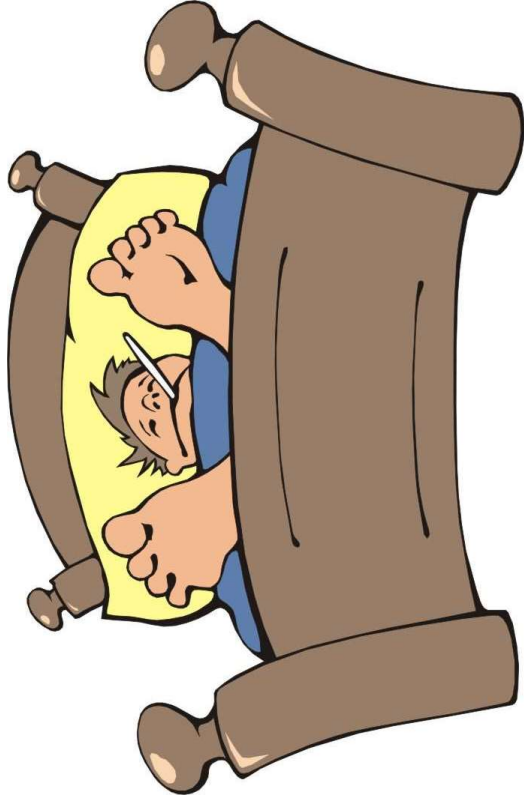
- Goto your favorite search engine website.

- Enter “US NRC Event Logs”

- Visit US NRC Event Log website.



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Radiation Sickness

- Large dose of radiation delivered to the torso of the body in a short period of time. (100 rem).
- Demonstrate how radiation sickness may occur.

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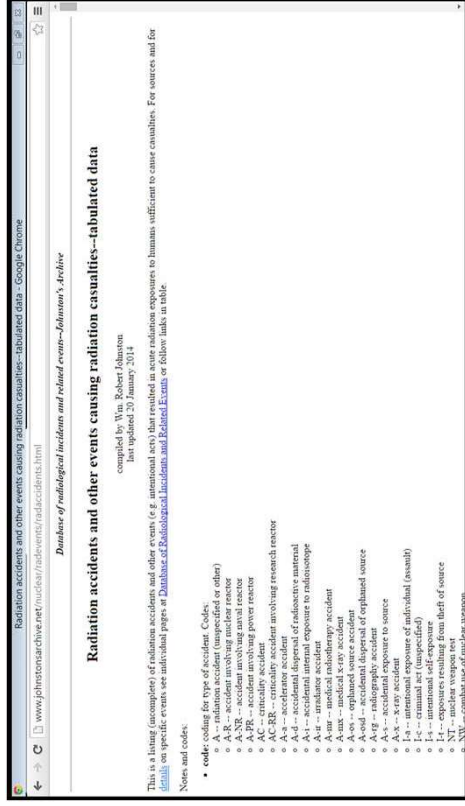
Radiation Sickness

- Symptoms and treatments.

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Deaths from a Radiography Source

- Only 1 radiographer has died from the prompt effects of radiation. (see handout).
- See pages 123-127.
- US NRC rules and regulations.



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Delayed Effects of Radiation

- Effects of radiation occurring years after exposure.
- Estimates made.
- Cancer and genetic defects.

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Cancer

- Cancer is a risk.
- Cause of cancer cannot be determined from working industrial radiography or other causes.
- ALARA and regulatory limits.

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**RISK
ASSESSMENT**

How Large is the Cancer Risk?

- No one knows.
- Estimates made from past studies.
- Days of life lost – 1 rem may result in loss of 1 day of life expectancy.

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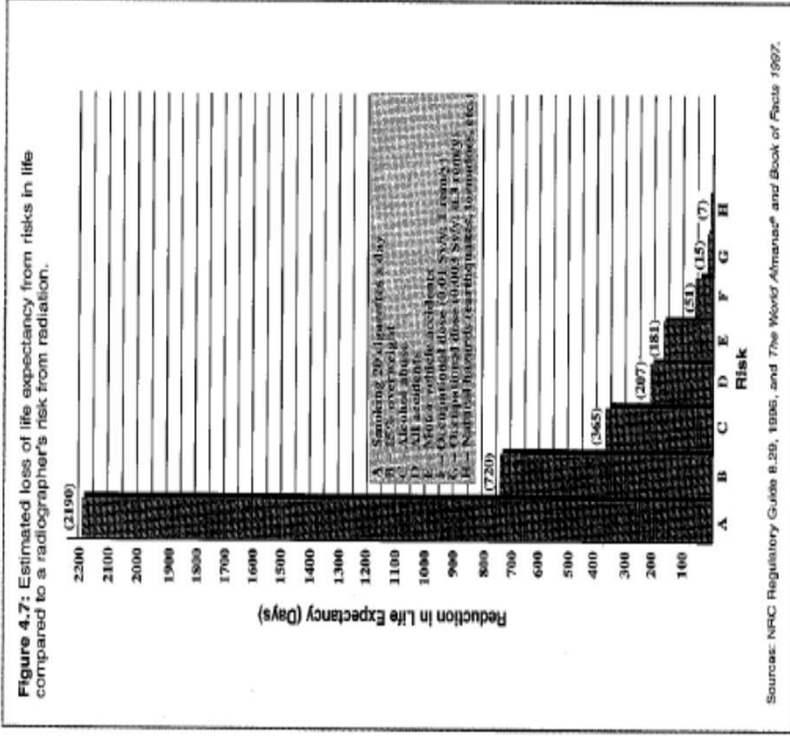
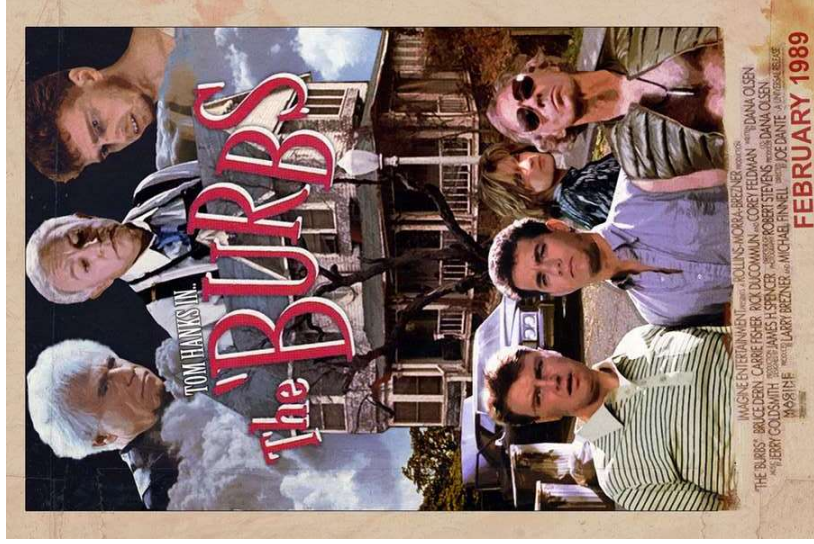


Figure 4.7, page 37

- Smoking 20 cigarettes a day = 2190 days of life lost.
- Occupational dose of 1 rem per year = 51 days of life lost.

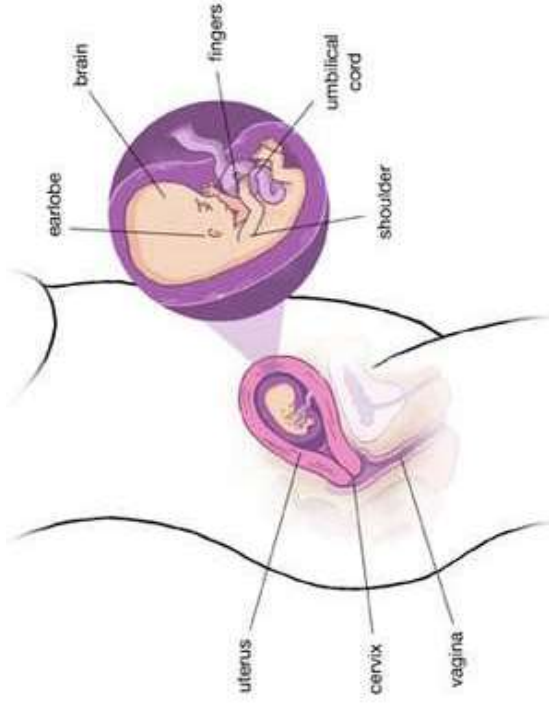
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Genetic Defects from Radiation

- Damage to reproductive cells.
- Mutation of the genes.
- Children of Japan, Chernobyl.

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Radiation Exposure of Pregnant Women

- Unborn child is more sensitive to radiation.
- Regulatory limits.
- Declared Pregnant Woman.

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How Sure are Scientists About Delayed Effects?

- Under regulatory limits, effects are uncertain.
- Follow your training.
- Improve ALARA.

Chapter 4: What Are the Harmful Effects of Radiation?

TO DO LIST

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To Do List

- Follow your training.
- Improve ALARA.
- Use detection equipment.
- Source exposed or not?
- Ensure source is shielded.

Chapter 4: Making Sense of It All



Making Sense of It All

- Prompt effects.
- Delayed effects.
- Safe practices.
- Dose limits.
- Use your detection and monitoring devices.
- Rules and regulations.

Chapter 4: What Are the Harmful Effects of Radiation? Quiz 1 of 8

Quiz 1 of 8:

Relative to radiation exposure, cancer is considering a prompt effect or delayed effect?

Delayed effect.

Chapter 4: What Are the Harmful Effects of Radiation? Quiz 2 of 8

Quiz 2 of 8:

Radiation sickness occurs when a large dose of radiation strikes which part of the human body?

Torso.

Chapter 4: What Are the Harmful Effects of Radiation? Quiz 3 of 8

Quiz 3 of 8:

A Radiographer is sent to the hospital for a possible radiation overexposure. What typically occurs during the visit?

Blood tests and monitoring.

Chapter 4: What Are the Harmful Effects of Radiation? Quiz 4 of 8

Quiz 4 of 8:

Touching or almost touching a radiography source for only a few seconds can cause a _____.

radiation burn

Quiz 5 of 8:

After accidentally touching a source or almost touching a source, do symptoms of radiation burn appear immediately?

No. Symptoms usually appear later and may get worse.

Quiz 6 of 8:

Working as a Radiographer, are there safe practices to not be exposed to any radiation during work?

You will be exposed to radiation working as a Radiographer. Use ALARA safe practices as you work.

Quiz 7 of 8:

The doctor took a blood sample. How can it be determined the radiation dose received?

Under a microscope, human cells are examined. From the sample and if cells are damaged, an estimate of damage can be determined.

Chapter 4: What Are the Harmful Effects of Radiation? Quiz 8 of 8

Quiz 8 of 8:

Are genetic defects always visible?

No. Genetic defects may only be psychological.



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End of Chapter 4

What Are the Harmful Effects of Radiation?