



charles lowe

Chapter 8

What Are the Basic Rules for Radiography?

Chapter 8: What Are the Basic Rules for Radiography?



Preface

- US NRC.
- Agreement States.
- Licensees,
Radiographers must
follow regulations.

Chapter 8: What Are the Basic Rules for Radiography?



Who Regulates Radiographers?

- US NRC License.
- Agreement State license.
- Rules and regulations.

Chapter 8: What Are the Basic Rules for Radiography?



Who Regulates Radiographers?

- US NRC state (or Non-Agreement State)
- US NRC regulates licensee, Radiographers using RAM.

Chapter 8: What Are the Basic Rules for Radiography?



Who Regulates Radiographers?

- Agreement State
- State has their own regulatory body over licensees, Radiographers using RAM.

Chapter 8: What Are the Basic Rules for Radiography?



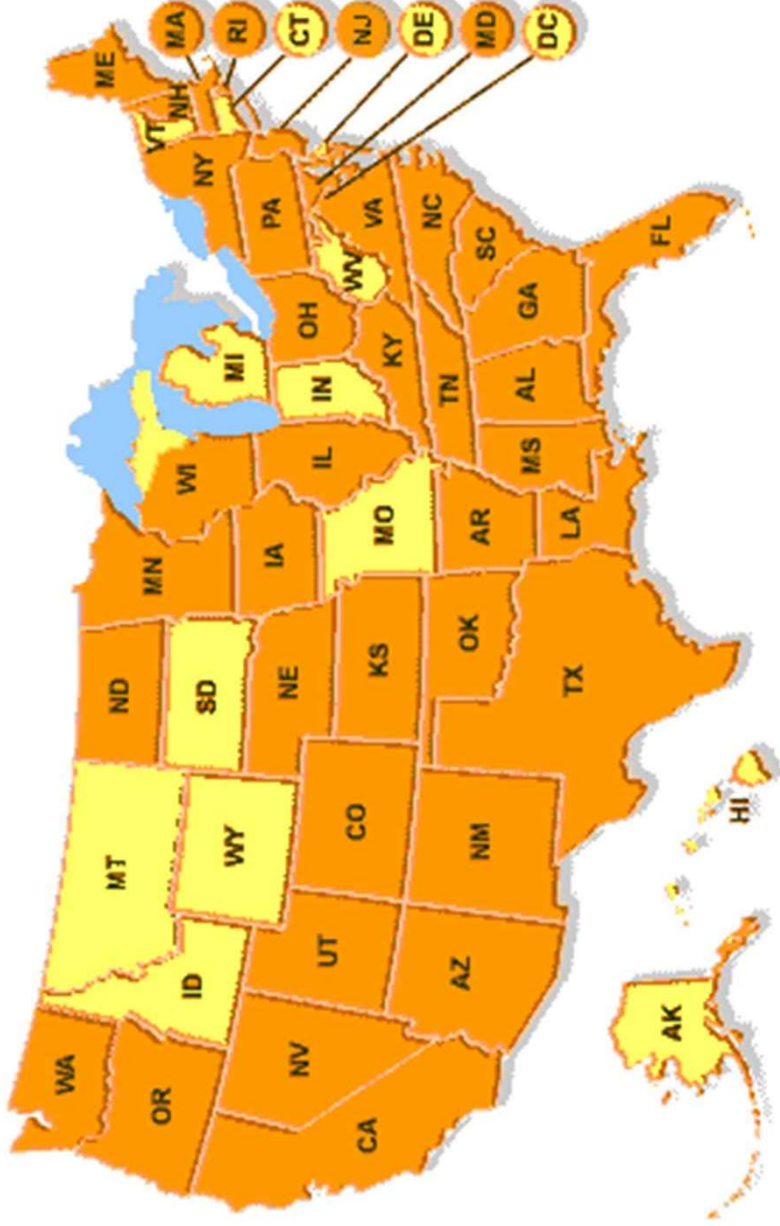
Who Regulates Radiographers?

- Texas company applies for a Minnesota RAM license. Company, personnel must follow conditions of MN RAM license in order to work with gamma in MN.

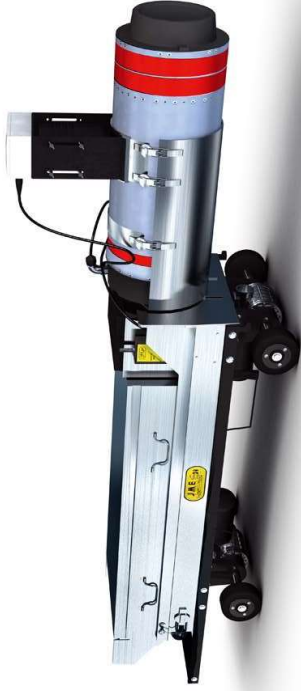
Chapter 8: What Are the Basic Rules for Radiography? r's Preface

Orange = Agreement State

Yellow = US NRC State



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Who Regulates Work Using X-ray Machines?

- The US NRC has no jurisdiction over licensees using X-ray machines.
- Each licensee must register X-ray machines in the state in which they will be used.

Chapter 8: What Are the Basic Rules for Radiography?

MARYLAND DEPARTMENT OF THE ENVIRONMENT
 1800 Washington Boulevard • Baltimore, Maryland 21230
 (410) 537-3300 • 1-800-633-6101 • www.mde.maryland.gov

RECIPROCAL NOTIFICATION Work Order Number: _____

1. Name _____

2. Address _____

3. City _____ State _____ Telephone: _____ Fax: _____

4. Notification Method: Call Date _____ Call Time _____ RHP Contact _____
 Letter Date _____
 E-mail to RHP-REC-PROCTY@mde.maryland.gov Date of e-mail _____

License No. _____ Expiration Date _____ Date MDE Requirements Letter Rec'd _____

RSD _____ Telephone # _____

Type of Work _____ Code _____ Fee \$ _____
 Device(s) used _____ Manufacturer _____
 Model _____ SN _____ Date of Q.M. Insp. _____
 Source: Isotope _____ Date of leak test _____
 Activity _____ Manufacturer _____ Model _____ SN _____


Dates of use (weekdays/weekend) _____
 Times use (am/pm) _____
 Site Location(s): Maryland Federal
 Job Address _____ City _____
 Client _____ Job Location Contact _____
 Client Phone # _____ Client Fax # _____
 Company's Representative(s) _____ Training _____
 Radiographer _____
 Assis. Radiographer _____
 Technician _____
 Service Person _____
 Other _____

Storage Method: _____ Vehicle ID: Make/Model _____
 State License No. _____ Year: _____

Additional Requirements:
 **Notify MDE by 1800 hrs if work not performed
 **Notify RHP by 1800 hrs if work not performed
 **Notify RHP if personnel leave site less than 72 hrs requested
 **Anytime submitted work times are rescheduled or changed
 **** Radiographers -- The state of MD requires quarterly calibration of survey meters ****

Reciprocity in Maryland is 180 days with a prior 3 day notice to RHP

MDE's Telephone: 410-537-3301 Fax: 410-537-3198
 Form Number MDE/AR/IA/PER/029
 Revision Date 7/13/05
 TTY Users 1-800-735-2258

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Reciprocity

- Instead of TX licensee applying for a MN RAM license, the TX licensee can apply for MN Reciprocity.
- Reciprocity application.

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Reciprocity

- Allows a radiography company licensed in one state to work in a different state where it is not specifically licensed.

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3. City _____ State _____ Telephone: _____ Fax: _____

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Fax Date _____
E-mail TO: RHP-RECIPROCTY@mde.maryland.gov, Date of e-mail _____

License No. _____ Expiration Date _____ Date MDE Requirements Letter Rec'd _____
RSD _____ Telephone # _____


Type of Work _____ Code _____ Fee \$ _____
Device(s) used _____ Manufacturer _____
Model _____ SN _____ Date of Q.M. Insp. _____
Source: Isotope _____ Date of leak test _____
Activity _____ Manufacturer _____ Model _____ SN _____

Dates of use (weekday/weekend) _____
Times use (am/pm) _____
Site Location(s): Maryland Federal
Job Address _____ City _____
Client _____ Job Location Contact _____
Client Phone # _____ Client Fax # _____
Company's Representative(s) _____ Training _____
Radiographer _____
Assist. Radiographer _____
Technician _____
Service Person _____
Other _____

Storage Method: _____ Vehicle ID: Make/Model _____
State License No. _____ Year: _____

Additional Requirements:
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**Notify RHP by 1800 hrs if work not performed
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Reciprocal Form 

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RECIPROCAL NOTIFICATION Work Order Number: _____

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 Device(s) used _____ Manufacturer _____
 Model _____ SN _____ Date of Q.M. Insp. _____
 Source: Isotope _____ Date of leak test _____
 Activity _____ Manufacturer _____ Model _____ SN _____

Dates of use (weekday/weekend) _____
 Times use (am/pm) _____

Site Location(s): Maryland Federal
 Job Address _____ City _____

Client _____ Job Location Contact _____
 Client Phone # _____ Client Fax # _____


Company's Representative(s) _____ Training _____
 Radiographer _____
 Assis. Radiographer _____
 Technician _____
 Service Person _____
 Other _____

Storage Method: _____ Vehicle ID: Make/Model _____
 State License No. _____ Year: _____

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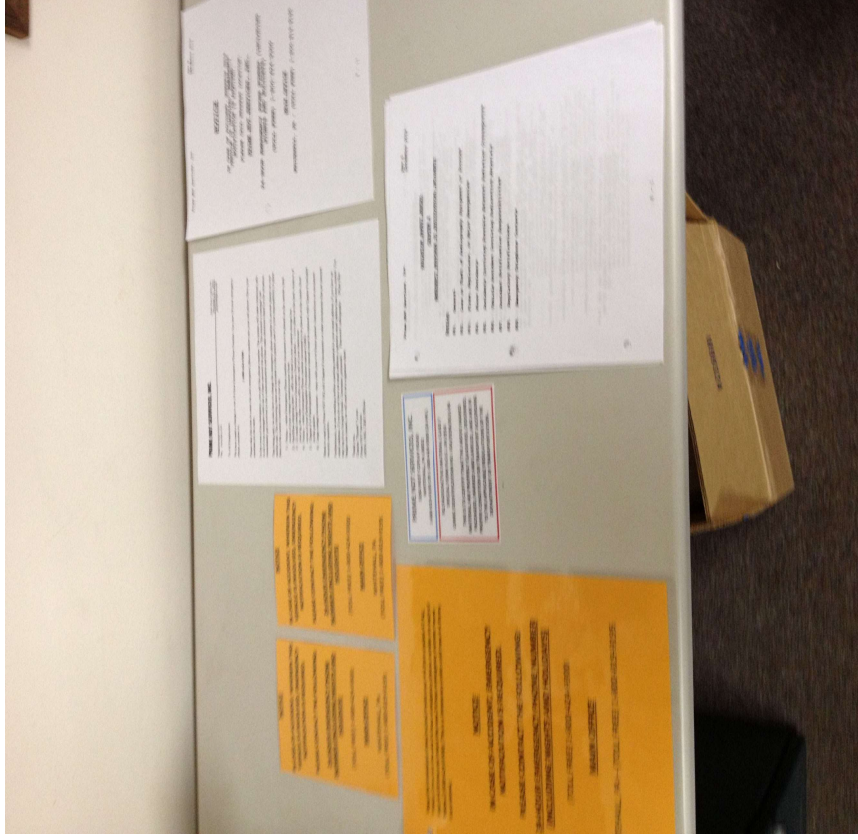
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Reciprocity

- Permission allows 180 days in the state.
- Notification requirements.
- Quicker, cheaper route.

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Compliance

- O&E Manual.
- License and/or Reciprocity.
- Stickers and warning labels.
- Notice to Employees.

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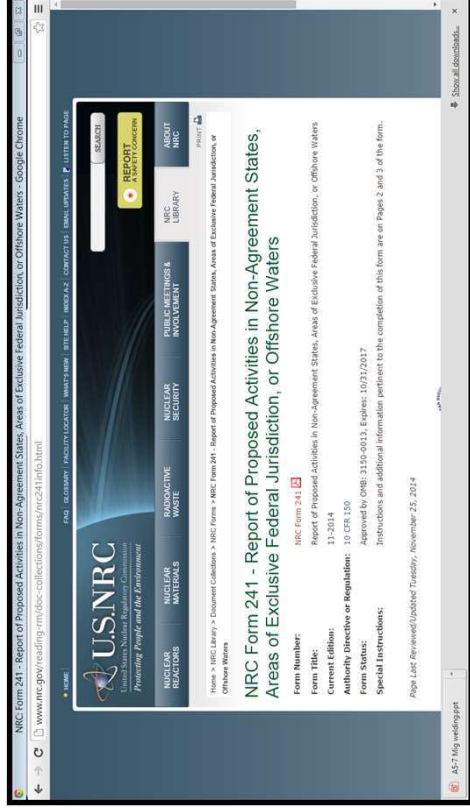


Offshore Work Sites

- State's territorial limits.
- Work within 3 miles is regulated by most Agreement States.
- TX, FL is 10 mile limit.

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- **Work offshore and outside the limits, the NRC is the determining regulator.**



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US NRC Regulations

- Congress
- The US Nuclear Regulatory Commission
- Code of Federal Regulations (CFR)

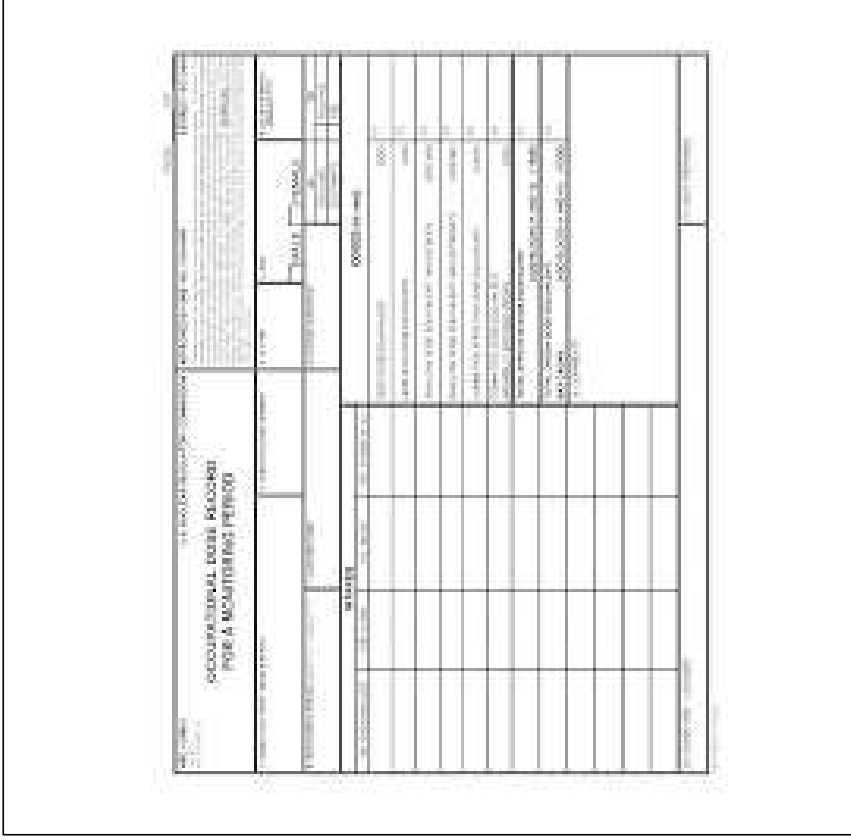
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Part 19 – Radiographers Bill of Rights

- Training
- Employee rights.
- Employers must train you.

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Part 19 – Radiographers Bill of Rights

- Reports of Radiation Dose
- Right to know.
- Recordkeeping.

Chapter 8: What Are the Basic Rules for Radiography?



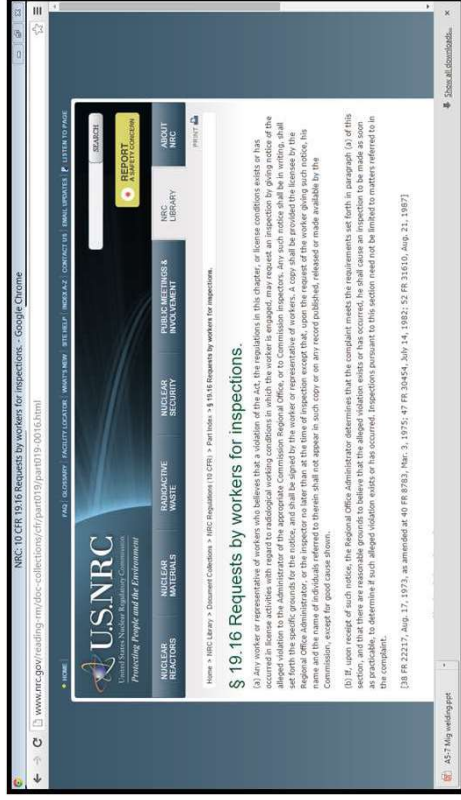
Part 19 – Radiographers Bill of Rights

- Talking to US NRC
Inspectors
- Your rights.

Chapter 8: What Are the Basic Rules for Radiography?

Part 19 – Radiographers Bill of Rights

- Requesting a US NRC Inspection.
- Your rights.



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Part 19 – Radiographers Bill of Rights

- A Worker Representative
May Accompany a US
NRC Inspector on a
Inspection.
- Your rights.


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Presents this Certificate to
[insert student name]

Certificate Number: _____

This Individual Has Satisfactorily Completed

An Agency-Accepted 40 Hour Radiation Safety for Industrial Radiography Training Course and Demonstrated Competency in the Subjects Identified in 10 CFR Part 34.45(c) and applicable parts of 25 TAC §89.255 By Successfully Completing a Written and Practical Exam.

ALL OUR RADIATION SAFETY COURSES ARE INSTRUCTED IN A CLASSROOM LECTURE, HANDS-ON FORMAT.

Given this _____ day of _____

INSTRUCTOR: _____
Charles Lowe, Radiation Safety Officer

Rev.0

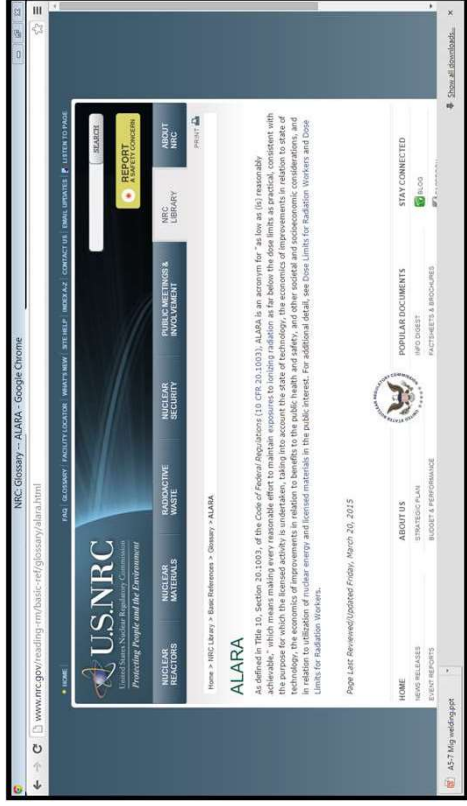
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Part 20 – Basic Radiation Safety

- Radiation Dose Limits.

- Your training, practice ALARA.

- 5 rem, whole body per year.



Chapter 8: What Are the Basic Rules for Radiography?



Part 20 – Basic Radiation Safety

- Restricted Areas,
Unrestricted Areas,
Radiation Areas and High
Radiation Areas.
- Establish safe perimeters.

Chapter 8: What Are the Basic Rules for Radiography?

$$\frac{I_1}{I_2} = \frac{D_2^2}{D_1^2}$$

Part 20 – Basic Radiation Safety

- Restricted Areas,
Unrestricted Areas,
Radiation Areas and High
Radiation Areas.
- Math calculations...revisit
the Inverse Square Law.

Chapter 8: What Are the Basic Rules for Radiography?



Part 20 – Basic Radiation Safety

- Restricted Areas
- An area to which the licensee restricts access for the purpose of radiation protection.

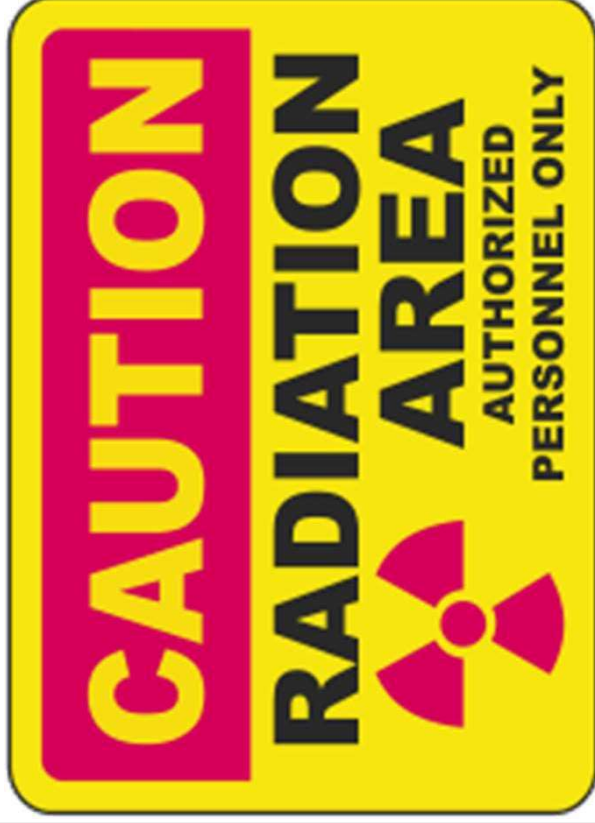
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Part 20 – Basic Radiation Safety

- Unrestricted Areas
- An area where access is not restricted.
- Maximum dose allowed is 2 mrem in any 1 hour.

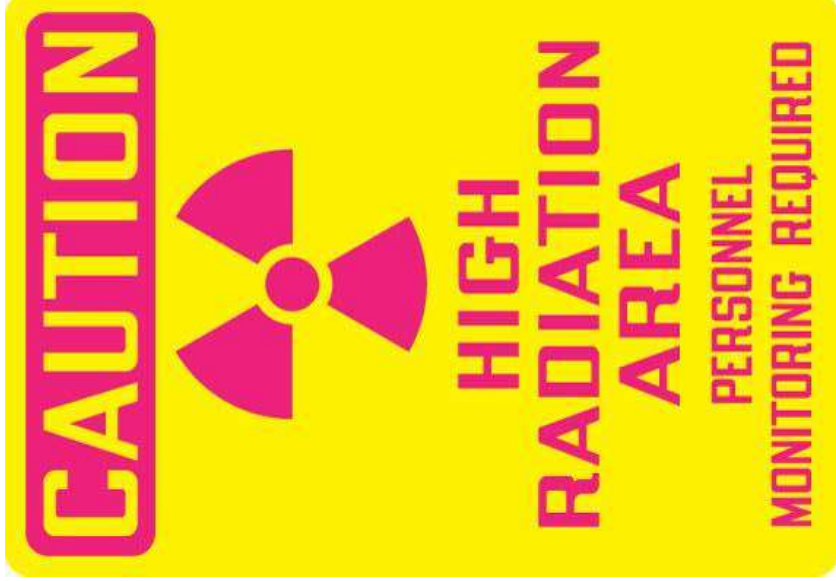
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Part 20 – Basic Radiation Safety

- Radiation Areas
- An area in which anyone could receive a radiation dose to a major portion of the body in excess of 5 mrem in any 1 hour.

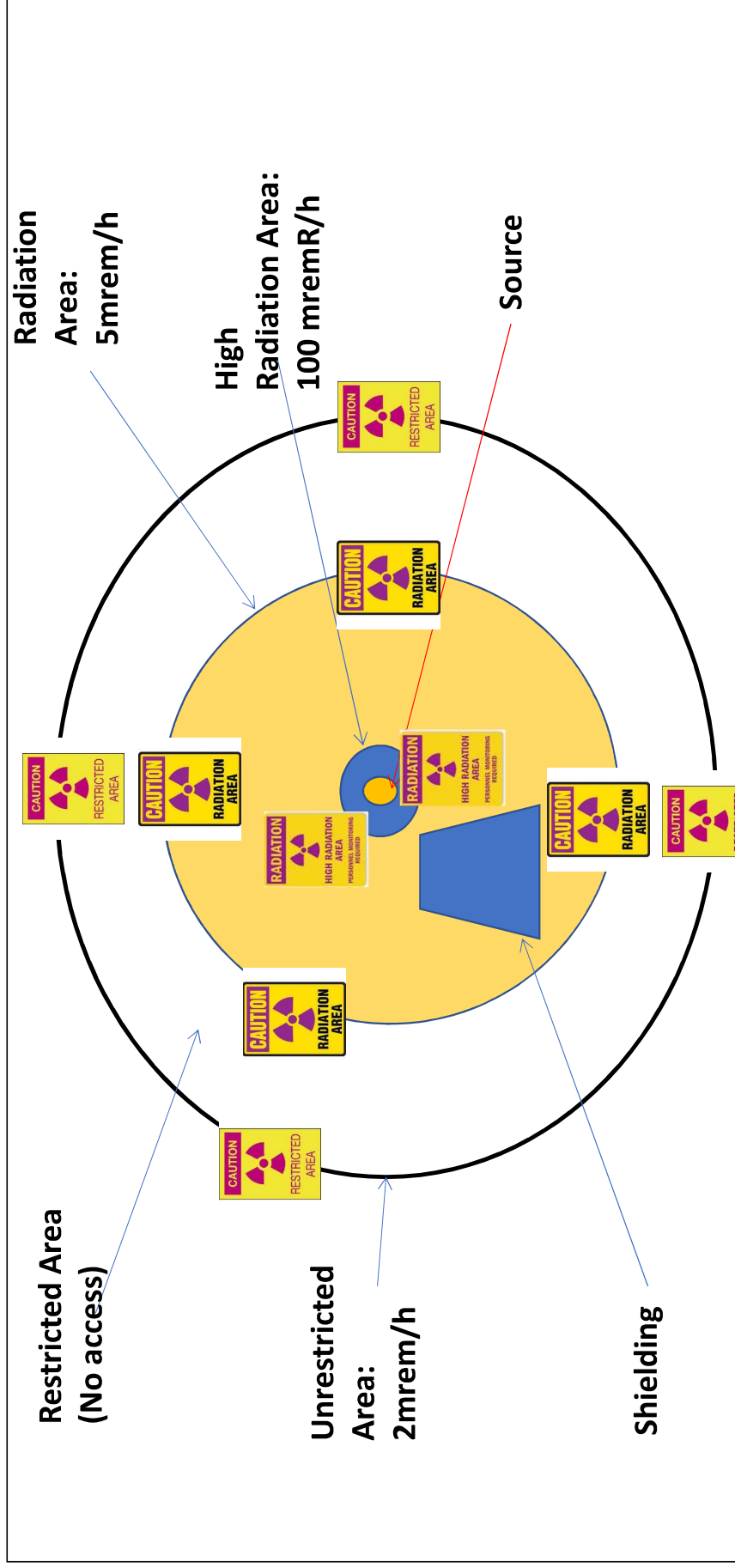
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Part 20 – Basic Radiation Safety

- High Radiation Areas
- If the dose to anyone could exceed 100 mrem in any 1 hour at a distance of 1 foot.

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Chapter 8: What Are the Basic Rules for Radiography?

$$\frac{I_1}{I_2} = \frac{D_2^2}{D_1^2}$$

Inverse Square Law Review

- 57 curies of Ir-192.
- 5 HVL collimator.
- 1 hour exposure time.
- Calculate distance from source to 2 mR/hr boundary.

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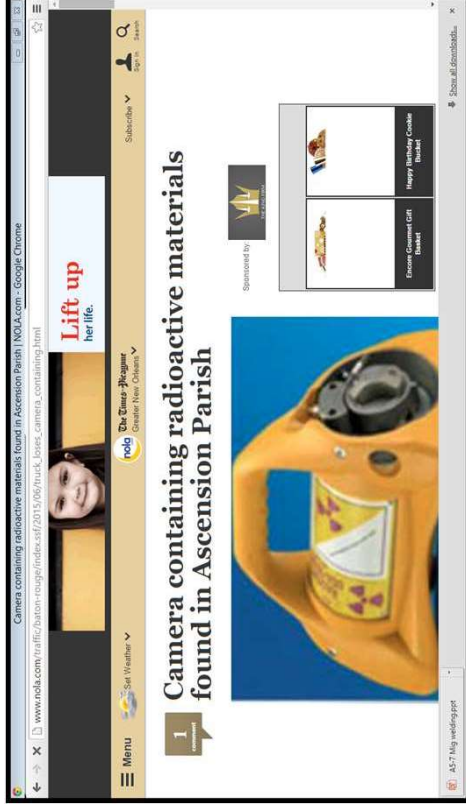
Part 20 – Receiving Radioactive Sources

- Licensee's responsibility.
- Pick up source from shipper within 3 hours if delivered during work hours.
- Or pick up within 3 hours after start of work.

Chapter 8: What Are the Basic Rules for Radiography?

Part 20 – Reporting a Lost or Stolen Source

- Sources lost or stolen must be reported immediately. The RSO will notify the US NRC and/or Agreement State regulatory agency.



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Part 20 – Reporting a Lost or Stolen Source

- Dirty bombs are a real threat.
- Death and injury.
- Economic and psychological impact.



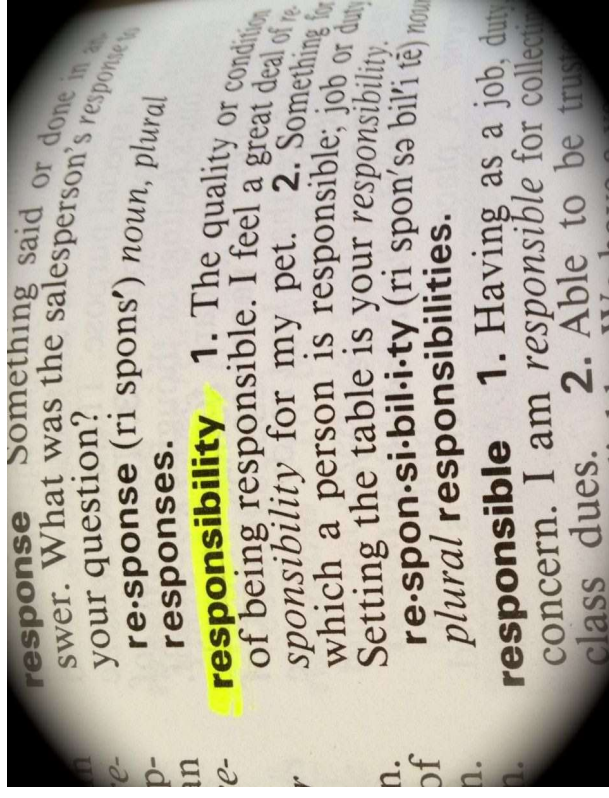
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Part 20 – Reporting Radiation Overexposures

- Overexposures reported to the US NRC and/or Agreement State.
- Within 24 hours if dose exceeds 5 rem.
- Lesser overexposures reported within 30 days.

Chapter 8: What Are the Basic Rules for Radiography?



Part 34 – Responsibilities

- Regulations in place, must be obeyed.
- Company written procedures (O&E Manual).
- Employees entrusted to follow regulations.

Chapter 8: What Are the Basic Rules for Radiography?



Part 34 – Responsibilities

- Radiation Surveys.
- Use your survey meter!
- Watch instructor perform steps (a) and (b).

Chapter 8: What Are the Basic Rules for Radiography?



Part 34 – Responsibilities

- Posting.
- Post your signs and/or barriers.
- Restricted Area, High Radiation Area, High Radiation Area.

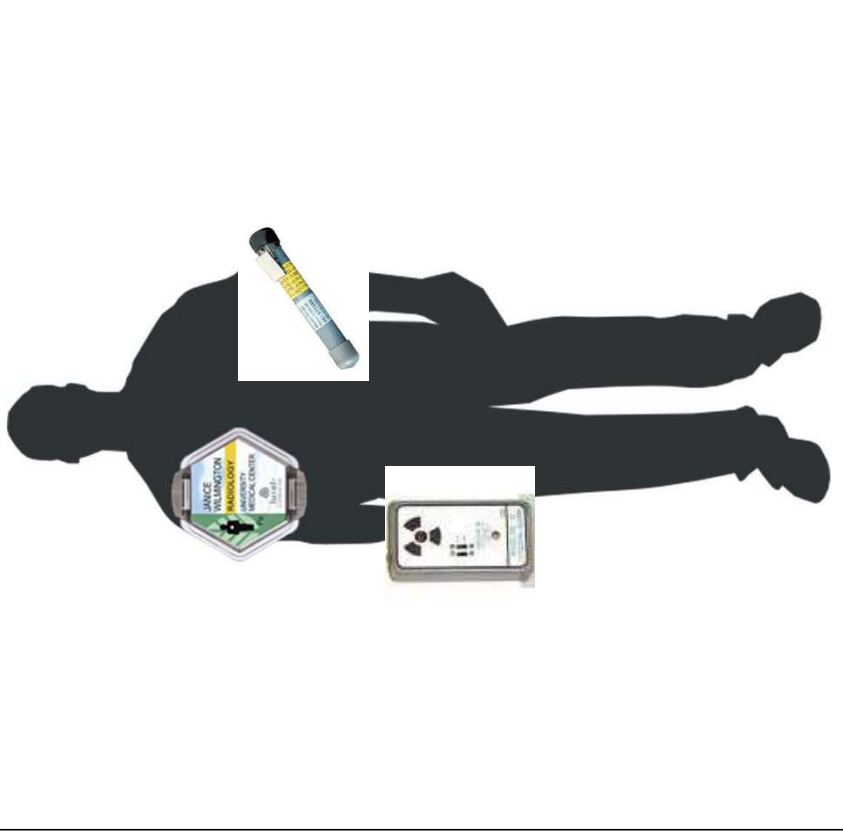
Chapter 8: What Are the Basic Rules for Radiography?



Part 34 – Responsibilities

- Surveillance.
- Direct visual surveillance of the restricted area.
- Prevent unauthorized access.

Chapter 8: What Are the Basic Rules for Radiography?



Part 34 – Responsibilities

- Personnel Monitoring.
- Wear and use your radiation detection/monitoring devices.
- Record radiation dose.

Chapter 8: What Are the Basic Rules for Radiography?



Part 34 – Responsibilities

- Locking of Radiographic Exposure Devices.
- Watch instructor lock the radiographic exposure device. Listen to reasons why this is important.

Chapter 8: What Are the Basic Rules for Radiography?



Part 34 – Responsibilities

- Storage of Sources.
- Vault
- Approved transport container.
- Sign(s) posted.

Chapter 8: What Are the Basic Rules for Radiography?



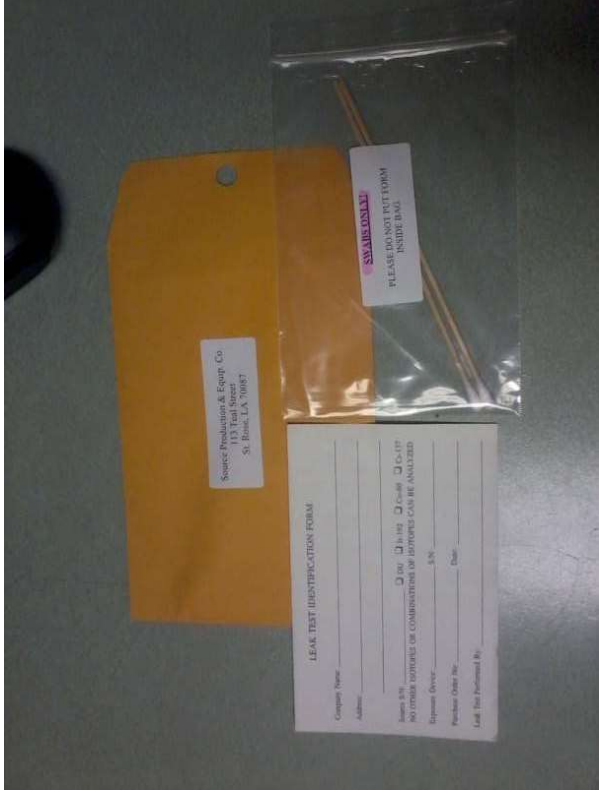
Part 34 – Responsibilities

- Radiation Survey Instruments.
- Check equipment, calibrations.
- Scale readings.

Chapter 8: What Are the Basic Rules for Radiography?

Part 34 – Responsibilities

- Leak Testing.
- Every 6 months.
- Sources not leak tested can not be used.



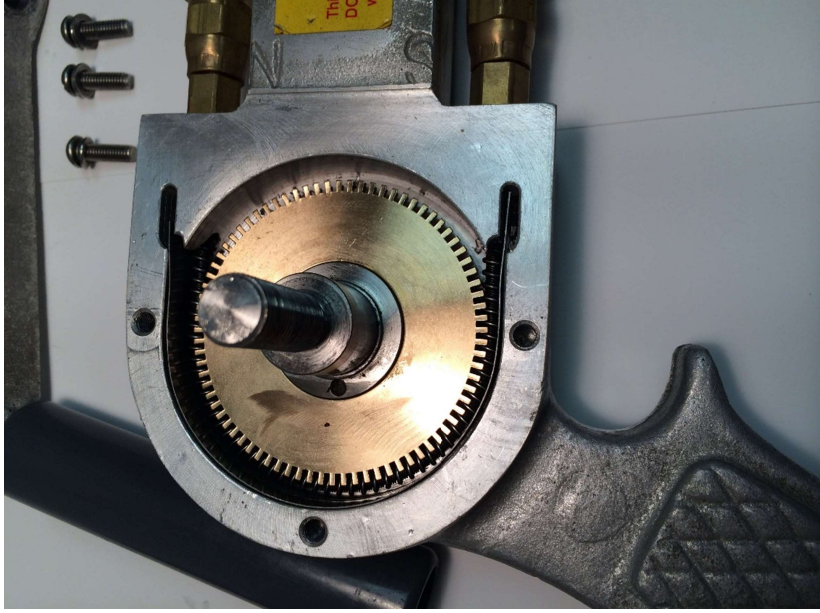
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Part 34 – Responsibilities

- Quarterly Inventory.
- Every 3 months the company must account for all the radiography sources it owns.

Chapter 8: What Are the Basic Rules for Radiography?



Part 34 – Responsibilities

- Inspection and Maintenance of Exposure Devices.
- Check equipment daily.
- Company checks equipment every 3 months. Records kept.

Chapter 8: What Are the Basic Rules for Radiography?



Part 34 – Responsibilities

- Permanent Radiographic Installations.
- Must have both visible and audible alarms.
- Gamma alarms.

Chapter 8: What Are the Basic Rules for Radiography?



Part 34 – Responsibilities

- Training:
- Trained in subjects of your training manual including case histories.
- O&E Manual and field work.

Chapter 8: What Are the Basic Rules for Radiography?



Part 34 – Responsibilities

- Supervision of Radiographer's Assistants.
- Radiographer's supervise Assistants.
- Protect you and the public.

Chapter 8: What Are the Basic Rules for Radiography?

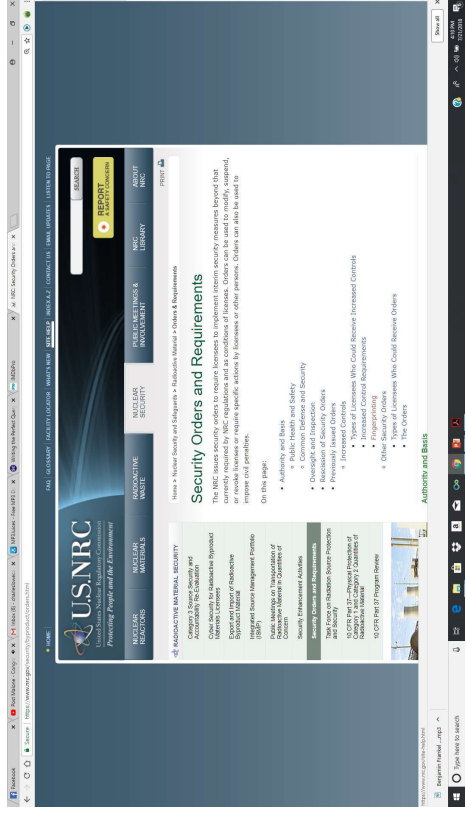


Part 34 – Responsibilities

- Certified Radiographer Cards.
- Texas Trainer status and regulations.

Chapter 8: What Are the Basic Rules for Radiography?

- **T**rustworthy and **R**eliable.
- **U**S NRC order.
- **B**ackground check.
- **U**nescorted access to **R**AM.



Chapter 8: What Are the Basic Rules for Radiography?



Making Sense of It All

- US NRC.
- Agreement States.
- Licensing.
- Reciprocity.
- Part 19.
- Part 20.
- Part 34.

Quiz 1 of 8:

The use of X-rays to perform industrial radiography is regulated by the US Nuclear Regulatory Commission.
True or False?

False. The US NRC has no jurisdiction over the use of X-rays.

Chapter 8: What Are the Basic Rules for Radiography? : Quiz 2 of 8

Quiz 2 of 8:

The Oklahoma company, Acme NDT, applied for Reciprocity recognition in the state of Kansas. Typically how many days are allotted to Acme NDT for working in the state of Kansas?

180 days.

Quiz 3 of 8:

Members of the general public are observing you perform Industrial Radiography. They are standing behind your posted Restricted Area signs. They can not exceed what amount of radiation?

2 mrem in any 1 hour.

Quiz 4 of 8:

What is the importance of surveying the camera and source guide tube after each exposure?

This survey ensures the radioactive source is in its shielded position.

Quiz 5 of 8:

Are you required to survey the “High Radiation Area” during the exposure?

No. Do not survey the “High Radiation Area” during the exposure. This action is not permitted as its not an ALARA practice and places you at risk for an overexposure.

Quiz 6 of 8:

According to the US NRC, survey meters must be calibrated every _____ months. Some Agreement States may require calibration every _____ months.

6

3

Quiz 7 of 8:

During an exposure you are required to perform constant, direct, and visual surveillance of the exposure area. Why is this important?

You must keep unauthorized personnel out of the area. The public does not have radiation safety training, detection devices, and authorization.

Chapter 8: What Are the Basic Rules for Radiography? : Quiz 8 of 8

Quiz 8 of 8:

How does a “carded” Radiographer obtain a Texas Trainer card?

You must have at least one year experience as a Radiographer. The process involves you completing an application found on Texas DSHS website.



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End of Chapter 8

What Are the Basic Rules for Radiography?