charles lowe

Chapter 1

Why Is Safety Training Important?

Preface

- Working with ionizing radiation.
- Gamma rays. (Iridium-192)
- X-rays. (X-ray machines)

What is Industrial Radiography?

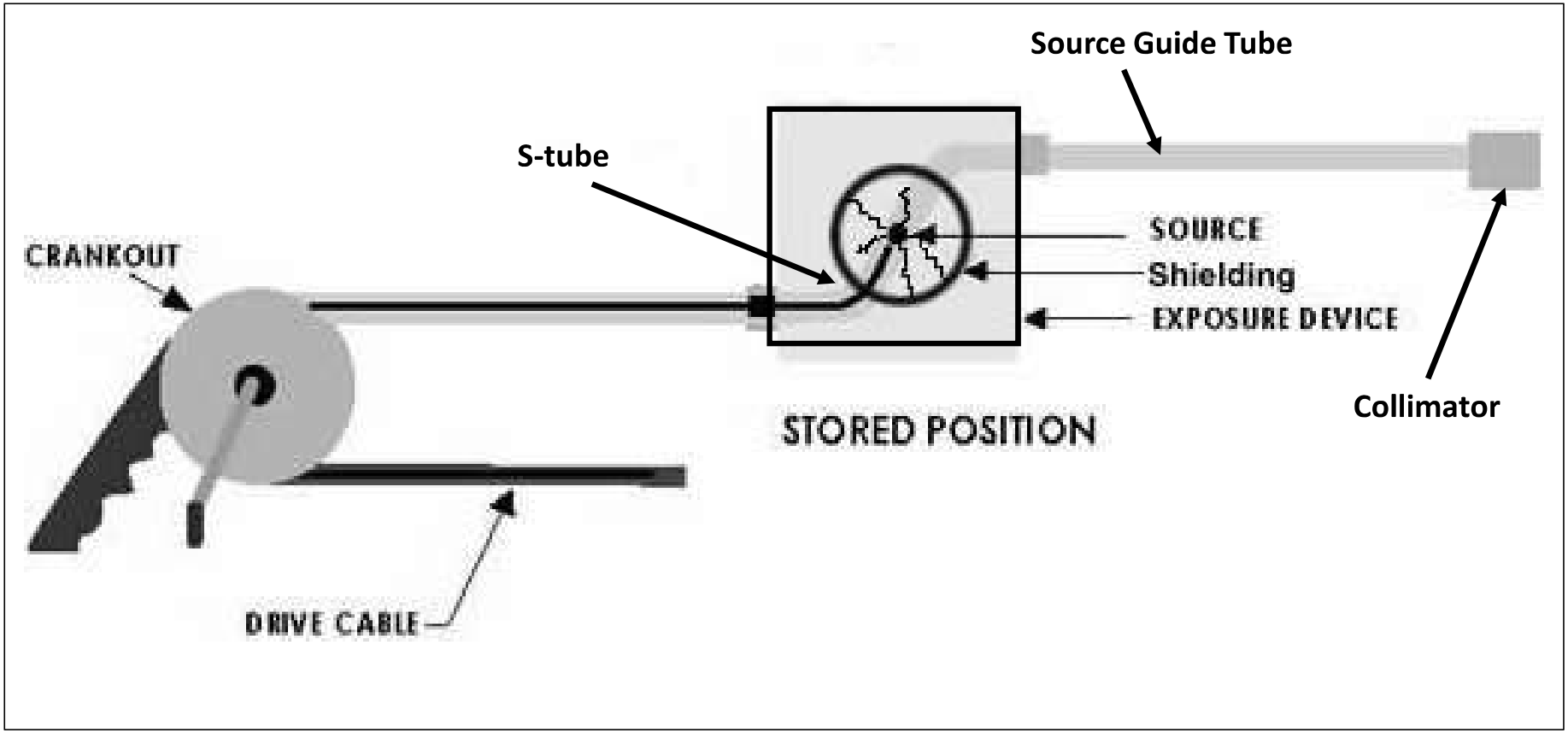
- Allows us ability to “see” inside welds or parts.
- Similar to medical radiography.
- Find discontinuities in objects.

What is Industrial Radiography?

- See the darker areas?
- See the lighter areas?
- Why the darker areas?
- Why the lighter areas?

Chapter 1: Why is Safety Training Important?

R.A.M. emits GAMMA RAYS


Source Guide Tube
S-tube
CRANKOUT
SOURCE
Shielding
EXPOSURE DEVICE
Collimator
STORED POSITION
DRIVE CABLE

Additional Notes:

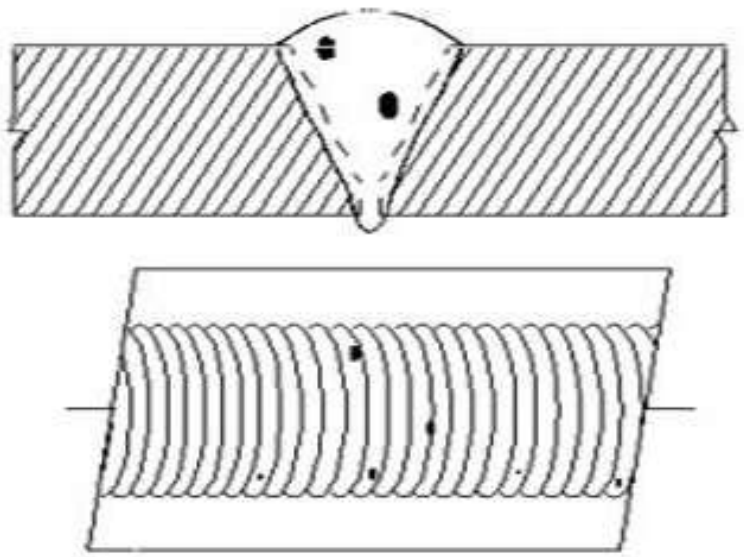
- Exposure Device is also known as a “camera”.
- Crankouts vary in length (25 ft +)
- The camera is composed of Depleted Uranium.
- Source Guide Tube varies in length.
- Collimators are typically composed of tungsten.
- S-tube prevents high radiation intensity from exiting the front and back of the device.
- Common RAM used: Iridium-192.

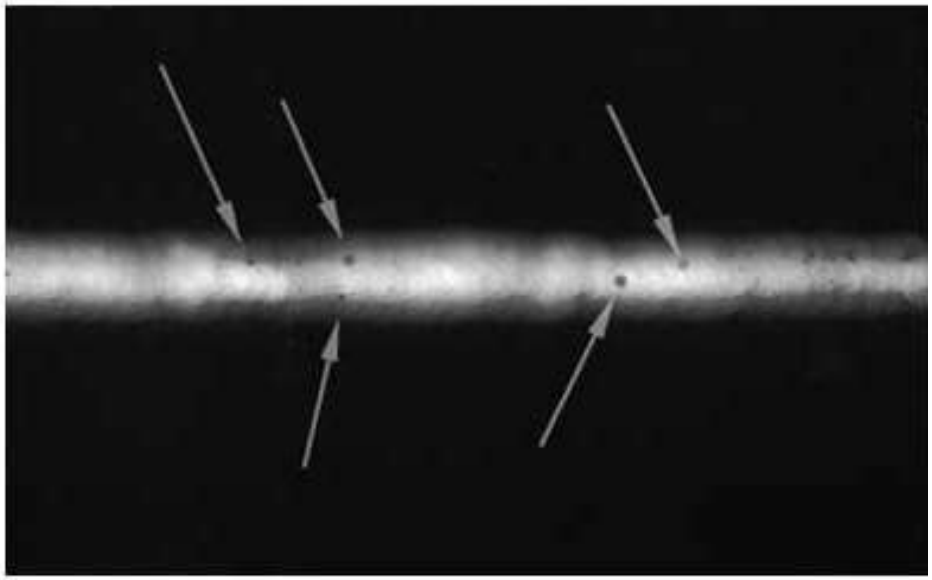
X-Ray machines emit X-rays.

Additional Notes:

- X-ray pipeline crawlers are used for inspecting many welds on a pipeline.
- Radiation intensity can be adjusted.
- More heat is generated than x-rays.
- JME crawlers, XIT crawlers, Company furnished.
- No RAM involved.

Chapter 1: Why is Safety Training Important?





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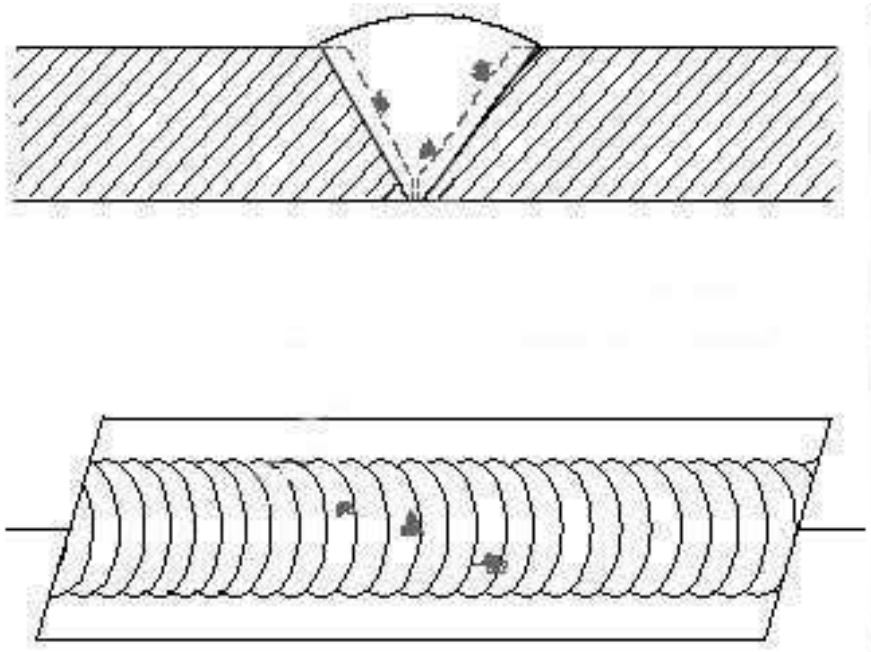

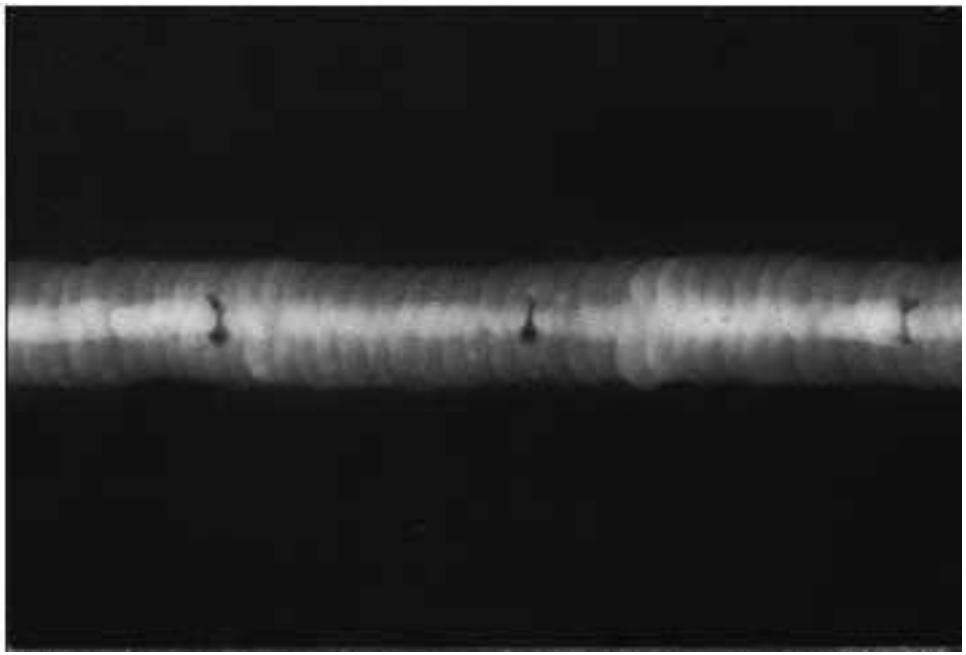

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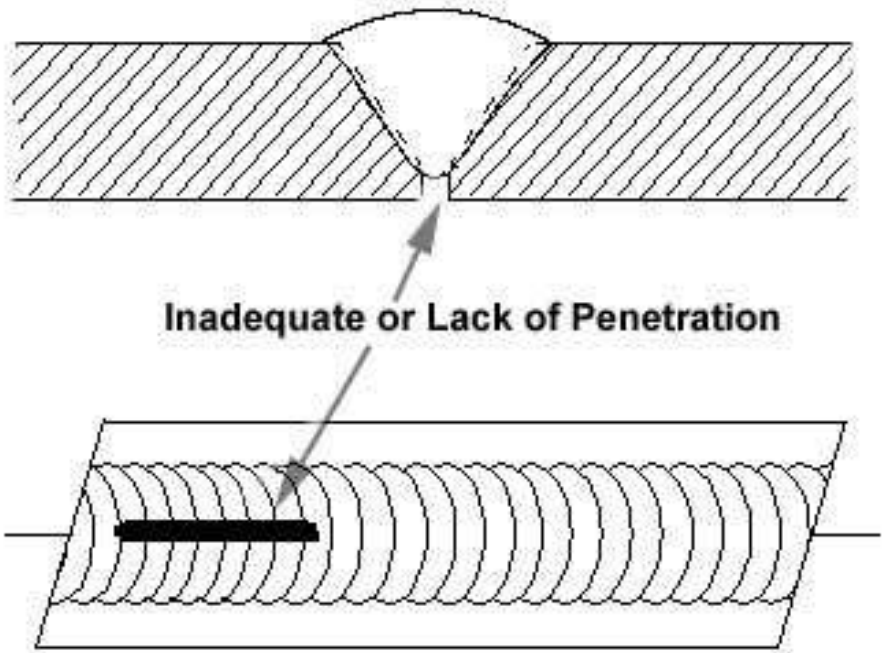

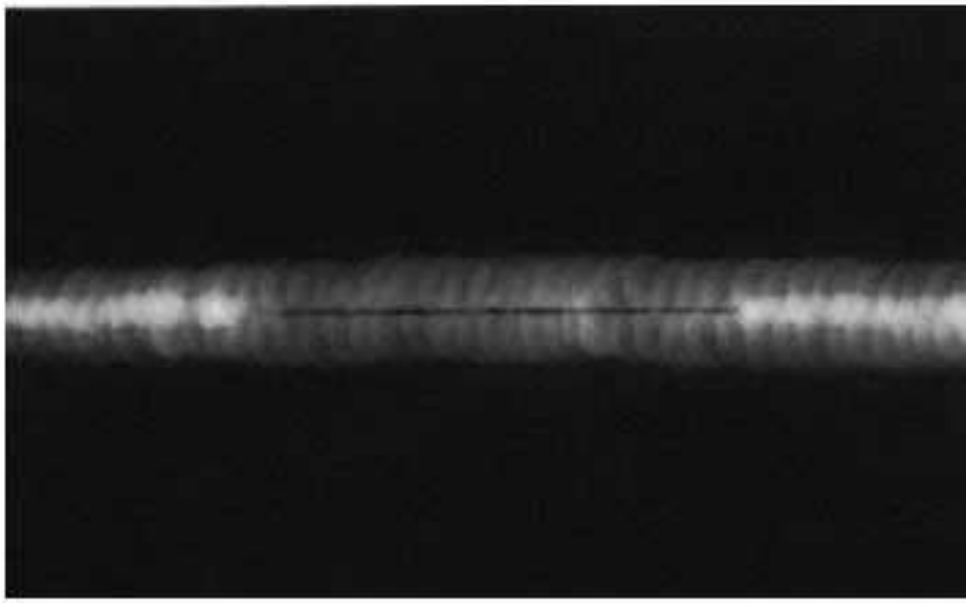

Chapter 1: Why is Safety Training Important?

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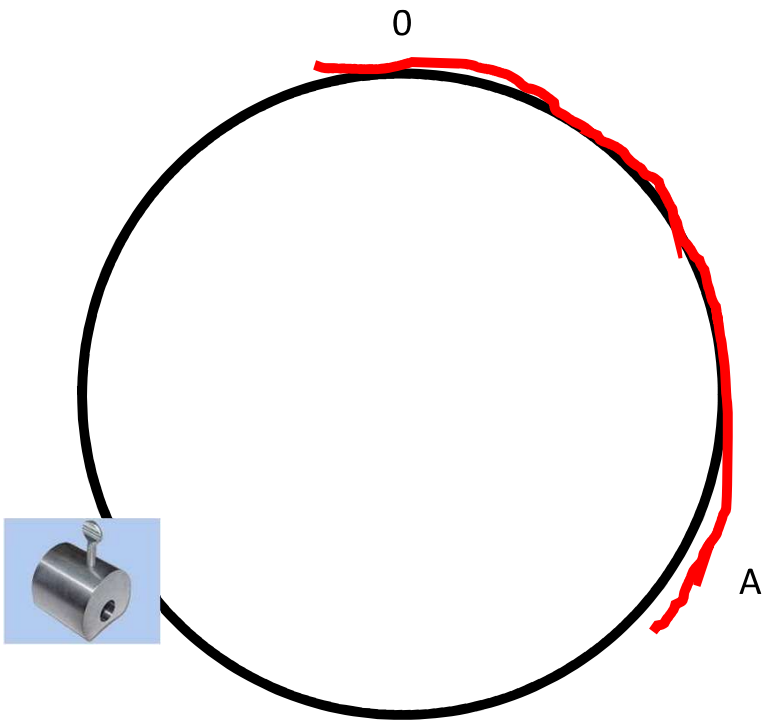

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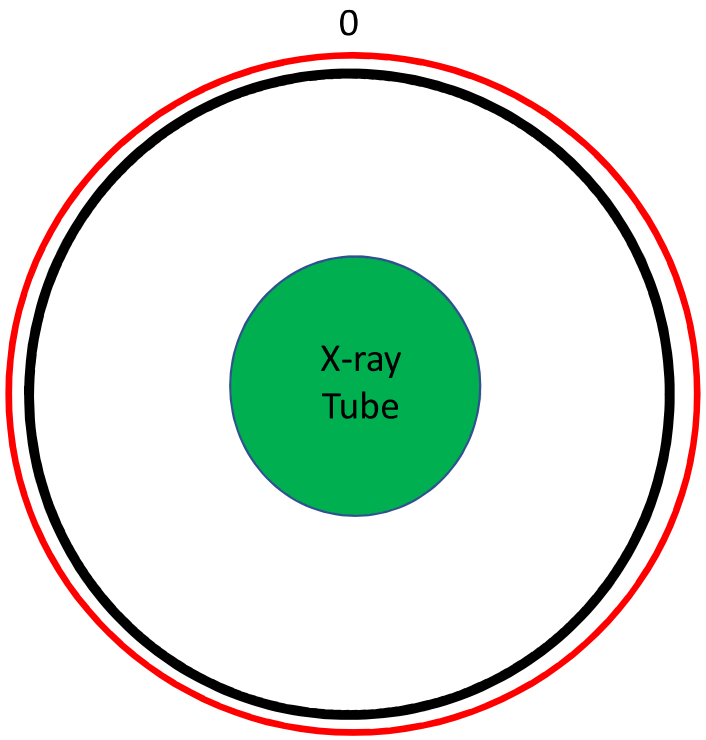

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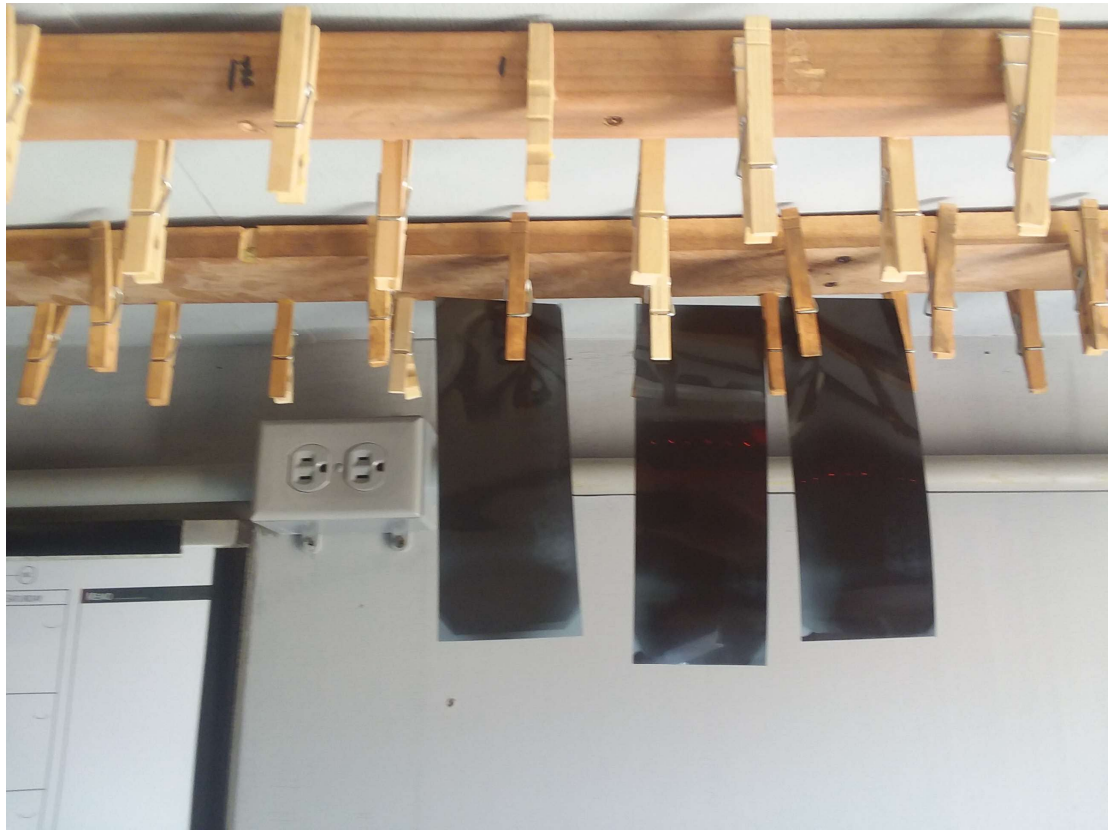

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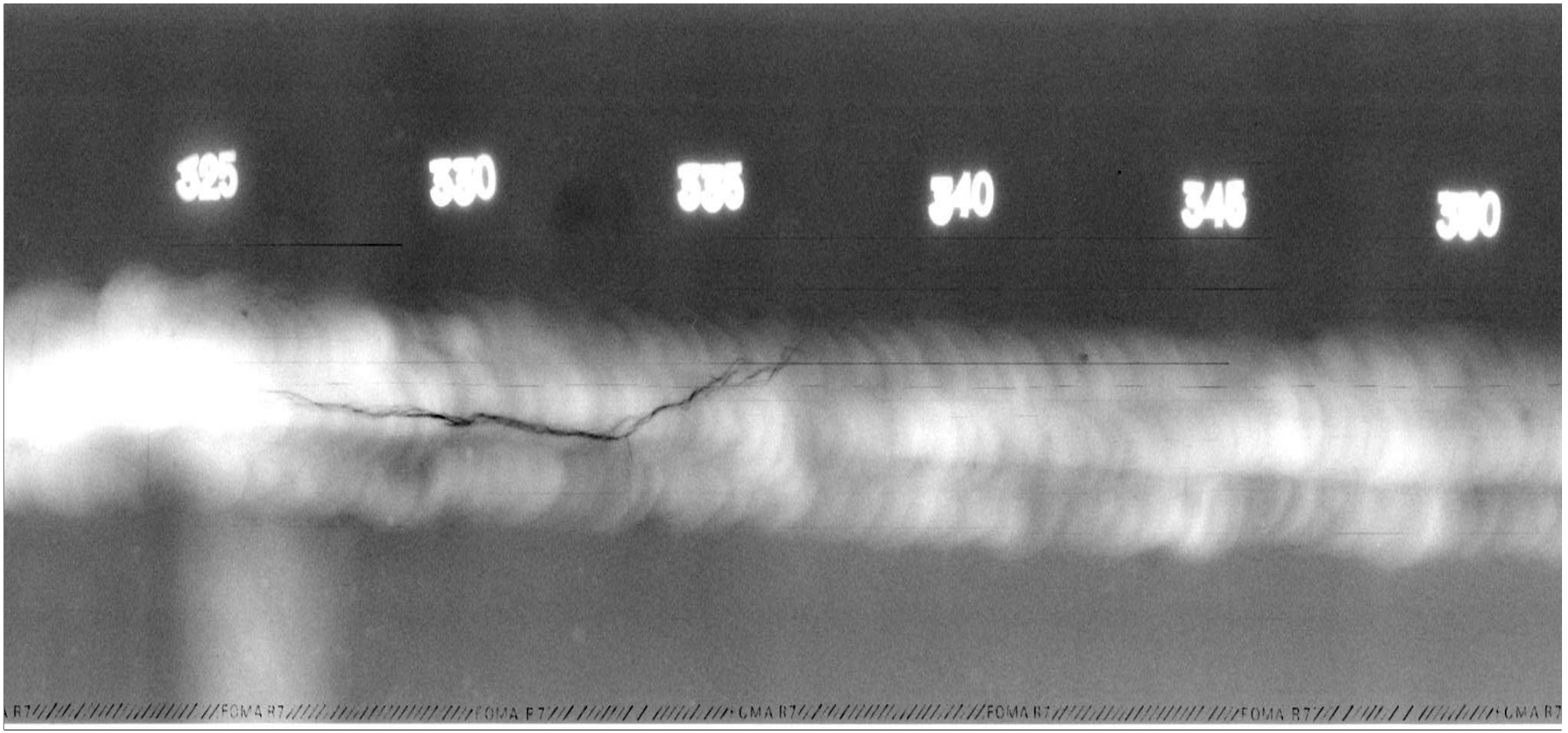
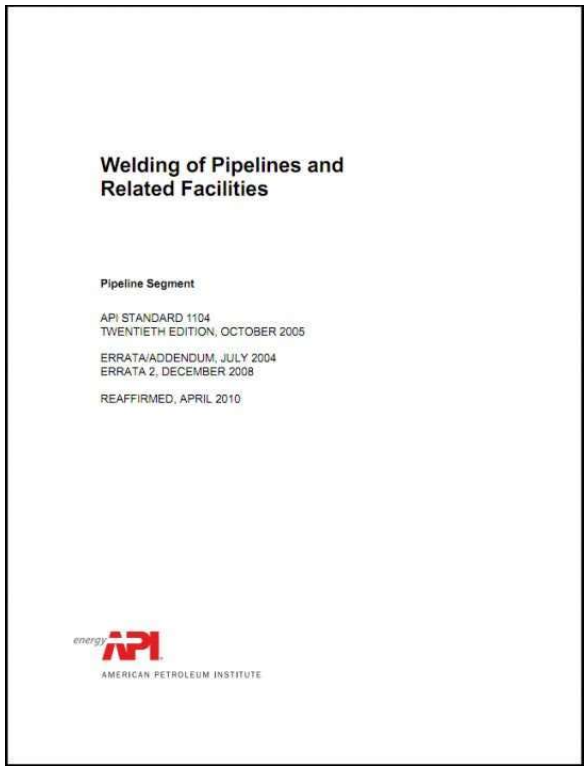


API 1104

20th Ed.



Welding of Pipelines and Related Facilities

Pipeline Segment

API STANDARD 1104
TWENTIETH EDITION, OCTOBER 2005

ERRATA/ADDENDUM, JULY 2004
ERRATA 2, DECEMBER 2008

REAFFIRMED, APRIL 2010

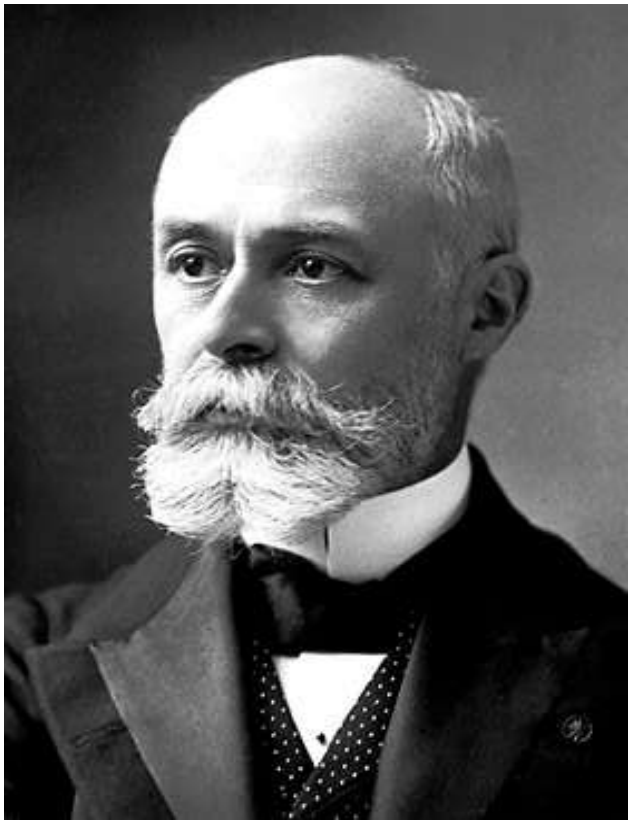
energy API
AMERICAN PETROLEUM INSTITUTE

What is Industrial Radiography?

- Pipeline construction.
- Aerospace.
- Locomotive.
- Facilities construction.
- Fabricated welds.
- Castings.
- Tanks and vessels.

The Beginning of Radiography

- Wilhelm Roentgen (1895).
- Discovered X-rays.
- Enhanced medical industry.

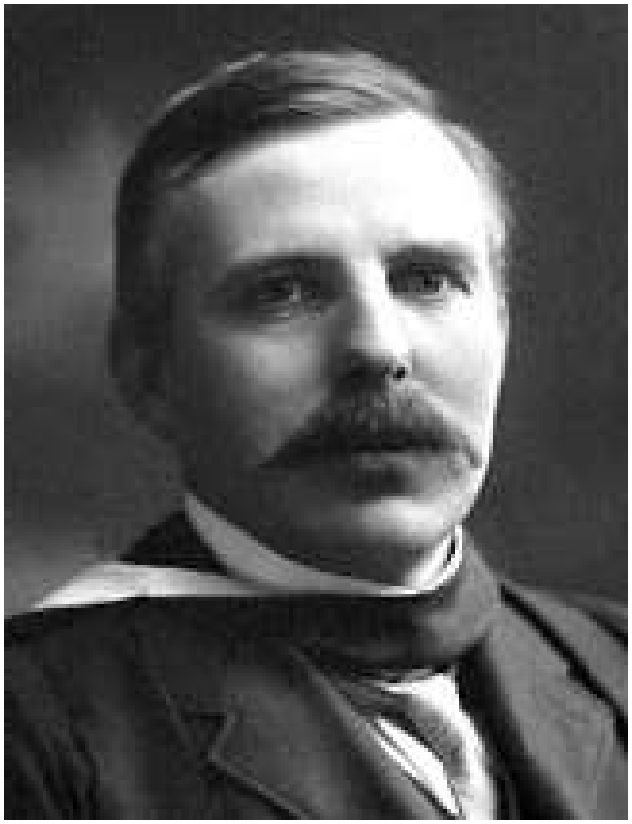


The Beginning of Radiography

- Henri Becquerel (1896).
- Discovered natural radiation. Emits gamma rays.
- Radiographs not comparable.

The Beginning of Radiography

- Marie Curie (1896).
- Discovered more intense natural radiation.
- Radium. Emits gamma rays.



The Beginning of Radiography

- Ernest Rutherford (1896).
- Discovered alpha, beta, and gamma rays.
- Spontaneous disintegration of atoms

The Beginning of Radiography

- Started in 1929.
- US Naval Research Laboratory.
- “Fishpoling” banned.

Basics of Radiation

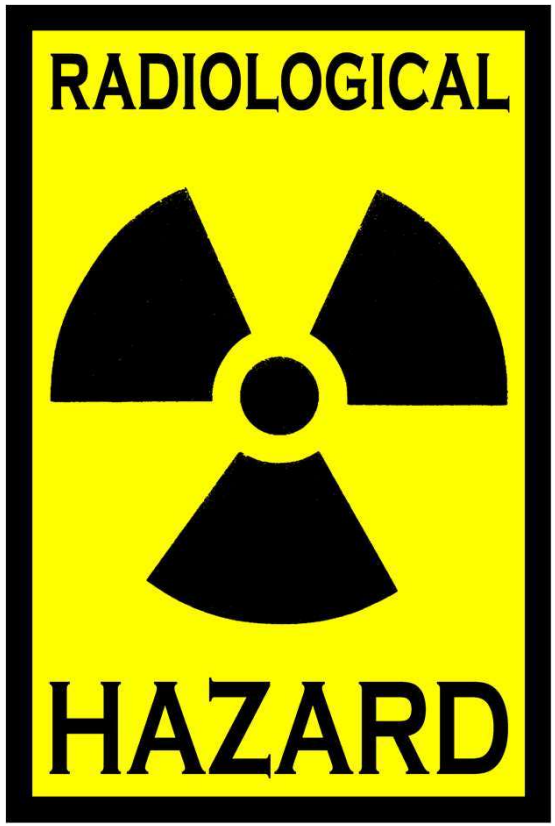
- Ionizes thru objects.
- Beam travels in straight lines.
- Beam travels at speed of light.
- Harmful, yet useful.
- Dissipates.

What is wrong in this picture?

- Let's discuss!

Radiation Hazards

- Emit intense, penetrating radiation.
- Touching a source can cause harm.
- Pressure to complete job.

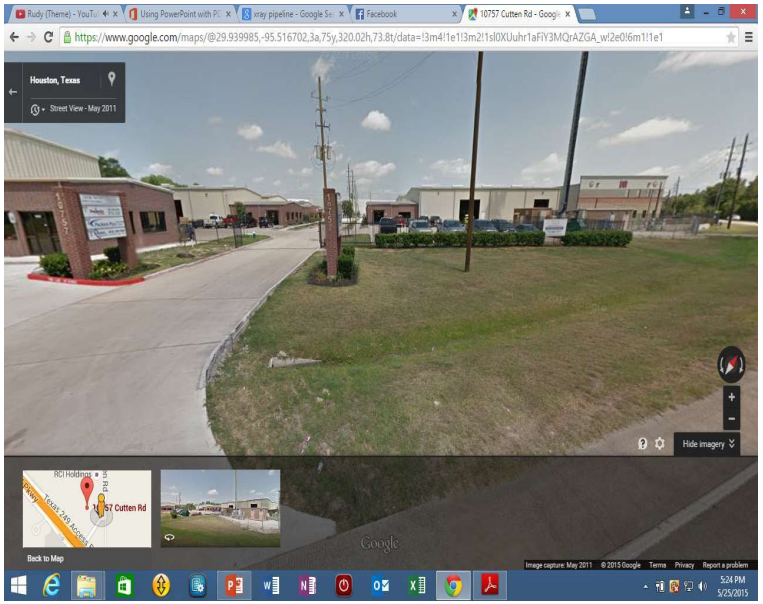


Radiation Hazards

- Ionizing Radiation is hazardous because humans can NOT use their human senses to detect this kind of energy.

Causes of Radiography Accidents

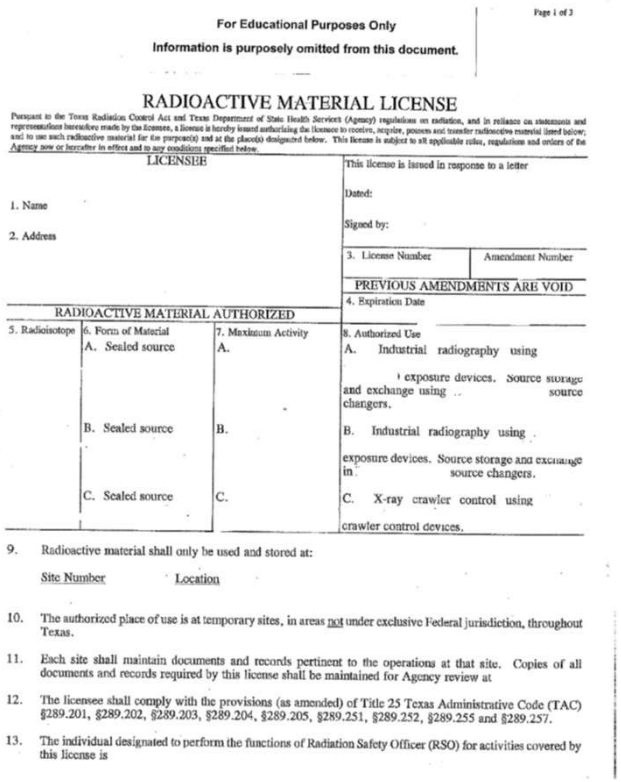
- Source left out.
- Omitted or improper survey.
- Source not locked.



Radiography Facilities

- Regulations.
- Operating and Emergency Procedures (O&E).
- Radiation Safety Officer (RSO).
- Licensing.

Chapter 1: Why is Safety Training Important?



For Educational Purposes Only

Information is purposely omitted from this document.

Page 1 of 3

RADIOACTIVE MATERIAL LICENSE

Pursuant to the Texas Radiation Control Act and Texas Department of State Health Services (Agency) regulations on radiation, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations and orders of the Agency now or hereafter in effect and to any conditions specified below.

LICENSEE

1. Name

2. Address

This license is issued in response to a letter

Dated:

Signed by:

3. License Number	Amendment Number

PREVIOUS AMENDMENTS ARE VOID

4. Expiration Date

RADIOACTIVE MATERIAL AUTHORIZED

5. Radioisotope	6. Form of Material	7. Maximum Activity	8. Authorized Use
	A. Sealed source	A.	A. Industrial radiography using exposure devices. Source storage and exchange using source changers.
	B. Sealed source	B.	B. Industrial radiography using exposure devices. Source storage and exchange in source changers.
	C. Sealed source	C.	C. X-ray crawler control using crawler control devices.

9. Radioactive material shall only be used and stored at:

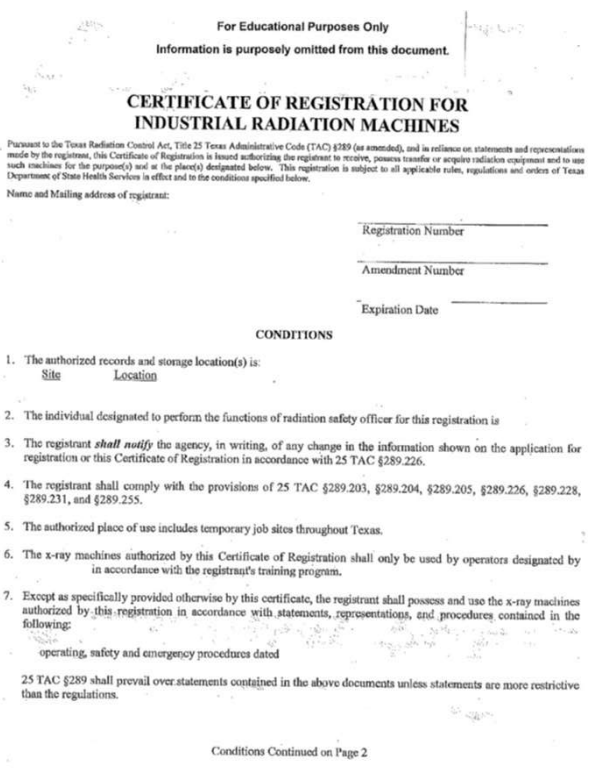
Site Number Location

10. The authorized place of use is at temporary sites, in areas not under exclusive Federal jurisdiction, throughout Texas.

11. Each site shall maintain documents and records pertinent to the operations at that site. Copies of all documents and records required by this license shall be maintained for Agency review at

12. The licensee shall comply with the provisions (as amended) of Title 25 Texas Administrative Code (TAC) §289.201, §289.202, §289.203, §289.204, §289.205, §289.251, §289.252, §289.255 and §289.257.

13. The individual designated to perform the functions of Radiation Safety Officer (RSO) for activities covered by this license is



For Educational Purposes Only

Information is purposely omitted from this document.

CERTIFICATE OF REGISTRATION FOR INDUSTRIAL RADIATION MACHINES

Pursuant to the Texas Radiation Control Act, Title 25 Texas Administrative Code (TAC) §289 (as amended), and in reliance on statements and representations made by the registrant, this Certificate of Registration is issued authorizing the registrant to receive, possess transfer or acquire radiation equipment and to use such machines for the purpose(s) and at the place(s) designated below. This registration is subject to all applicable rules, regulations and orders of Texas Department of State Health Services in effect and to the conditions specified below.

Name and Mailing address of registrant:

Registration Number

Amendment Number

Expiration Date

CONDITIONS

1. The authorized records and storage location(s) is:
   Site Location
2. The individual designated to perform the functions of radiation safety officer for this registration is
3. The registrant ***shall notify*** the agency, in writing, of any change in the information shown on the application for registration or this Certificate of Registration in accordance with 25 TAC §289.226.
4. The registrant shall comply with the provisions of 25 TAC §289.203, §289.204, §289.205, §289.226, §289.228, §289.231, and §289.255.
5. The authorized place of use includes temporary job sites throughout Texas.
6. The x-ray machines authorized by this Certificate of Registration shall only be used by operators designated by in accordance with the registrant's training program.
7. Except as specifically provided otherwise by this certificate, the registrant shall possess and use the x-ray machines authorized by this registration in accordance with statements, representations, and procedures contained in the following:

   operating, safety and emergency procedures dated

   25 TAC §289 shall prevail over statements contained in the above documents unless statements are more restrictive than the regulations.

Conditions Continued on Page 2

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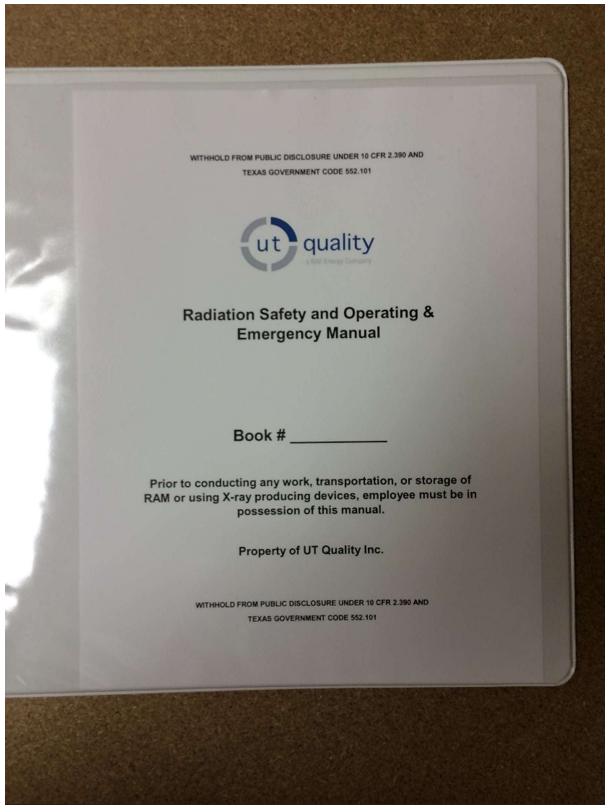
Radiation Safety Officer (RSO)

- Oversees radiation safety programming.
- Meets requirements.
- Many responsibilities.



Written Procedures

- Operating and Emergency Manual.
- What is written and approved must be followed.
- i.e. How often are survey meters calibrated? How?

Radiological Emergencies

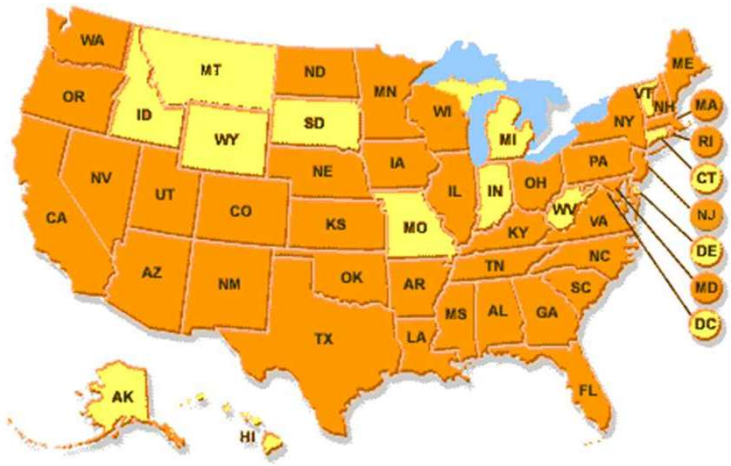
- Pocket dosimeter goes off-scale.
- Source “disconnect”.
- Overexposure.
- Crimped guide tube, can’t retract source.
- Vehicle wreck carrying RAM.

§289.255(v)(1)

Specific Subsection	Name of Record	Time Interval Required for Record Keeping
(t)(5)(F) and (u)(8)(F)	Annual Refresher Training	3 years
(t)(6) and (u)(9)	Radiation Surveys	3 years or until disposal is authorized by the agency if a survey was used to determine an individual's exposure
(t)(7)(C)	Annual Evaluation of Radiation Machines in Shielded Rooms	3 years
(t)(8)(A)(i)	Operating Instructions In Cabinet X-Ray Systems	3 years
(t)(8)(A)(ii)	Tests of X-Ray Interlocks	3 years
(t)(8)(A)(iii)	Evaluation of Certified Cabinet X-Ray Systems	3 years
(u)(6)	Leak Tests	3 years
(u)(10)(D)	Annual Evaluation of Shielded Rooms Containing Sealed Sources	3 years
(u)(10)(E)	Test of Sealed Source Interlocks	3 years
(v)(3)	Records at Temporary Job Sites	During temporary job site operations

Internal Inspections

- Updates on regulations.
- Protect you and the general public.
- i.e. 180 day audits, compliance audits.
- ALARA.
- Annual refresher.



Personnel Certification for Radiation Safety

- Agreement States.
- Non-Agreement States (NRC states).
- NRC has no jurisdiction over X-ray radiography.

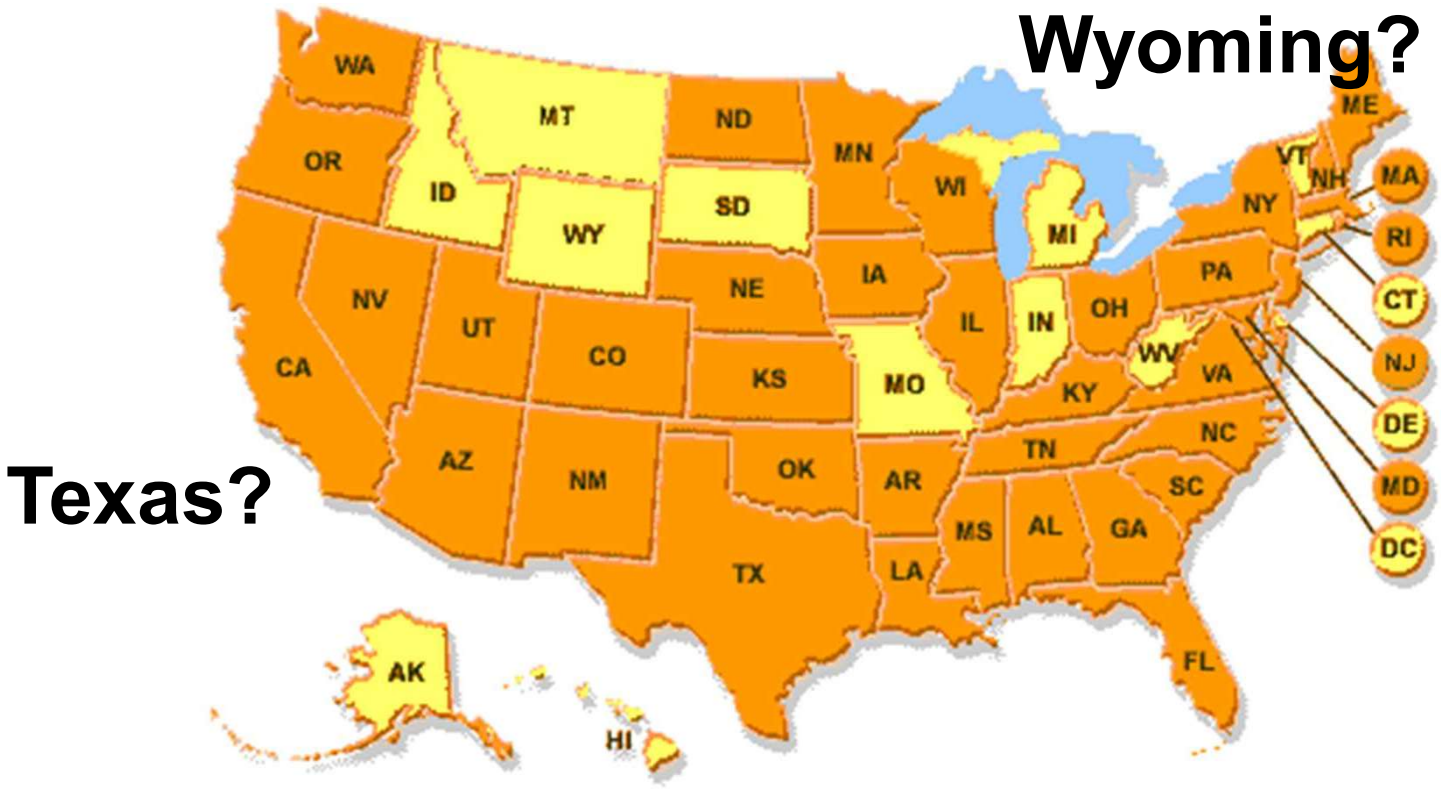
Since Agreement States agree to a standard set forth by the US NRC, all states have similar regulations pertaining to RAM. States can exceed the standard.

OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY

Department of
State Health Services

Department
of Health

Agreement
States


Wyoming?
Texas?
WA
OR
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PA
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VT
NH
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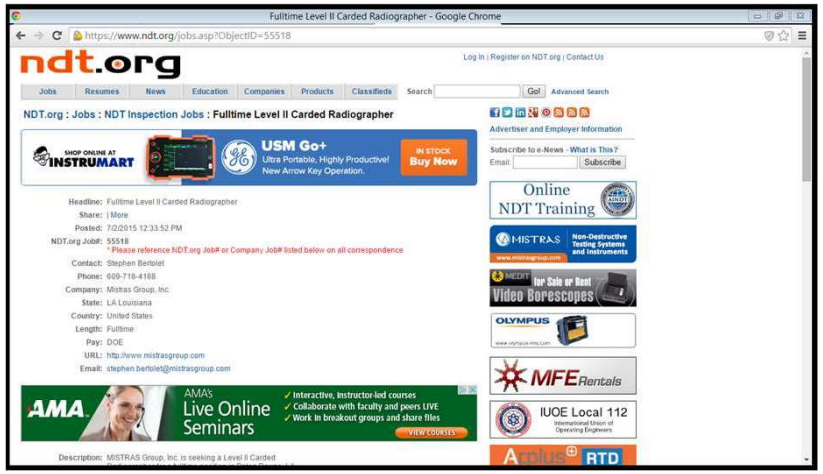
Regulations?

- Title 10 CFR Parts
- 19
- 20
- 34
- 72
- Other applicable parts

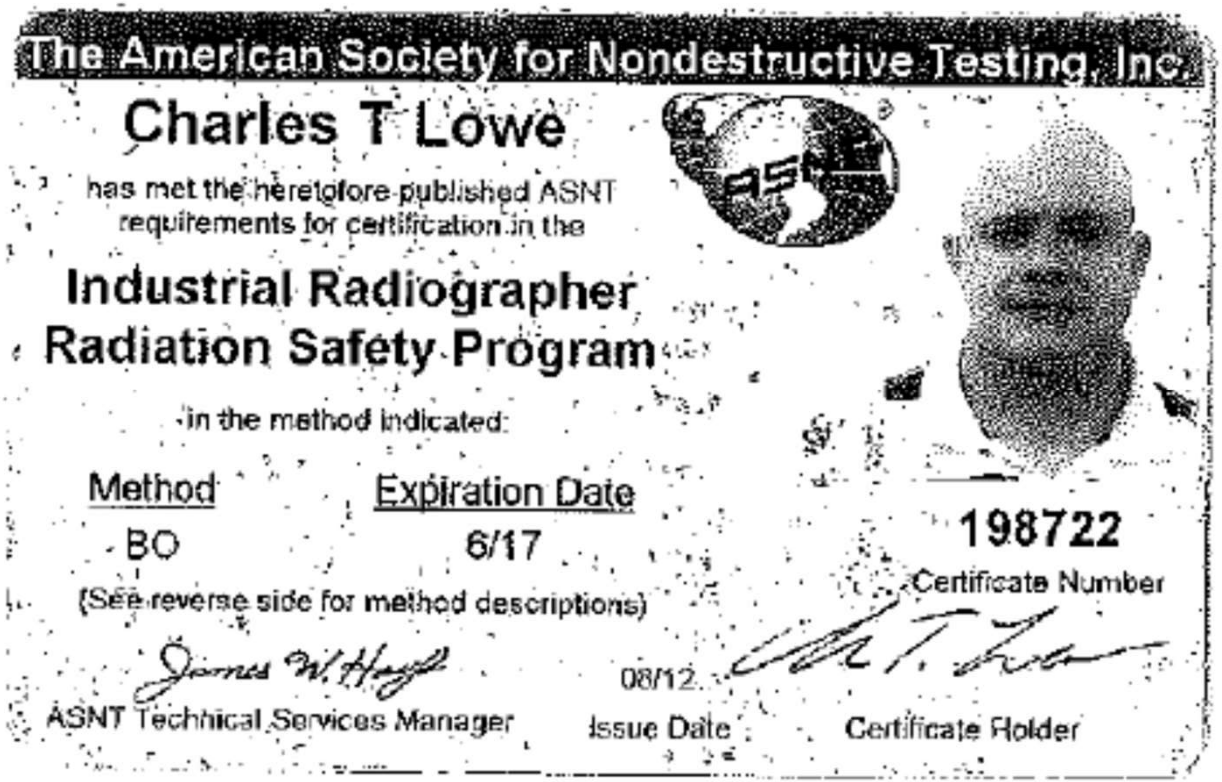


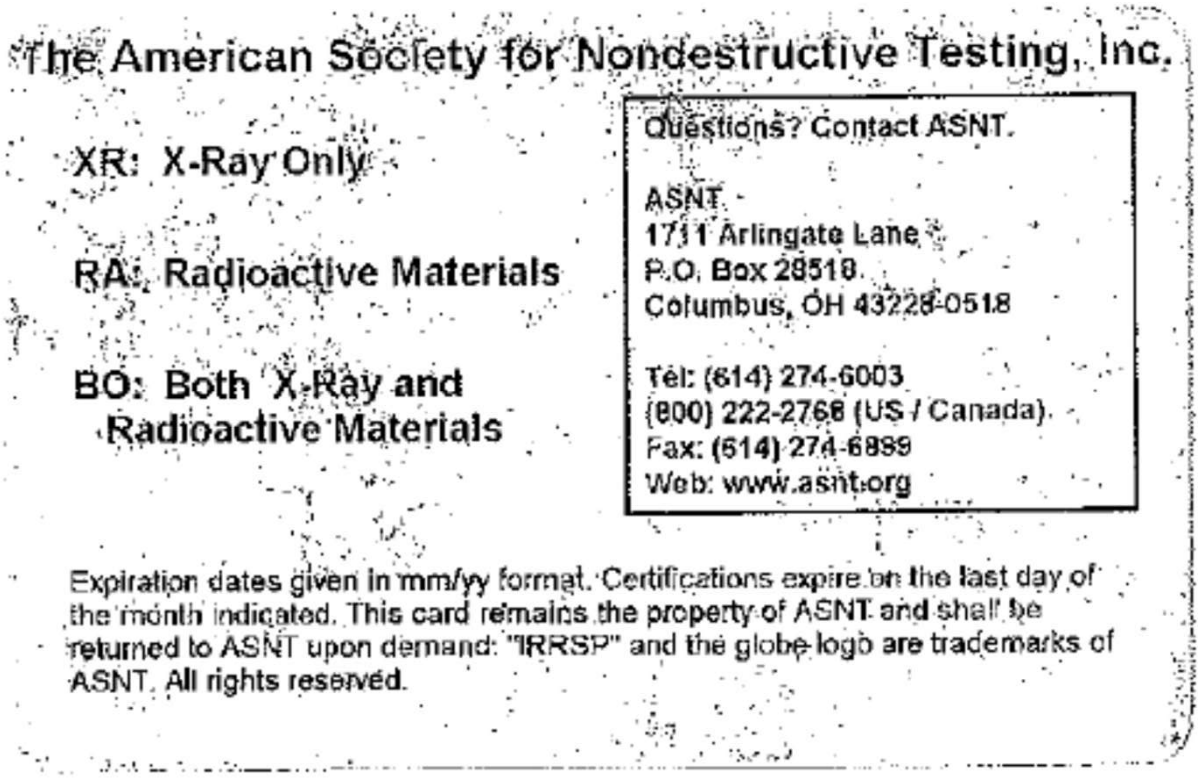
Safety Personnel Certification

- In 1997, the NRC required all industrial radiographers be certified (Certified Radiographers).
- “Carded” Radiographers.

Chapter 1: Why is Safety Training Important?

Chapter 1: Why is Safety Training Important?





The American Society for Nondestructive Testing, Inc.

XR: X-Ray Only

RA: Radioactive Materials

BO: Both X-Ray and Radioactive Materials

Questions? Contact ASNT.

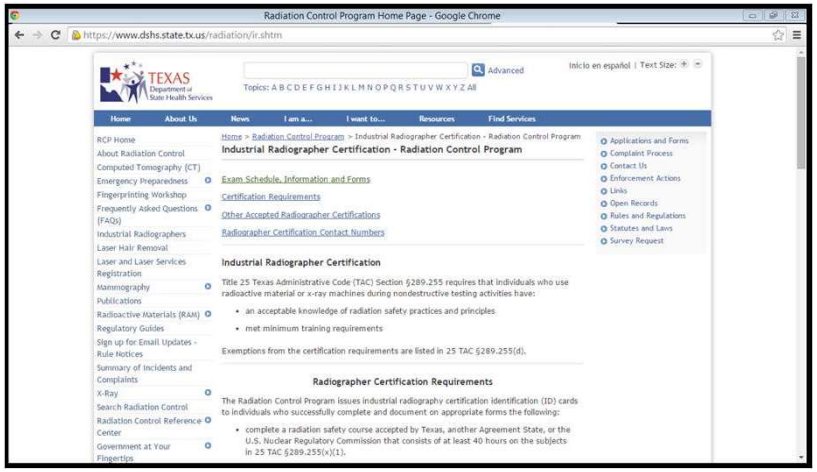
ASNT
1711 Arlingate Lane
P.O. Box 28518
Columbus, OH 43228-0518

Tel: (614) 274-6003
(800) 222-2768 (US / Canada)
Fax: (614) 274-6899
Web: www.asnt.org

Expiration dates given in mm/yy format. Certifications expire on the last day of the month indicated. This card remains the property of ASNT and shall be returned to ASNT upon demand. "IRRSP" and the globe logo are trademarks of ASNT. All rights reserved.

Steps to obtain Certified Radiographer Card

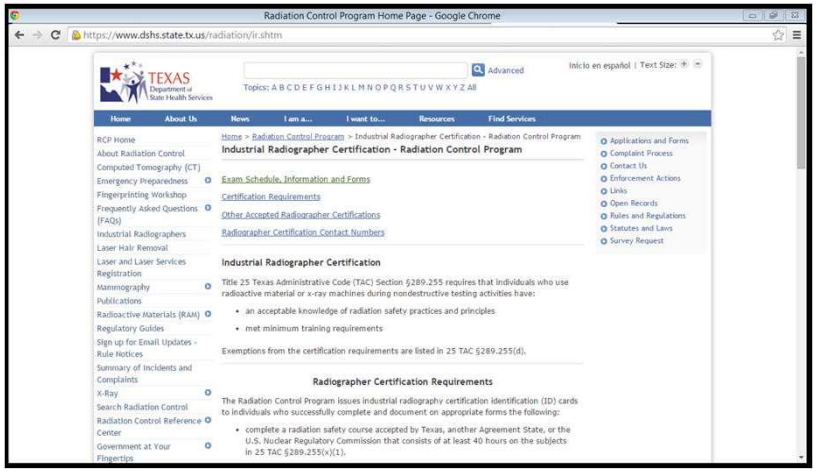
- Attend 40 Hour Radiation Safety Training.
- Register and take a Certified Radiographer exam (RAM, X-ray, or both).
- OJT training hours.



Steps to obtain Certified Radiographer Card

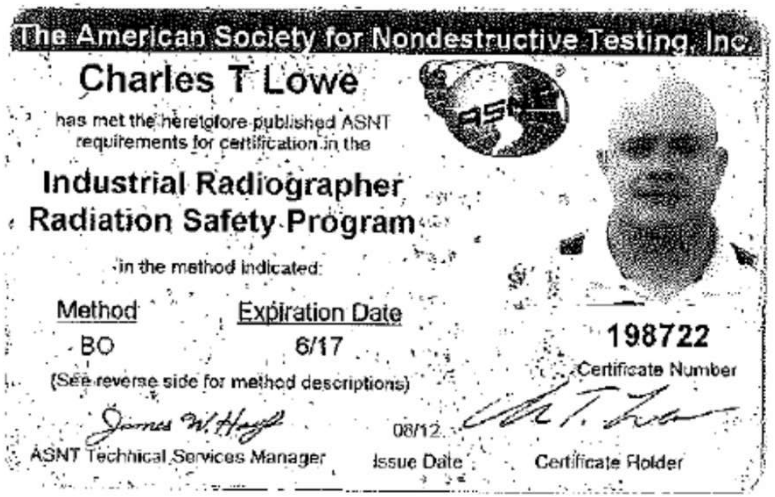
- OJT Training Hours:
- RAM - 200 hours.
- X-ray – 120 hours.

- Note: ASNT IRRSP requires more OJT training hours + practical exam.



Steps to obtain Certified Radiographer Card

- Texas, Oklahoma, Louisiana, ASNT IRRSP, etc.
- 125 Questions.
- 3 hours to complete.
- 70% or higher to pass.
- 5 years.



Two-person rule

- 2 qualified people present during exposure.
- One of the two qualified people must have a Certified Radiographer card and endorsed for energy used.

Level 2

RAM card

Compliant?

Assistant

No card

Level 2

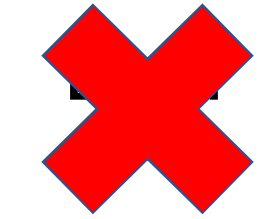
BOTH card

Compliant?

Assistant

No card

Level 2



Compliant?

Assistant

No card

Level 2

RAM card

Texas Trainer Card

Working in Texas

Compliant?

Assistant

No card

SNT-TC-1A

VERSUS

Radiation Safety

Radiographer Certification

- Technical Certification(s)
- Safety Certification(s)

Safety Certifications

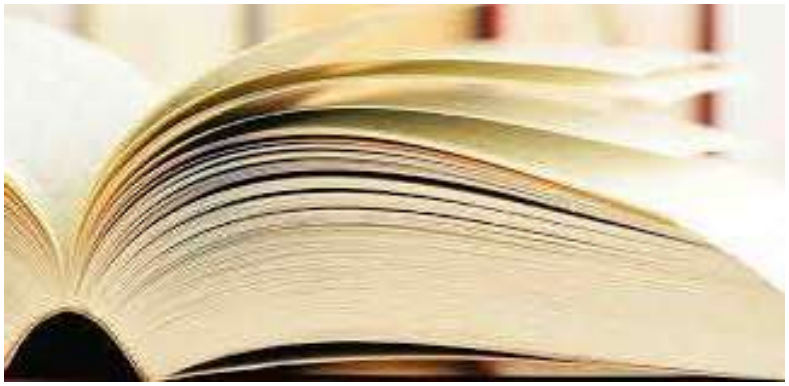
- 40 Hour Radiation Safety
- Certified Radiographer Card
- ARSO
- RSO
- Emergency Source Retrieval

Technical Certifications

- RT 1, 2, 3
- MT 1, 2, 3
- PT 1, 2, 3
- UT 1, 2, 3
- More inspection methods.

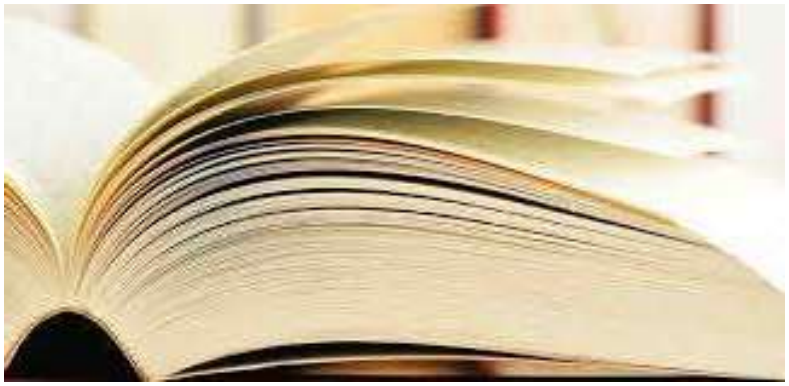
Qualification vs. Certification

- Qualification – Classroom and Exam(s).
- Certification – Company and Exam(s).



Making Sense of It All

- What is Industrial Radiography?
- Credits to its founders.
- RAM and X-ray very useful yet very dangerous.
- Regulations in place.



Making Sense of It All

- Licensees possessing RAM and X-ray producing machines.
- Required training.

Quiz 1 of 8:

Performing industrial radiography on a weld, what can be discovered about the weld?

We can “see” inside the weld and find out if the weld contains discontinuities.

Quiz 2 of 8:

Who discovered X-rays and which industry benefitted from the discovery at the time?

Wilhelm Roentgen. Medical.

Quiz 3 of 8:

Causes of radiography accidents are failure to survey or properly survey to ensure the radioactive source is retracted back to its shielded container. Can you use your eyesight to see that the radiation is properly shielded?

No. You can not see radiation using your eyesight. No human sense can detect.

Quiz 4 of 8:

Pertaining to RAM, Texas has similar regulations to that of Oklahoma. Name an item whereby Texas exceeded the US NRC standard?

Texas requires a Radiographer with TX Trainer endorsement to work with a Radiographer Trainee.

Quiz 5 of 8:
Discussing certified radiographer cards, you are working on a 2-person crew. You are a Trainee with a Trainee Status Card working with Ir-192. Your supervising Radiographer has a Certified Radiographer Card. Your supervising Radiographer's card should be endorsed for what?

A state card endorsed for gamma or both gamma and xray.

Quiz 6 of 8:

Your supervising Radiographer tells you to “shoot” welds up ahead while he goes for lunch. You are alone “shooting” welds using Ir-192. What is wrong with this?

At least 2 qualified persons must be present during all exposures.

Quiz 7 of 8:

You sign-up and take a Certified Radiographer exam through the state of Texas. You passed the exam with flying colors. However, the state will not send you a card until what is fulfilled?

Documented “On the job” training hours.

Quiz 8 of 8:

Describe the general process of making an exposure using RAM.

Establish safety area. Clear safety area. Crankout source. Move back. After exposure is complete, crank the source back into the shielded position. Ensure source is shielded using a survey meter prior to performing next RT steps.

charles lowe

End of Chapter 1

Why Is Safety Training Important?