

New Mexico Environment Department
Radiation Control Bureau
Radiation Protection Program



Overview



Radiation Control Bureau Programs

- Radioactive Material License Program: means any materials or sources, regardless of chemical or physical state, that emit radiation, and includes medical, commercial, industrial, research, testing and educational facilities in New Mexico not under federal authority.
- Radiation Machine Registration Program: includes any device that is capable of producing radiation; ionizing radiation produced by X-ray machines, analytical measurement equipment and linear accelerators in New Mexico not under federal authority.
- FDA Mammography Quality Std Act Program: includes all privately owned facilities in New Mexico certified by the FDA to conduct mammography screening and diagnostic exams not under federal authority.
- Medical Imaging, and Radiation Therapy License Program: includes all medical facilities performing diagnostic and therapy on humans using medical radioactive materials, x-ray machines, linear accelerators, ultra-sound or magnetic resonance imaging (MRI) in New Mexico not under federal authority.
- WIPP emergency preparedness Program: includes the training of emergency responders along the Waste Isolation Pilot Plant route in radiation health physics.
- Indoor Radon Program: includes outreach, training, mitigation information and testing for RADON in the homes and public building in New Mexico.

Radiation Material License Program

Statutory Authority:

Radiation Protection Act, 74-3-1 through 74-3-16

NM Regulations:

20.3 NMAC Parts:1,3,4,5,7,10,12,13,14,15 & 16

Federal Agreement:

New Mexico entered into an agreement {Section 274b, Atomic Energy Act, 1954, as amended} with the Nuclear Regulatory Commission (NRC) that give us the authority to license and inspect radioactive materials used or possessed within our borders, not under federal authority.

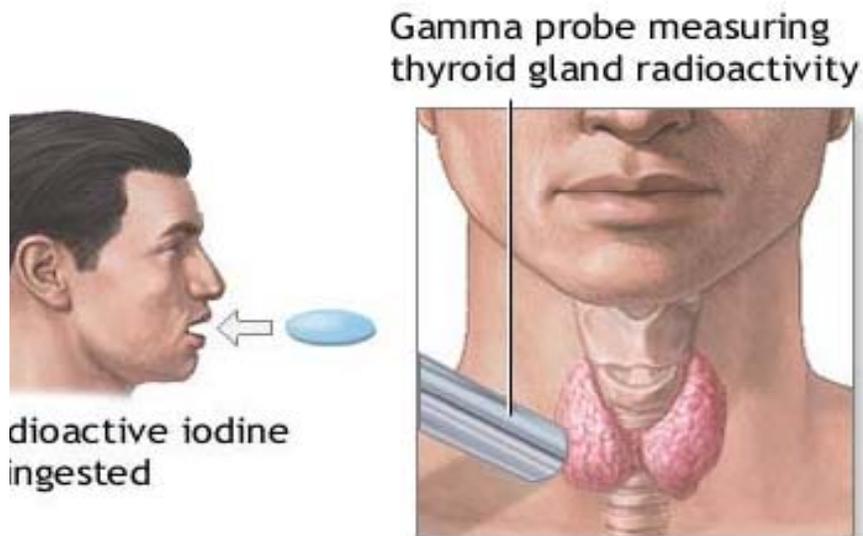
Radioactive Material License Program

Type of License (~200)

- Medical License
 - Nuclear Medicine
 - High Dose Brachytherapy
 - Low Dose Brachytherapy
 - PET/CT
 - Gamma Knife Therapy
- Radio Pharmaceutical License
- Cyclotron License
- Industrial Radiography License
- Density Moisture Gauge License
- Nuclear Gauge License
- Research and Developments License
- Analytical License
- Well Logging License
- Broad Scope License (example UNM)

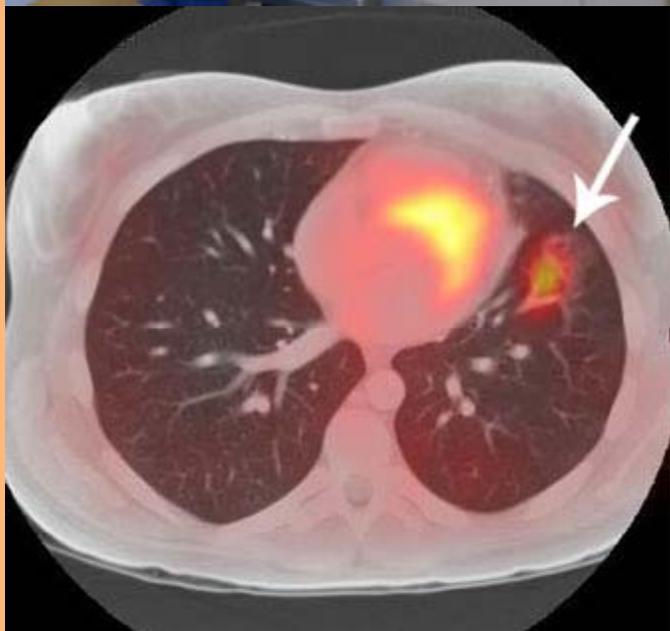
Iodine 131 Cancer Therapy

- Used to treat patients with thyroid cancer;
 - Radioactive iodine is in a pill form prepared by Radio-Pharmacy Licensee;
 - Doses given for therapy treatment range from 150-250 millicurie;
 - Doses for diagnostic exams Thyroid Uptake: 0.005 to 0.015 millicurie
Scintiscanning: 0.050 to 0.10 millicurie
- For localization of extra-thyroidal metastases the usual dose 1.00 millicurie.
- EPA 4/2/11 To-date, levels recorded at Albuquerque monitor have been thousands of times below any conservative level of concern.



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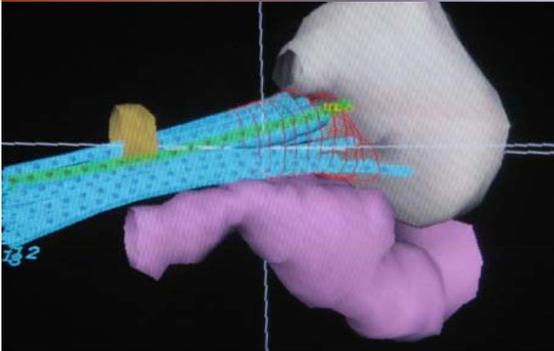
PET/CT IMAGING



- ✓ Medical licensee & Machine registrant
- ✓ Licensed Nuclear Medicine Technologist injects the patient with radioactive material.
- ✓ Licensed Radiological Technologist scans the patient in PET/CT machine.
- ✓ Licensed Radiologist supervises the entire process and interprets the results of the exam.
- ✓ Cyclotron licensee provides the unit doses of the radioactive material used in the diagnostic exam.
- ✓ F-18 (FDG) is the radioactive material

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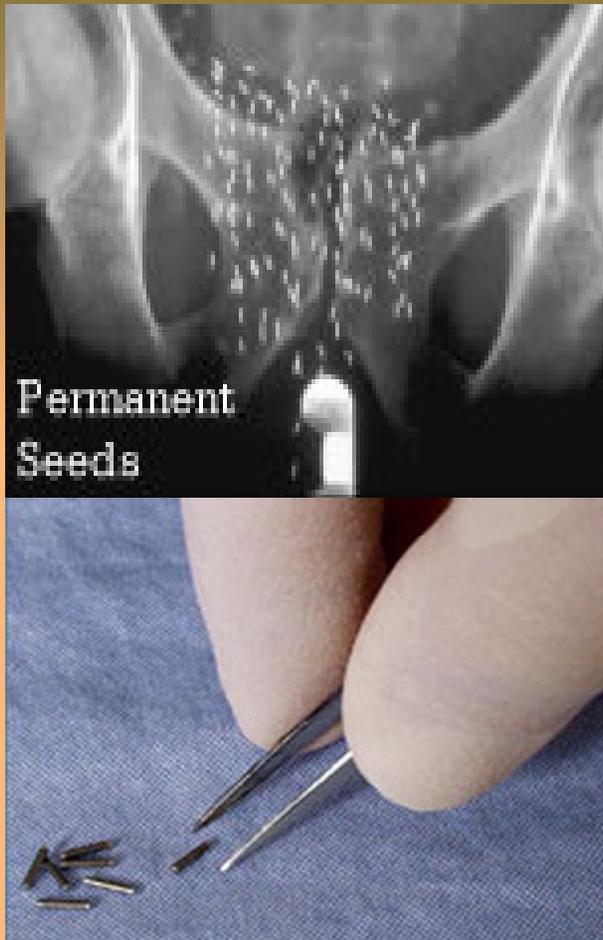
High Dose Brachytherapy License



- ✓ Hospital or Cancer Center Licensee
- ✓ License Radiologist Authorized User
- ✓ Medical Physicist AU on License
- ✓ License Manufacturer service provider
- ✓ Patient receiving therapy for prostate cancer with Iridium 192

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Low Dose Brachytherapy



- ✓ Hospital or Cancer Center Licensee
- ✓ License Radiologist Authorized User
- ✓ Medical Physicist AU on License
- ✓ License Manufacturer providing the Iodine 125 seeds
- ✓ Patient receiving therapy for prostate cancer Iodine 125 implant
- ✓ ~100 Iodine 125 seeds are implanted

Nuclear Medicine Stress Test

- ✓ Hospital, Medical or Private Cardiologist licensee
- ✓ Licensed Nuclear Medicine Technologist injects the patient with radioactive material, and scans the patient on a gamma camera.
- ✓ Licensed Cardiologist supervises as the authorized user and interprets the results of the exam.
- ✓ The patient receives a unit dose of Tc99m.
- ✓ The Radio-pharmacy licensee supplies the unit doses to the licensee.

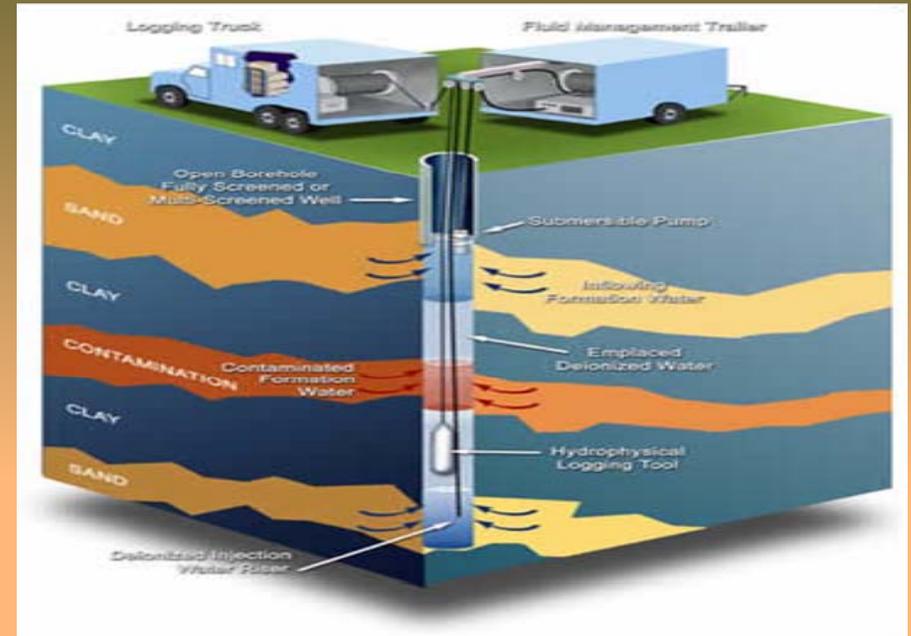


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Well Logging

Oil and Gas industry

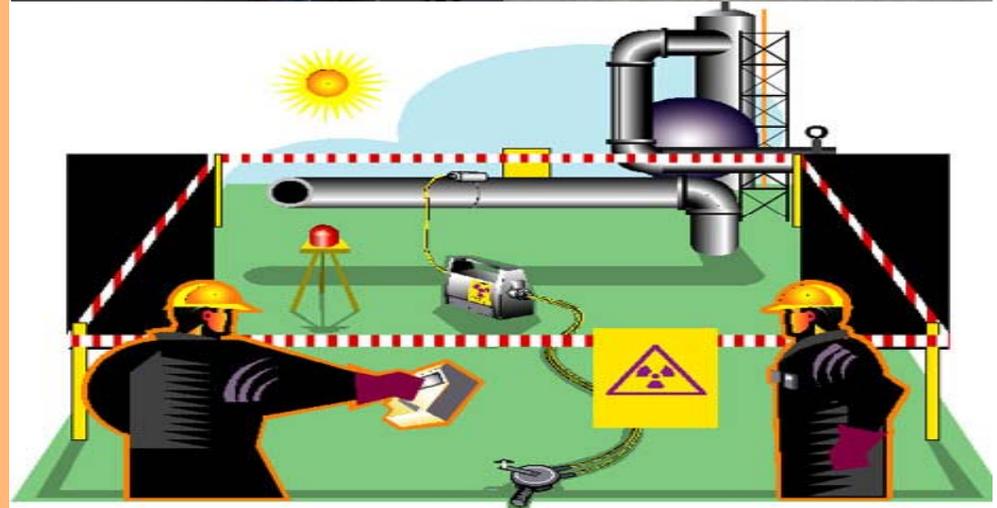
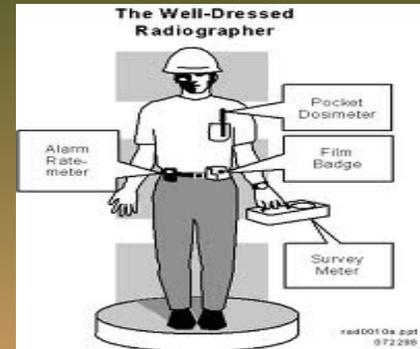
- ✓ Well Logging Licensee
- ✓ Licensee must have qualified Radiation Safety Officer
- ✓ Licensee employee must be trained and certified on radiation safety and handling radioactive materials
- ✓ Licensee must maintain security on radioactive materials at all times
- ✓ Licensee may be subject to Increased Control NRC security order
- ✓ Radioactive material is usually Cs 137 or Am 241/Be



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Industrial Radiography

- ✓ Subject to INCREASED CONTROL security order radioactive material is Ir-192
- ✓ Licensee must have qualified Radiation Safety Officer
- ✓ Licensee employee must be certified industrial radiographers
- ✓ Licensee employee must be trained and certified on radiation safety and handling radioactive materials
- ✓ Licensee must identify 2mR/hr exposure rate when source is open and areas must be properly posted
- ✓ Licensee must ensure all personnel in the area working with the radioactive material have an alarming dosimeter, and digital dosimeter and a personnel dosimeter



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Radiation Machine Registration Program

- **Statutory Authority:**

Radiation Protection Act, 74-3-1 through 74-3-16

- **NM Regulations:**

20.3 NMAC Parts, 1,2,4,6,8,9,10 & 11

- **FDA Regulations:**

21CFR 900

Radiation Machine Registration Program

Types of Registrants

~1400 Registered Facilities

- Particle Accelerator Registrant
- Hospital Registrant
- Medical Office Registrant
- Medical Clinic Registrant
- Dental Office Registrant
- Industrial Registrant
- Veterinary Registrant
- Mobile Unit Registrant

Cyclotron Registrant & Licensee Produces medical Isotopes for use in Diagnosing Cancer



- ✓ Licensee produces radioactive materials (i.e. ^{18}F , ^{11}C , ^{13}N and ^{15}O on an single position target).
- ✓ Registrant must provide adequate shielding to ensure exposure from radioactive materials and radiation (i.e. neutrons and photons and electrons) produced by the machine is below public dose limits.
- ✓ Licensee/Registrant radiation safety officer meets all requirements for the safe operation of the cyclotron.
- ✓ Licensee/Registrant employee are properly trained and meet all FDA requirements for the production of medical isotopes.

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Particle Accelerator Registrant

CANCER Therapy using LINEAR ACCELERATOR



- ✓ Registrant must provide adequate shielding to ensure exposure from radiation (i.e. neutrons and photons and electrons) produced by the machine is below public dose limits.
- ✓ Registrant radiation safety officer must meet all requirements for the safe operation of the accelerator.
- ✓ Registrant employee must be licensed therapist.
- ✓ Registrant must have licensed oncologist, medical physicist and dosimetrist present.
- ✓ Registrant must have all patient treatment plans reviewed by the oncologist, medical physicist and dosimetrist prior to treatment.

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Medical Clinic Registrant



Lead apron protect gonad area

- ✓ Registrant light field to x-ray beam must be with 2% of SID
- ✓ Registrant must use patient protection.
- ✓ Registrant must use appropriate technique settings (radiation energy) to ensure patient dose is minimal.
- ✓ Registrant must use licensed Radiological Technologist
- ✓ Registrant must ensure public dose limits are met.
- ✓ Registrant must ensure equipment is properly maintained.
- ✓ Registrant must ensure must maintain patient exposure log.

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Hospital Registrant



- ✓ **Registrant** must ensure annual entrance exposure rates for fluoroscopy x-ray units are completed by a qualified medical physicist.
- ✓ **Registrant** must use licensed Radiological Technologist
- ✓ **Registrant** must ensure must maintain patient exposure log.
- ✓ **Registrant** must ensure occupation and public dose
- ✓ **Registrant** must ensure must maintain patient exposure log.
- ✓ **Registrant** must ensure patient exposure are minimal

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Dental Office Registrant

Registrant must:

- ✓ Use employee certified and trained in applying x-ray to humans.
- ✓ Maintain records demonstrating Occupation and Public dose are met.
- ✓ Maintain an exposure log for all patient exams.
- ✓ Use appropriate technique settings (radiation energy) to ensure patient dose is minimal.



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FDA MQSA Inspection Program



- Inspection follow FDA procedures
- Verifying interpreting physician initial qualifications
- Verifying Technologist initial qualifications
- Verifying equipment quality control test
- Verifying medical physicist initial qualifications
- Verifying medical physicist annual survey
- Verify continuing experience and continuing education is maintained

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Medical Imaging & Radiation Therapy Program

- **Statutory Authority:**

Chapter 61, Article 14E NMSA 1978 may be cited as the "Medical Imaging and Radiation Therapy Health and Safety Act".

NM Regulations:

20.3 NMAC Parts 20

Medical Imaging & Radiation Therapy Program

Types of License (~4000 Licensees)

- Radiographic Technologist
- Nuclear Medicine Technologist
- Therapy Technologist
- Fusion Technologist (CT & NMT)
- Limited Technologist
- Ultra Sound Technologist
- MRI Technologist

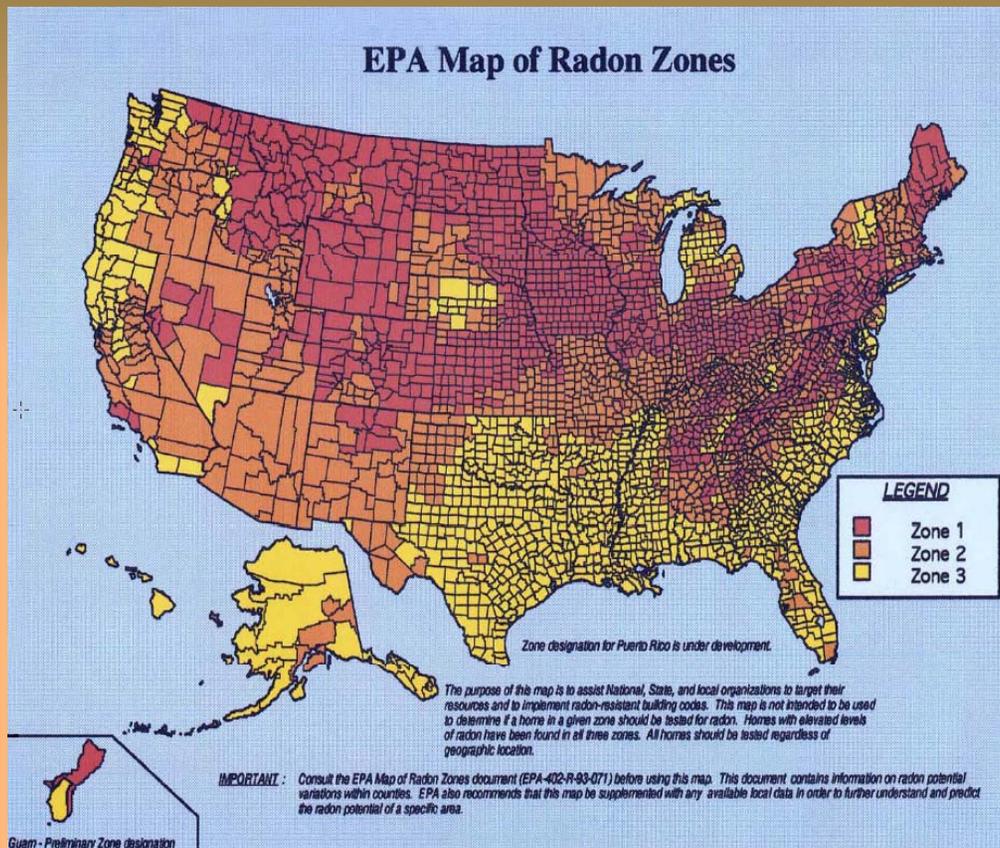
WIPP Emergency Preparedness Program



- Federally Funded by DOE
- Training-WIPP Route
 - State/Local First Responders
 - Fire (~500-600)
 - Police (~200)
 - Hospital ER Personnel (15 Hospitals)
- Dosimetry
 - Motor Transportation (MTD)
 - Health Department
- Equipment Calibration

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Radon Program



Zone 1 counties have a predicted average indoor radon screening level greater than 4 pCi/L (Pico curies per liter) (**red zones**) Highest Potential

Zone 2 counties have a predicted average indoor radon screening level between 2 and 4 pCi/L (Pico curies per liter) (**orange zones**) Moderate Potential

Federally Funded by EPA

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U.S. Food and Drug Administration

- **REGULATORY ACTION GUIDANCE**

FDA uses Derived Intervention Levels (DIL) to help determine whether domestic food in interstate commerce or food offered for import into the United States

presents a safety concern.

- **Radionuclide Group DIL**

Strontium-90 4320 pCi /Kg or 160 Bq /Kg

- Iodine-131 4590 pCi /Kg or 170 Bq/Kg

- Cesium-134 + Cesium-137 32,400 pCi /Kg or 1200 Bq /Kg

- Plutonium-238 + Plutonium-239 + Americium-241 54 pCi /Kg or 2 Bq /Kg

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State detects radioactive iodine in Michigan air

- On Monday an analysis of last weeks sample showed a total activity of 23 picocuries or 0.85 Becquerel's (Bq) of iodine-131.
- For example, a typical banana contains 15 Bq or 405 picocuries of potassium 40, a common radioactive isotope
- The amount of iodine-131 in the Washington milk was 0.8 picocurie per liter or 0.03 Bq/L, according to the Washington state agency.