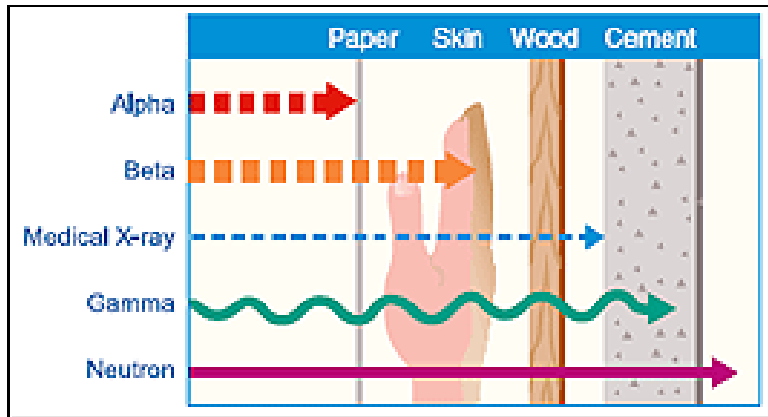


## Radiation and Fossil Fuels

### What is radiation?

Radiation is energetic waves (x, gamma) and particles (alpha, beta, neutron) emitted from radioactive (unstable) elements and machines.



Source: United States Nuclear Regulatory Commission  
<https://www.nrc.gov/about-nrc/radiation/health-effects/radiation-basics.html#forms>

### NORM and TENORM

**NORM** (Naturally Occurring Radioactive Materials) are concentrated in the earth.

They are released by mining and fracking. When they are further concentrated, they are called **TENORM** (Technologically Enhanced NORM).

When radioactive materials are mined for nuclear weapons and power, they are regulated under the Atomic Energy Act. When radioactive materials are unearthed incidental to mining and fracking to obtain fossil fuels, they are not regulated under the Atomic Energy Act.

### Emissions and Exposure

- **Low, slow, continuous doses of radiation can be more dangerous** per unit dose than one high dose because cells are repeatedly hit while they are trying to recover from the previous exposure.
- Background radiation is not safe but it is unavoidable (except for radon abatement in buildings). Even background radiation causes some cancers in the population.
- Exposure from fracking and nuclear power are in addition to background levels of radiation.
- Man-made radioactivity and the unearthing of radioactive deposits in the earth release radioactivity to the living environment, increasing risks to human and all living things.


### Fracking Radioactive Elements/Isotopes

- **Radium** (Ra 226, Ra 228) produces **increased incidence of bone, liver, or breast cancer**.
- **Radon** (Rn 222) is the **second leading cause of lung cancer in the U.S.**
- **Lead** (Pb 210)
- **Polonium** (Po 210): **Its decay products accumulate in pipe slag/sludge and can be fatal if they enter the body.**

**Federal Laws should regulate radioactivity, but many have exemptions for fracking, resulting in less EPA oversight of oil and gas development.**

**Key Environmental and Public Health Laws Governing Hydraulic Fracturing**

- Safe Drinking Water Act (SDWA)
- Clean Water Act (CWA)
- Resource Conservation and Recovery Act (RCRA)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Emergency Planning and Community Right-to-Know Act (EPCRA)
- Toxic Substances Control Act (TSCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
- Clean Air Act (CAA)\*



Source: [Watershed Council](#)

**Fracking and Oil and Gas Exemptions & Limitations: OSHA Exemptions**

Federal Law	Applicable to Oil and Gas Development	Exemptions or Limitations	Source of Exemption Exemption or Limitation
<b>Safe Drinking Water Act</b>	<ul style="list-style-type: none"> <li>Underground Injection Control Program</li> <li>Imminent and Substantial Endangerment Provision</li> </ul>	<ul style="list-style-type: none"> <li>Hydraulic fracturing fluids other than diesel fuels do not require Underground Injection Control Permit</li> </ul>	Statutory – 2005 Energy Policy Act
<b>Clean Water Act</b>	<ul style="list-style-type: none"> <li>National Pollutant Discharge Elimination System program</li> <li>Spill reporting and spill prevention and response planning requirements</li> </ul>	<ul style="list-style-type: none"> <li>Federal stormwater permits not required for uncontaminated stormwater at oil and gas construction or well sites</li> </ul>	Statutory - 1987 Water Quality Act and 2005 Energy Policy Act
<b>Resource Conservation and Recovery Act</b>	<ul style="list-style-type: none"> <li>Non-exempt wastes present at well sites may be regulated as hazardous</li> <li>Imminent and Substantial Endangerment Provision</li> </ul>	<ul style="list-style-type: none"> <li>Oil and gas exploration and production wastes not regulated as hazardous waste</li> </ul>	1988 Regulatory/EPA decision
<b>Comprehensive Environmental Response, Compensation, and Liability Act</b>	<ul style="list-style-type: none"> <li>Hazardous substance release reporting</li> <li>Imminent and Substantial Endangerment Provision for releases of a pollutant or contaminant</li> </ul>	<ul style="list-style-type: none"> <li>Liability and reporting provisions do not apply to injections of fluids authorized by state law for production, enhanced recover, or produced water</li> <li>Petroleum releases not covered</li> </ul>	Statutory – 1980
<b>Emergency Planning and Community Right-to-Know Act</b>	<ul style="list-style-type: none"> <li>Reporting on use, inventories, and releases into the environment of hazardous and toxic chemicals above threshold quantities</li> </ul>	<ul style="list-style-type: none"> <li>Oil and gas well operations not required to report releases of listed chemicals to Toxics Release Inventory</li> </ul>	1997 Regulatory/EPA decision

- OSHA is responsible for regulating radioactivity in the workplace for the oil and gas industry, in standards for “General Industry” that are listed in the federal code under 29 CFR 1910.1096.
- **Despite the dangers this type of oil and gas waste poses, a 1980 provision enacted by Congress has deemed it non-hazardous** and therefore exempt from federal rules that would otherwise apply to hazardous waste.

Source: [DeSmog](#)

**An EPA spokesperson told DeSmog:**

“There is no one federal Agency that specifically regulates the radioactivity brought to the surface by oil and gas development.”

**In a separate exchange, EPA spokesperson Eneida Jones stated:**

“EPA does not regulate radioactivity in oil and gas production, processing and transport systems.” Jones pointed to state agencies as having the authority to track and regulate oil and gas waste and its radioactivity.”

– DeSmog, Justin Nobel, February 2, 2023

**Opinion piece in Bloomberg Law by Bemnet Alemayehu and Amy Mall of the Natural Resources Defense Council: “Legal Gaps Leave Fracking a Radioactive Mess”**

Source: <https://news.bloomberglaw.com/environment-and-energy/legal-gaps-leave-fracking-a-radioactive-mess>

**About Physicians for Social Responsibility Pennsylvania**

Physicians for Social Responsibility Pennsylvania (PSR PA) promotes socially and environmentally responsible practices, policies and programs to safeguard and improve public health. We accomplish this through education, training, direct service, and advocacy. Learn more at [www.psrpa.org](http://www.psrpa.org).