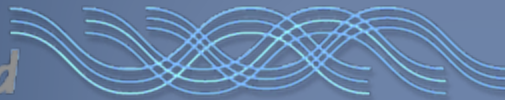


Shale Gas and RADIOACTIVITY: POTENTIAL HEALTH IMPACTS



*Concerned
Health Professionals of NY*



Larysa Dyrszka MD
March 2024

RADIOACTIVITY

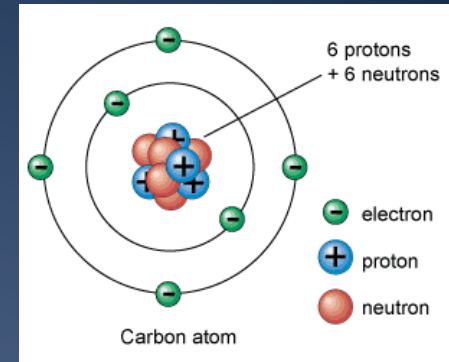
Justin Nobel, "Inside West Virginia's Chernobyl," Truthdig, September 18, 2023, <https://www.truthdig.com/articles/inside-west-virginias-chernobyl/> .



PHYSICS

Basic atomic and nuclear structure

- atoms
- elements
- isotopes



<https://www.universetoday.com/56747/atom-structure/>

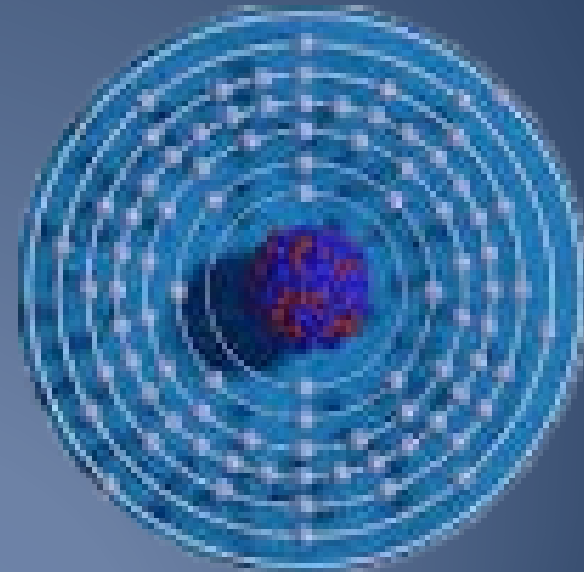
Radium

atomic number	88	(226)	atomic weight
symbol	Ra	●	acid-base properties of higher-valence oxides
electron configuration	[Rn]7s ²	—	physical state at 20 °C (68 °F)
name	radium		

Alkaline-earth metals Solid

Strongly basic

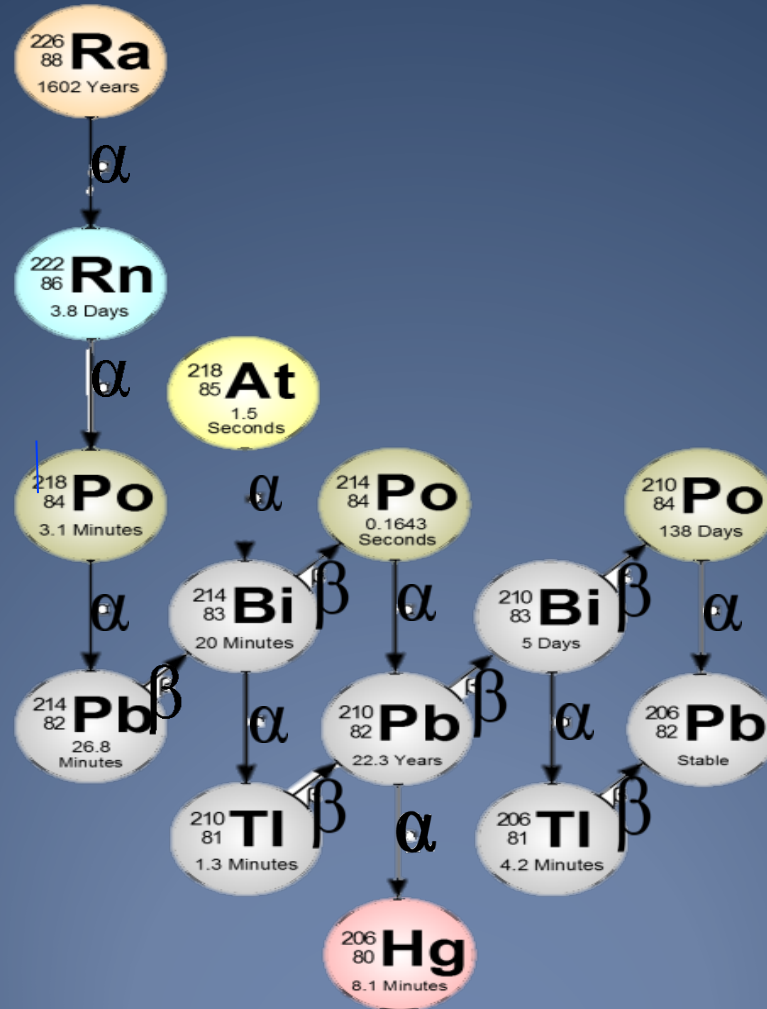
() indicates the mass of the longest-lived isotope.



<https://www.sciencedirect.com/topics/physics-and-astronomy/radium-isotopes>

<https://www.nuclear-power.com/radium-properties/>

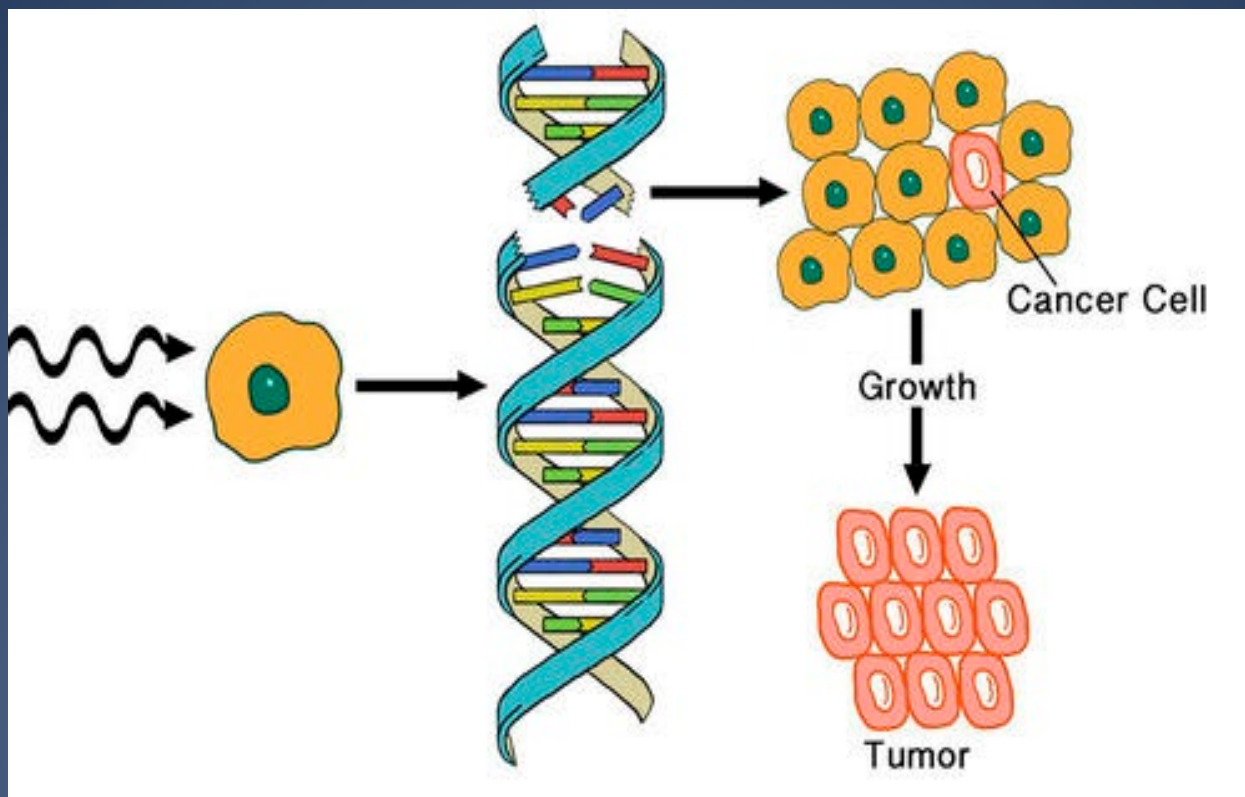
RADIUM DECAY



- Actinides
- Alkali Metals
- Alkaline Earth Metals
- Halogens
- Metalloids
- Noble Gases
- Poor Metals
- Transition Metals

<https://physicsopenlab.org/2016/11/05/some-alpha-spectra/>

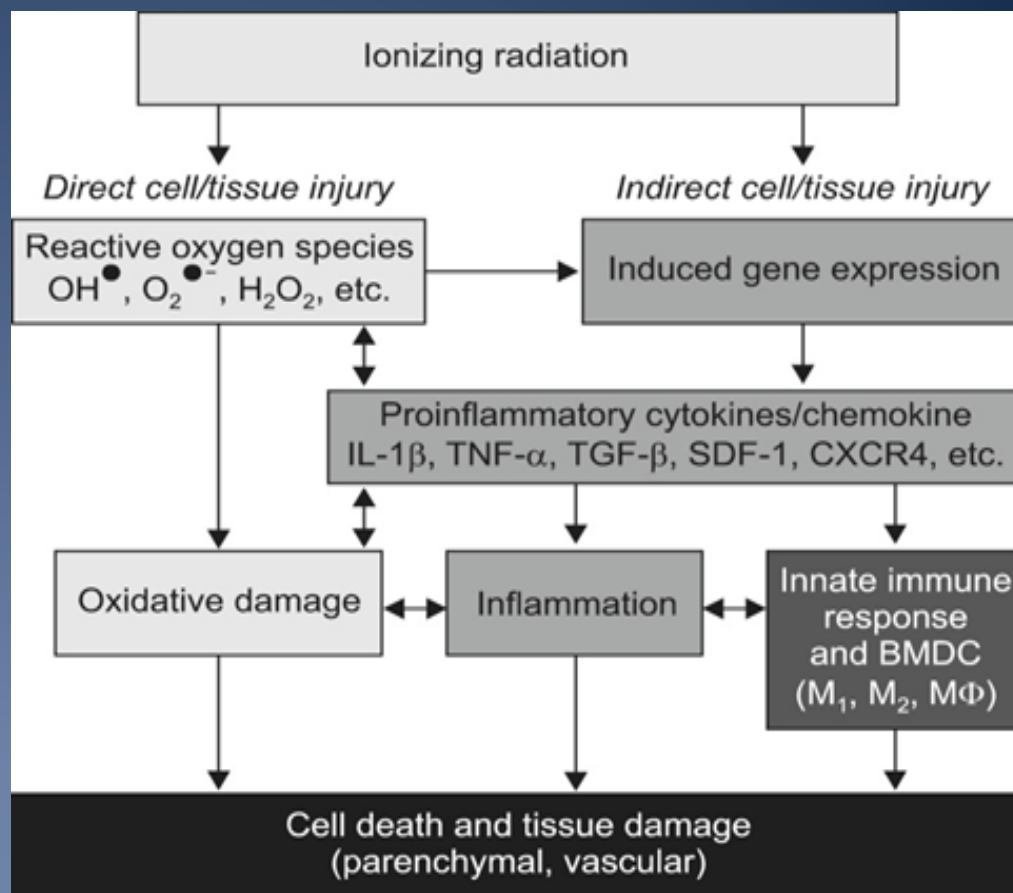
CELL DAMAGE FROM IONIZING RADIATION



<https://www.ck12.org/book/ck-12-chemistry-basic/section/24.4/>

HEALTH IMPACTS OF RADIATION

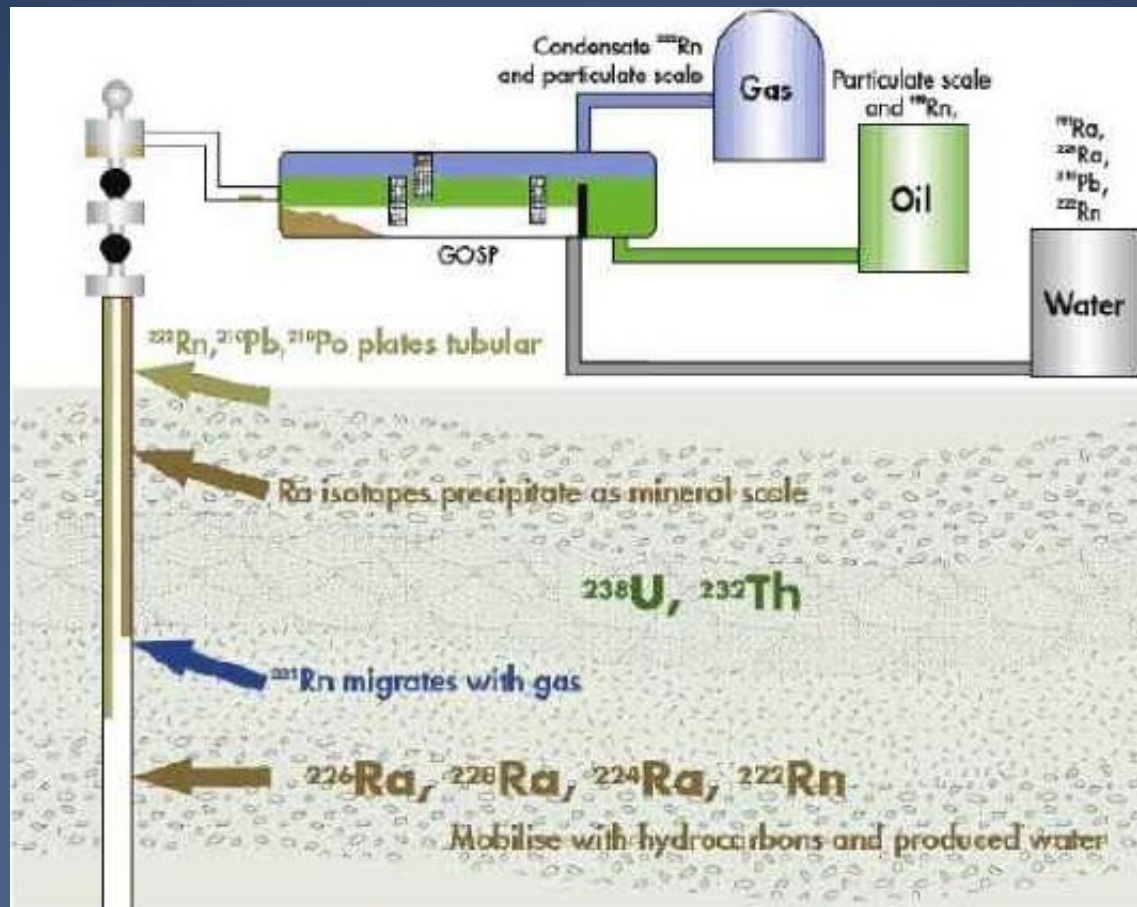
- Genetic effects
- Neoplastic disease
- Effect on growth and development
- Premature aging
- Cataracts of eye lens



Radiat Oncol J. 2014 Sep; 32(3): 103-115.

Published online 2014 Sep 30. doi: [10.3857/roj.2014.32.3.103](https://doi.org/10.3857/roj.2014.32.3.103)

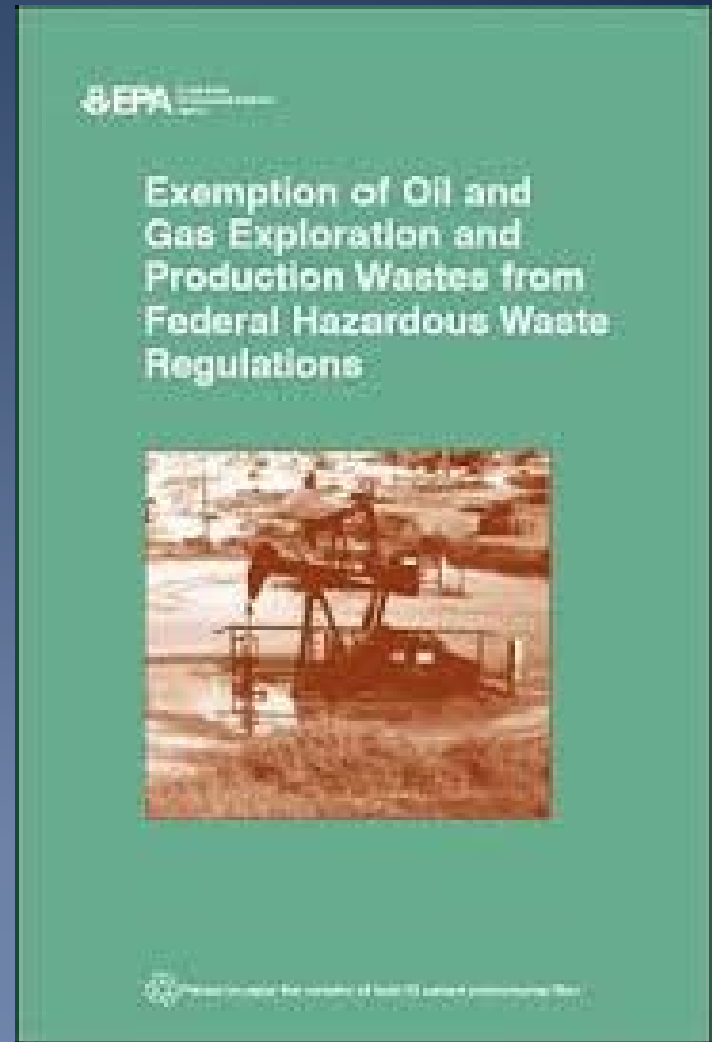
NORM ORIGINS



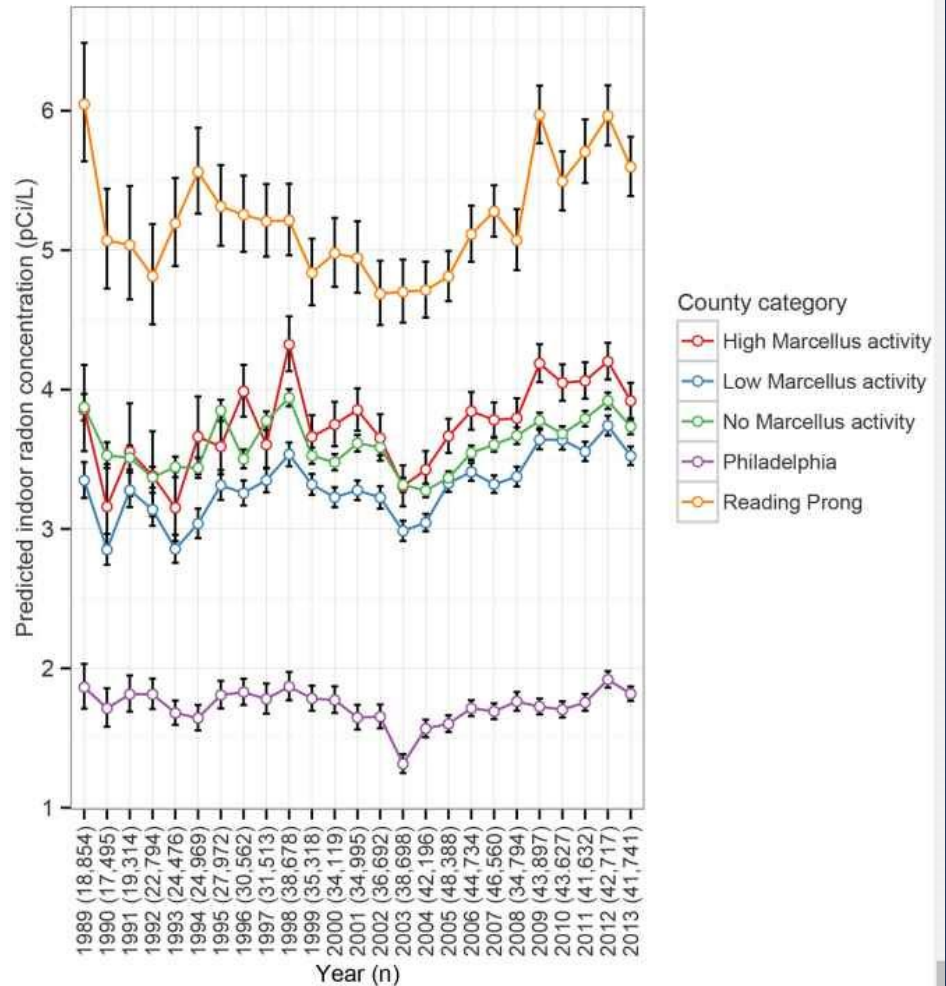
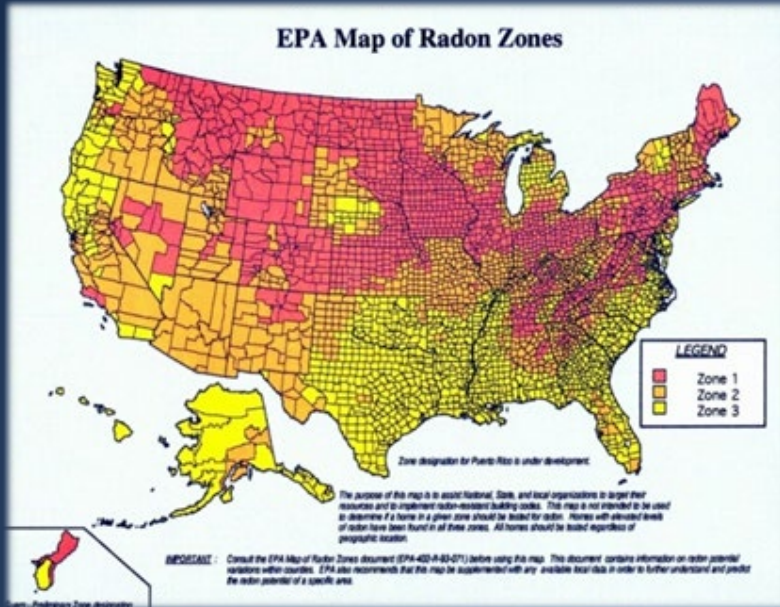
<http://www.ogp.org.uk/pubs/412.pdf>

FEDERAL EXEMPTION




- http://www.shalegas.energy.gov/resources/060211_earthworks_petroleumexemptions.pdf
- <http://www.epa.gov/osw/nonhaz/industrial/special/oil/oil-gas.pdf>



RADON



<https://www.epa.gov/sites/default/files/2018-12/documents/radon-zones-map.pdf>

	Zone 1 counties have a predicted average indoor radon screening level greater than 4 pCi/L (picocuries per liter) (red zones)	Highest Potential
	Zone 2 counties have a predicted average indoor radon screening level between 2 and 4 pCi/L (orange zones)	Moderate Potential
	Zone 3 counties have a predicted average indoor radon screening level less than 2 pCi/L (yellow zones)	Low potential

<https://doi.org/10.1289/ehp.1409014>

WASTE

- hazardous with current disposal methods
<https://doi.org/10.1016/j.jenvrad.2022.107042>
- waste contains radioactive elements, brine and gases
<https://doi.org/10.1016/j.ecolind.2023.110616> .
- <https://www.iaea.org/publications/8338/radiation-protection-and-the-management-of-radioactive-waste-in-the-oil-and-gas-industry>

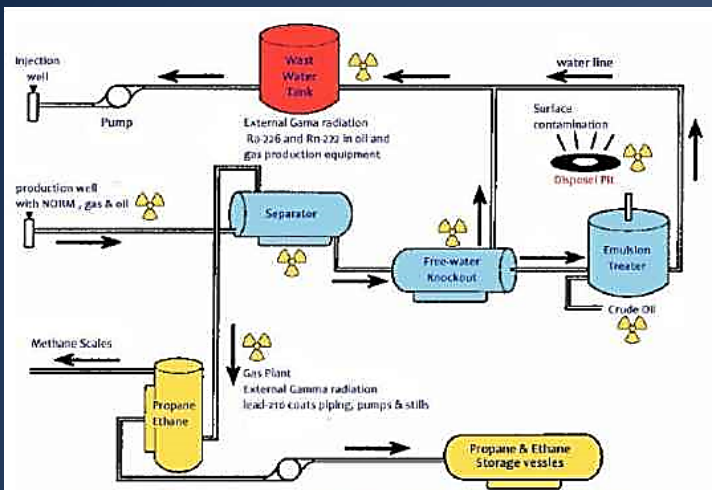


<http://www.michiganradio.org/post/questions-linger-after-company-spreads-toxic-chemicals-northern-michigan-roads>

COMMUNITY IMPACTS

- airborne radioactivity affects housing, community character, schools downwind
- contaminates local water resources
- economic issues such as employment, value of home
- health infrastructure including availability, insurance, cost
- justice concerns such as vulnerable populations, equality
- worker safety, accidents
- cumulative effects of multiple stressors

EXPOSURE to RADIOACTIVITY in the O&G SECTOR

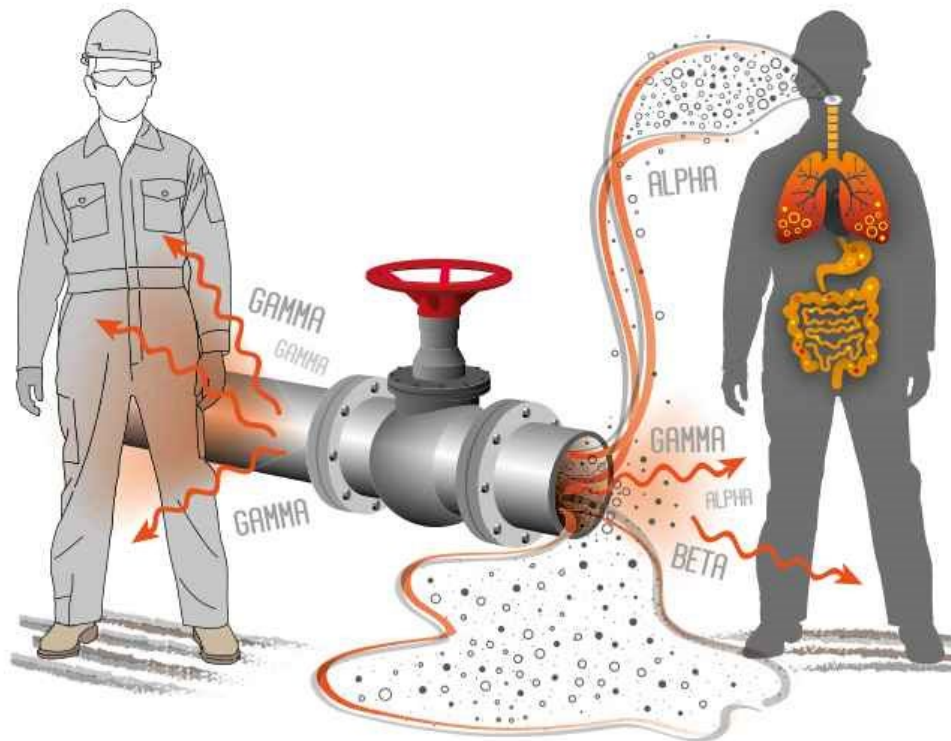


[https://www.researchgate.net/publication/348805684_TE-NORM Radiological Impact and Radiation Protection in Oil and Gas Industry A review](https://www.researchgate.net/publication/348805684_TE-NORM_Radiological_Impact_and_Radiation_Protection_in_Oil_and_Gas_Industry_A_review)

https://www.researchgate.net/publication/359006152_materials_in_the_oil_and_gas_industry

<https://www.iaea.org/publications/8338/radiation-protection-and-the-management-of-radioactive-waste-in-the-oil-and-gas-industry>

Irradiation



Gamma rays can escape vessels and pipes, increasing the risk of irradiation

Alpha particles are slow and heavy, they pose the greatest risk when ingested or inhaled

Beta particles can penetrate further, but typically have less energy

WORKERS

- exposed to radioactive materials from drill cuttings, fracking waste and cleaning of trucks
- inadequate use of protective equipment by workers in the U.S.
- recommendations from the International Atomic Energy Agency (IAEA) http://www-pub.iaea.org/MTCD/publications/PDF/TCS-40_web.pdf
- ALARA stands for "as low as reasonably achievable"
- TIME, DISTANCE, SHIELDING





Workers wearing personal protective equipment decontaminating a valve inside an on-site facility (courtesy: National Radiological Protection Board, UK).



Removal of bulk sludge from a vessel (courtesy: Atomic Energy Commission of Syria).

IAEA TCS 40. Radiation Protection and the Management of Radioactive Waste in the Oil and Gas Industry

https://www-pub.iaea.org/MTCD/Publications/PDF/TCS-40_web.pdf



NORM contamination within a vessel being measured using a surface contamination measuring instrument (courtesy: National Radiological Protection Board,



<https://www.truthdig.com/articles/a-slow-rolling-disaster-in-fracking-country/>



Thank you

www.concernedhealthny.org