TENORM Policy and Guidance

Revision 2013

Stakeholder Process Meeting #2

December 11, 2013

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TENORM Policy

- Limit the potential annual exposures resulting from TENORM and unimportant quantities of source material to a maximum of **25 mrem** for any individual member of the public
- Develop mechanisms to address radiation protection requirements while minimizing additional regulatory structure or burden

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TENORM Policy Revisions

- Radiation Management Unit (RAM) now has significant experience applying the TENORM policy to water treatment residuals, contaminated soils and other materials
- Change in “source material” definition
- Shift approach from material-specific to media-specific
- Include dose from Radon progeny in dose assessment

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Developing the Policy

- Identify the materials to be considered
- Evaluate potential exposure pathways
- Develop generic dose assessments
- Select generic evaluation criteria
- Establish amounts that result in acceptable levels of exposure

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Generic Acceptable Levels

Limits above background[1]	May Be Managed Without Consideration of the Radioactive Constituents if Less Than:	Will Require a Radioactive Materials License and Will Be Directly Regulated if Greater Than:
Combined Ra-226/Ra-228	3 pCi/g	50 pCi/g
Natural Uranium	30 pCi/g	339 pCi/g[2]
Natural Thorium	3 pCi/g	55 pCi/g[2]

[1] If both U Nat and Th Nat are present unity applies (i.e. the sum of the fractions of the limits for U Nat and Th Nat may not exceed 1)

[2] Source materials greater than 0.05% by mass

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Background Values

- Policy is based on dose above background.
- Policy currently recognizes established general background values for concentrations by mass.
- Can site specific background values be used?
  - Yes

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Background Values

- Site specific background values can be established.
- How?
  - Characterization of an area or site will be acceptable if the sampling and analysis plans meet the statistical requirements of:
    - EPA's Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), or
    - EPA's Guidance for QA Project Plans (EPA QA/G-5) and Guidance for Choosing a Sampling Design for Environmental Data Collection (EPA QA/G-5S), or
    - EPA's SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Chapter nine: Sampling Plan

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Why 25 mrem?

- The current policy and the draft of the revised policy employ a limitation of a 25 mrem per year dose to a member of the public from these materials.
- How did the Department arrive at that value?

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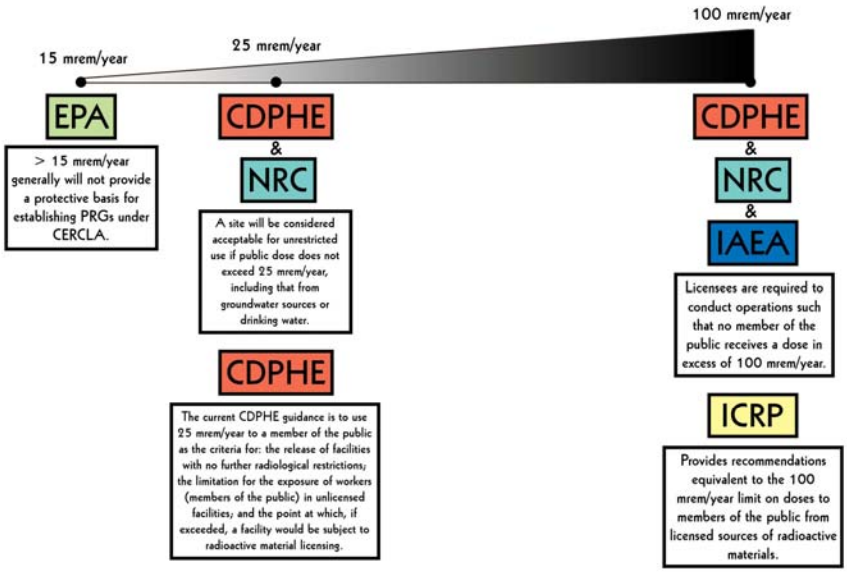

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Why 25 mrem?

- After review of the generally accepted and promulgated values the 25 mrem per year value was determined to be the most appropriate value.
- Comments?

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Radon Dose

- Once a policy value for limiting dose is established a decision on the inclusion or exclusion of the dose from Radon and its daughters in that value needs to be made.
- A significant amount of new information on residential radon studies has become available in the past few years.
- EPA Position: "There is no safe level of radon any exposure poses some risk of cancer. The National Academy of Sciences (NAS) studied and reported on the causes of lung cancer in two 1999 reports. They concluded that radon in indoor air is the second leading cause of lung cancer in the U.S. after cigarette smoking."

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Radon Dose

- National Academy of Sciences (NAS): estimated that 15,000-22,000 Americans die every year from radon-related lung cancer.
- World Health Organization's International Agency for Research on Cancer: there is sufficient evidence to conclude that radon causes cancer in humans (IARC, 1988). Scientific committees assembled by the National Academy of Sciences (NAS, 1988), the International Commission on Radiological Protection (ICRP, 1987), and the National Council on Radiation Protection and Measurement (NCRP, 1984) also have reviewed the available data and agreed that radon exposure causes human lung cancer.

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Radon Dose

- The Health Physics Society: Radon is the second most important cause of lung cancer after cigarette smoking.
- The American Medical Association, the American Lung Association, and the National Medical Association have developed programs to reduce the health risks of radon.

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Radon Dose

- The Department recognizes the dose from Radon and its daughters as a public health issue and as a result as part of this effort has investigated potential doses from Radon related to the disposition of TENORM materials.
- What fraction of the dose from TENORM materials is due to Radon?
- Lets look at two different scenarios for three different members of the public…

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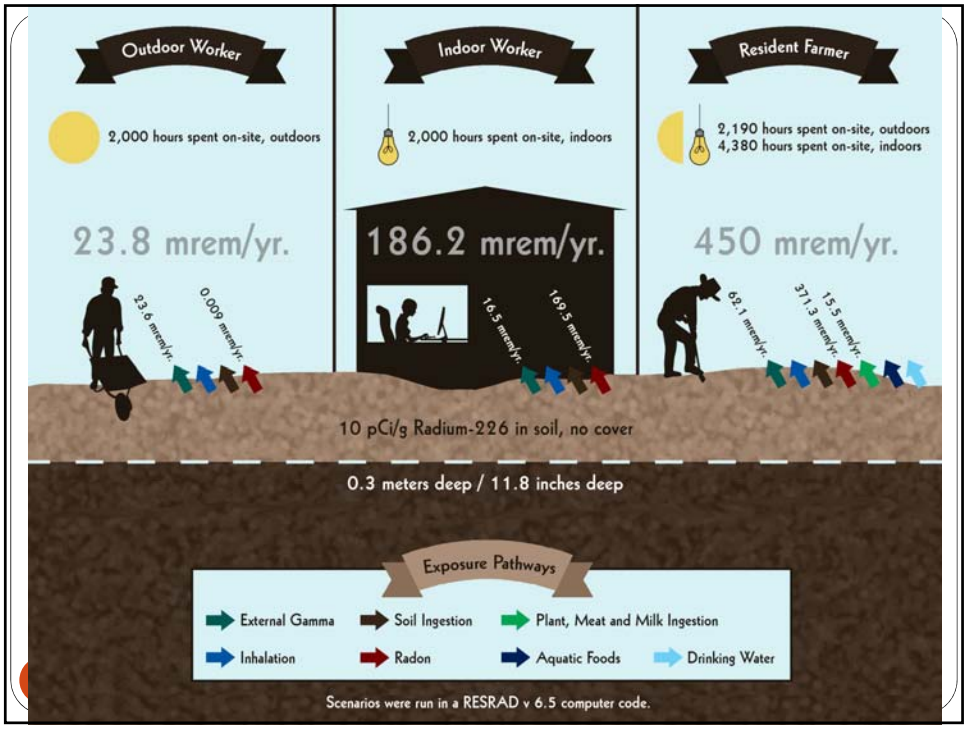
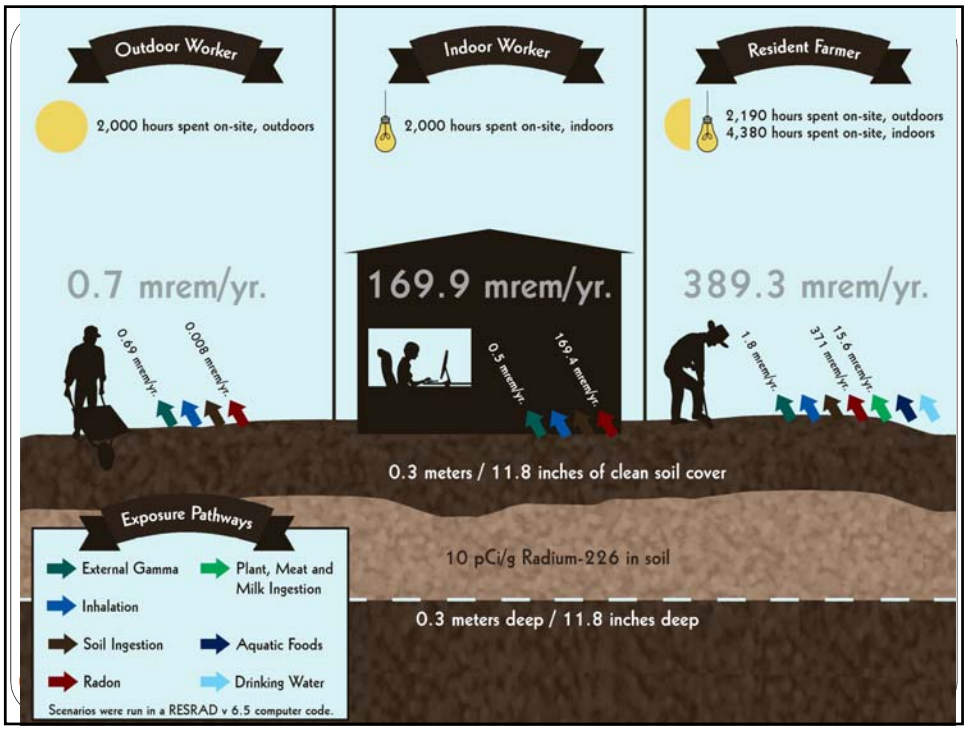

Outdoor Worker
2,000 hours spent on-site, outdoors
23.8 mrem/yr.
23.6 mrem/yr.
0.009 mrem/yr.
Indoor Worker
2,000 hours spent on-site, indoors
186.2 mrem/yr.
16.5 mrem/yr.
169.5 mrem/yr.
Resident Farmer
2,190 hours spent on-site, outdoors
4,380 hours spent on-site, indoors
450 mrem/yr.
62.1 mrem/yr.
371.3 mrem/yr.
15.5 mrem/yr.
10 pCi/g Radium-226 in soil, no cover
0.3 meters deep / 11.8 inches deep
Exposure Pathways
External Gamma
Soil Ingestion
Plant, Meat and Milk Ingestion
Inhalation
Radon
Aquatic Foods
Drinking Water
Scenarios were run in a RESRAD v 6.5 computer code.


Outdoor Worker
2,000 hours spent on-site, outdoors
0.7 mrem/yr.
0.69 mrem/yr.
0.008 mrem/yr.
Indoor Worker
2,000 hours spent on-site, indoors
169.9 mrem/yr.
0.5 mrem/yr.
169.4 mrem/yr.
Resident Farmer
2,190 hours spent on-site, outdoors
4,380 hours spent on-site, indoors
389.3 mrem/yr.
1.8 mrem/yr.
371 mrem/yr.
15.6 mrem/yr.
0.3 meters / 11.8 inches of clean soil cover
10 pCi/g Radium-226 in soil
0.3 meters deep / 11.8 inches deep
Exposure Pathways
External Gamma
Plant, Meat and Milk Ingestion
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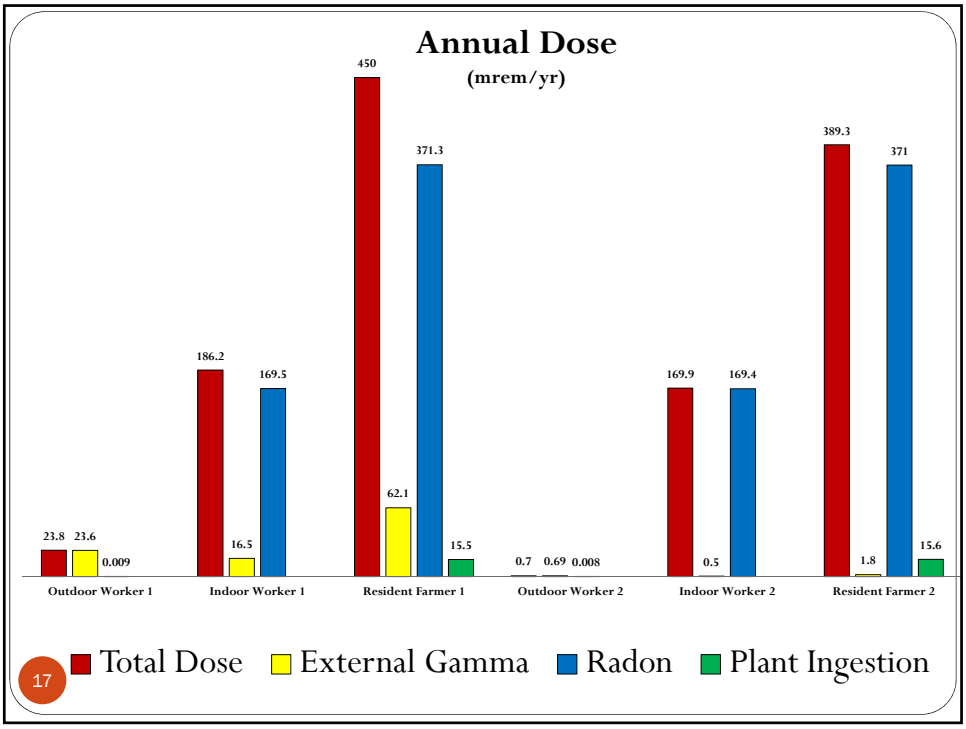

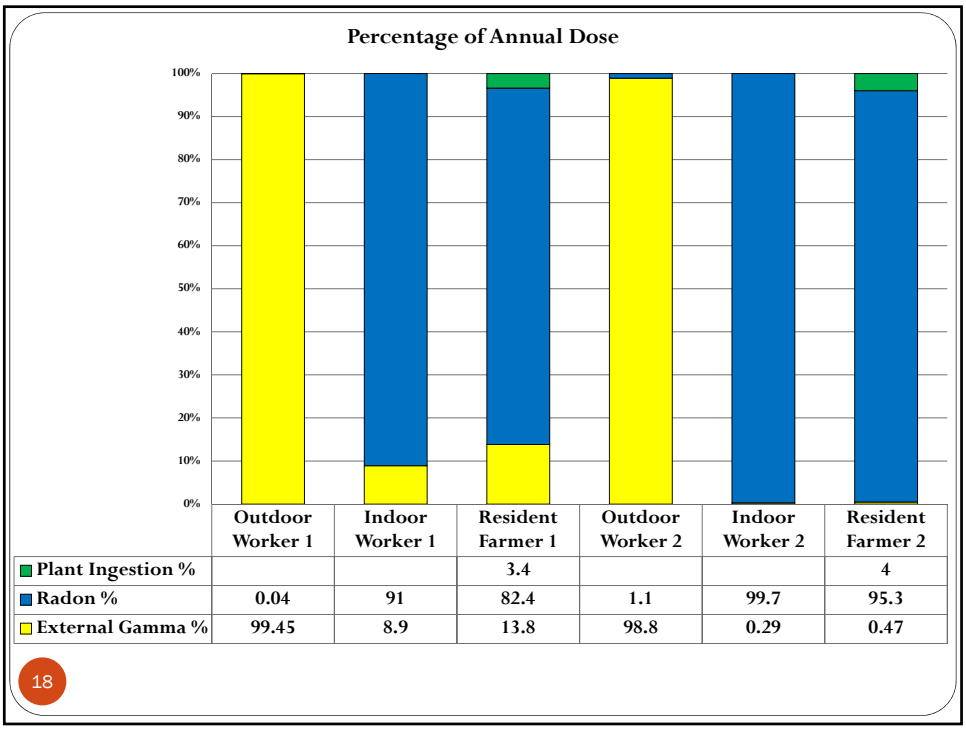

	Outdoor Worker 1	Indoor Worker 1	Resident Farmer 1	Outdoor Worker 2	Indoor Worker 2	Resident Farmer 2
Plant Ingestion %			3.4			4
Radon %	0.04	91	82.4	1.1	99.7	95.3
External Gamma %	99.45	8.9	13.8	98.8	0.29	0.47

Radon Dose

- How do we include Radon in the evaluation of TENORM disposition?

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Next Steps

- Other topics of concern?
- Need more meetings?
  - Topic/media specific?
  - Large group or breakout sessions?
- Comment on proposed revision by January 13
  - Review and assimilate comments
  - Respond to comments and finalize policy

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Next Steps (cont'd)

- Guidance development
  - Propose guidance language for comment
  - Meet for specific guidance discussion as needed
  - Review and assimilate comments
  - Respond to comments and finalize guidance
  - Repeat process for additional guidance

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