RAS 14513

Army Anagnostopoulos Exh. # 1-L

[Originally Attached As EXHIBIT HWA # 13 to Witness Anagostopoulos' pre-filed testimony]

U.S. NUCLEAR REGULATORY COMMISSION
In the Matter of U S ARMY (JEFFERSON PROVING GROUND)
Docket No. 40-8838-ML Official Exhibit No. ARMY EXH. # 1-L
OFFERED by: (Applicant/Licensee) Intervenor _____
NRC Staff Other _____
IDENTIFIED on _____ Witness/Panel _____
Action Taken: ADMITTED REJECTED WITHDRAWN
Reporter/Clerk _____

Health Effects of Exposure to Low Levels of Ionizing Radiation, BEIR V Report, National Research Council, National Academy Press, Washington, D.C., ISBN 0-309-03997-5, page 18,,1990.

TEMPLATE = SECY-028

SECY-02

HEALTH EFFECTS OF EXPOSURE TO LOW LEVELS OF IONIZING RADIATION

[redacted]

#19

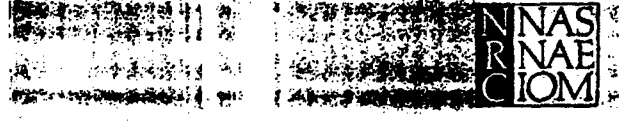


TABLE 1-3 Average Annual Effective Dose Equivalent of Ionizing Radiations to a Member of the U.S. Population

Source	Dose Equivalent[a]		Effective Dose Equivalent	
	mSv	mrem	mSv	%
Natural				
Radon[b]	24	2,400	2.0	55
Cosmic	0.27	27	0.27	8.0
Terrestrial	0.28	28	0.28	8.0
Internal	0.39	39	0.39	11
Total natural	--	--	3.0	82
Artificial				
Medical				
x-ray diagnosis	0.39	39	0.39	11
Nuclear medicine	0.14	14	0.14	4.0
Consumer products	0.10	10	0.10	3.0
Other				
Occupational	0.009	0.9	<0.01	<0.3
Nuclear fuel cycle	<0.01	<1.0	<0.01	<0.03
Fallout	<0.01	<1.0	<0.01	<0.03
Miscellaneous[c]	<0.01	<1.0	<0.01	<0.03
Total artificial	--	--	0.63	18
Total natural and artificial	--	--	3.6	100

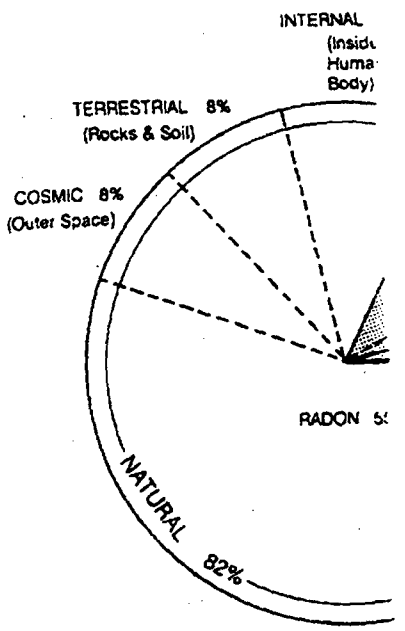
[a] To soft tissues.
[b] Dose equivalent to bronchi from radon daughter products. The assumed weighting factor for the effective dose equivalent relative to whole-body exposure is 0.08.
[c] Department of Energy facilities, smelters, transportation, etc.

SOURCE: National Council on Radiation Protection and Measurements (NCRP87b).

differences in the relative biological effectiveness of different types of radiation. The effective dose equivalent relates the dose-equivalent to risk. For the case of partial body irradiation, the effective dose equivalent is the risk-weighted sum of the dose equivalents to the individually irradiated tissues.

As seen in Table 1-3 and Figure 1-1, three of the six radiation sources, namely radiation from occupational activities, nuclear power production (the fuel cycle), and miscellaneous environmental sources (including nuclear weapons testing fallout), contribute negligibly to the average effective dose equivalent, i.e., less than 0.01 millisievert (mSv)/year (1 [mrem]/year).

A total average annual effective dose equivalent of 3.6 mSv (360 mrem)/year to members of the U.S. population is contributed by the other three sources: naturally occurring radiation, medical uses of radiation, and radiation from consumer products. By far the largest contribution (82%) is made by natural sources, two-thirds of which is caused by radon and its



decay products. Approximately eq
come from cosmic radiation, terre
radionuclides. The importance of e
of human exposure has only recen

The remaining 18% of the a
consists of radiation from medical
nuclear medicine, 4%) and from co
by medical procedures is smaller t
products, the chief contributor is,
although building materials, minin
coal burning also contribute. Sn
natural radionuclide polonium-210
of a small region of the bronchial e
0.2 Sv per year) that may cause an

Uncertainties exist in the da
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for the most important exposure,
decay products, have many associ