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TABLE I

AVERAGE ENVIRONMENTAL EXTERNAL WHOLE BODY RADIATION
(NCRP Max. Permissible Level = 500 mr/yr
for the population as a whole)

	mr/yr	Hours Life Expectancy Lost Per Yrs Exposure	Days Life Expectancy Lost Per 65 Yrs Exposure
Cosmic Rays Only at Sea Level	35	4	11
Over Sedementary Rock Outdoors - at Sea Level	78	9	25
Over Granite Rock Outdoors - at Sea Level	145	17	47
Brick or Concrete House - at Sea Level	150-300	18-36	49-98
Luminous Dial Watch	40	5	13
Medical and Dental X-rays (Americans)	80	10	26
Fallout at Present*	0.3	0.03	0.1
Total Average Over Population	200-400	24-48	65-130
*Projected Fallout Exposure From Continued Testing for Many Years	0.6-16	0.07-2	0.2-5

It is seen that cosmic-rays give a relatively small dose rate which is about equal to that of luminous dial watches. Living in a brick or concrete house is a relatively large effect. Fallout gives the smallest of all the dose rates; being somewhat less than 1% of any possible living situation. The radiation due to fallout can be expressed in terms of cosmic radiation by noting that an increase in altitude of 200 feet from sea level increases the cosmic radiation dose rate by an amount just equal to the present fallout dose rate. The increase in dose rate due to cosmic rays from its sea level value to its value in Kensington is several times the fallout dose rate while the increase in cosmic ray dose rate from its sea level value to the value in Denver, Colorado is 60 times the fallout dose rate.

In addition to the above external sources of radiation a person is subjected to internal radiation which can either be localized or distributed throughout his body due to differences in the metabolism of the different elements. Four elements are significant. Potassium 40 and Carbon 14 are distributed uniformly throughout the body, while Radium 226 and Strontium 90 are concentrated in the bones. The Radium 226 content of human bones varies greatly with the locality in which the person lives. The Strontium 90 content of the bones, which is the principal constituent of fallout, is seen at the present time to be relatively small compared to that of Radium 226, and in the projected future (assuming that the present rate of testing continues indefinitely) to still be relatively small compared to that of other natural sources of radiation to the bone.

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TABLE II

AVERAGE ENVIRONMENTAL INTERNAL WHOLE BODY AND BONE RADIATION DOSES
(NCRP Max Permissible Level for bones - 3000 mr/yr)

	mr/yr
Potassium forty	25
Carbon fourteen	1
Radium in bones - local and non-uniform (depends on water and food sources)	5-370
Present* Strontium ninety in adult bones	0.3
Present* Strontium ninety in childrens bones	1
Total bone dose due to Radium and other sources	130-500
*Projected Strontium ninety bone dose rate if tests continue indefinitely at the present rate	3-30

The even smaller doses due to natural causes in turn also produce no detectable biological effects. It thus seems reasonable that the still smaller radiation levels due to fallout, even though the weapons tests be continued indefinitely, will produce no detectable effects. It should be emphasized that even though we were, until 50 years ago, unaware of it, that all animals and all man and all other living forms have from even the remotest times been subjected to these low levels of radiation, and apparently there is adequate immunity built into these living forms to protect them from injury and to allow them to continue to exist indefinitely although continuously irradiated by a few hundred mr/yr.

Conclusions: Three successive levels of radiation dose rate have been mentioned, the largest of which, the one established as safe for workers in the radiation industry by the NCRP, produces no observable biological effect.