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than the [illegible] matters were all published in the [illegible] which are public documents and [illegible] information about the operation [illegible]

[illegible] These have all been careful [illegible] given reasonable [illegible] occurred, responsibility [illegible] In other instances [illegible] losses which have [illegible] studies have been [illegible] the problem was one [illegible] Nevada and Utah during [illegible] attributed [illegible] taken in conjunction with [illegible] in which the herds had [illegible] degree to which these animals [illegible] It was concluded, from [illegible] that while there had been [illegible] could not have been [illegible] had [illegible]

[illegible] to answer these [illegible] the comparative [illegible] has been plays [illegible] ve

part [illegible] radioactive fall-

out [illegible] general

inter[illegible] 1956 onward.

[illegible] research was

required [illegible] approximate tra-

jectories [illegible] research program

was under[illegible] the support of the

AEC, [illegible] also plays an

important [illegible] nation-wide monitoring

system. [illegible] Safety Laboratory of the

AEC, [illegible] the nation

[illegible] the Health and

Safety La[illegible] the Health and

Safety La[illegible] and is

prepared [illegible] findings

of [illegible] Committee so

desire.

The [illegible] during the spring

of 195[illegible] devices in Nevada

at th[illegible] the public as to

a pos[illegible] AEC and the Weather

Bureau [illegible] purpose of analyzing

all relev[illegible] bearing on

weather [illegible] The witnesses from the W[illegible]

[illegible] been operated for the [illegible] Weather Bureau has [illegible] possible to speak [illegible] radio-active [illegible] for all parts of the [illegible] in the [illegible] recipient of considerable [illegible] other country of which we [illegible]

As the [illegible] has progressed the essen[illegible] In the Commission's February [illegible] cumulative external [illegible] States from all tests of [illegible] roentgen. We can [illegible] analyses, that strontium- [illegible] of long half-life, [illegible] does not exceed [illegible] permissible level [illegible] only small [illegible] measurement.

A[illegible] throughout the United States fr[illegible] [illegible] wastes amounts to 0.2[illegible] [illegible] by cosmic rays and radium [illegible] together with the potassium-[illegible] living things.

No[illegible] but extensive operation[illegible] undertaken [illegible] years the marine biologist[illegible] University [illegible] have been studying the effect[illegible] Eniwetok on the fauna of [illegible] Applied Fisheries Research Lab[illegible] Washington, the Commission support[illegible] [illegible] and has constructed [illegible] marine biological station [illegible] weeks a team [illegible] AEC [illegible] Laboratory and from [illegible] Energy, and the University [illegible] working aboard the Coast Guar[illegible] Commander Albert J. Carpent[illegible] measuring the residual radioactiv[illegible] water [illegible] flowing westward from the [illegible] operations last spring.

By [illegible] they have been [illegible] radio-activity [illegible] develop new knowledge [illegible] Equatorial Current [illegible]. [illegible] expedition was conducted, [illegible] quantitative knowledge [illegible] second, to [illegible] system for studying the ocean [illegible], having worked these [illegible] detect an increase [illegible].

The [illegible] encountered gave about [illegible]. Such a figure as this [illegible] for continuous [illegible] on Radiation [illegible] Commission. Studies [illegible] the various [illegible] important to man, [illegible] the ocean life [illegible].

[illegible] as it exists today [illegible] of our inquiry [illegible] levels of exposure [illegible] general environment [illegible] a number of [illegible] Marshall [illegible] number of [illegible] serious and serious [illegible] order of 175 [illegible] at least [illegible] epidermis. This [illegible] from the average exposure [illegible] from all tests.

[illegible] effects [illegible]?

In [illegible] radiation [illegible] however has no bearing [illegible] therapy in the treatment [illegible] beneficial to normal [illegible] and that [illegible] all [illegible] activities. As [illegible] which one cannot [illegible] It cannot be said that below [illegible] that if injury [illegible] detect it and [illegible] whatever [illegible] consequence to [illegible].

[illegible] a value [illegible] level at which [illegible] acceptable as a maximum [illegible] level, there would be extremely [illegible] effect at all.

[illegible] and is [illegible] refer to a finite [illegible] likeli- hood [illegible] extremely small. [illegible] the word hazard [illegible] interpreted [illegible] injury affecting himself, [illegible] about him. These [illegible] are [illegible] examples in which [illegible] specialist, [illegible] well- informed [illegible]

The [illegible] broad groups. [illegible] related [illegible] damage [illegible] and [illegible]

S[illegible]

[illegible] in the [illegible] exposure is over-whelmingly [illegible] ingestion of radioactive [illegible] whole body gamma [illegible] and the rate of delivery [illegible] affected are the central ner[illegible] tissues and the gastrointes[illegible] delivered, transient depression [illegible] detected at an exposure [illegible] will occasionally be found [illegible].

Where [illegible] weeks to months the total [illegible] is recognizable change [illegible] delivered within a few [illegible] occur, it seems [illegible] survivors of Hiroshima [illegible] frequency of leukemia [illegible] the normal [illegible] such cases [illegible] studied. From [illegible] and perhaps probable [illegible] of life expectancy, [illegible] study [illegible] require hundreds of roentgens [illegible] see no possibility whatever [illegible] exposure levels from radioactive [illegible]

GENETIC EFFECTS

Radiat[illegible] cells but by acting upon certain [illegible] give rise to alteration of the gene[illegible]. It appears that there is no defin[illegible] that there is a linear relationship [illegible] changes and the total irradiation. [illegible] that the rate at which the radiati[illegible] negligible factor.

The [illegible]ly been made with relatively high [illegible] roentgens with mice to a maximum [illegible] several [illegible] in the case of the more resist[illegible]. Ea[illegible] its own range of sensitivity.

If one [illegible] which has been experimenta[illegible] however small, then the ex[illegible] the conclusion that a small but f[illegible] mutations at the level of the [illegible] environment. That mutations [illegible] well established and indeed form [illegible]. At present, however, we do not [illegible] frequency is caused by [illegible] environment and what is due [illegible]

The [illegible] the ultimate effect of [illegible] survival of populations. Since many [illegible] to be dominant lethals, their [illegible] the recognition of anomalous [illegible] numbers of individuals [illegible]. The technique, which [illegible] with animals, becomes very [illegible] human population for obvious re[illegible]

Some [illegible] consequently not be detectable [illegible] individual carrying such a mutation [illegible] individual carrying the identi[illegible]

The [illegible] the problem. The fate of [illegible] important question. These mutations [illegible] forces of natural selection [illegible] and may be expected [illegible]

The [illegible] genetic problem in man consti[illegible] studies being conducted in [illegible] given until the statistical [illegible] ible that some evidence of genetic [illegible] have [illegible] among the more highly irradiated [illegible]. At the lower exposure rates, [illegible] can be recognized.

# [illegible]

[illegible]

Mos[illegible] development and testing [illegible] titative. No statement [illegible] people of the United St[illegible] actual values of [illegible]. These values have been accu[illegible] information has been [illegible].

Whi[illegible] we are forced to conclude [illegible] existing levels of radioactiv[illegible] States, to the extent that they [illegible]. Among the myriad other in[illegible] and genetic import, we [illegible] any effect whatever on the gen[illegible].

STATEMENT BY DR. [illegible] REEN
GENETICIST, DIVISION OF BIOLOGY AND MEDICINE
UNITED STATES ATOMIC [illegible] COMMISSION
BEFORE
THE [illegible] COMMITTEE [illegible]
[illegible]

The [illegible] limited to the exposed [illegible] Descendants [illegible] people may show genetic effects [illegible] What [illegible] best obtainable estimate of the magn[illegible] [illegible] or, taking into account the [illegible] over several years and also the var[illegible] exist.

Each [illegible] genes, or hereditary material, [illegible] several thousands of genes are transmitted [illegible] without change. A gene may [illegible] under natural conditions so that the [illegible] from those of the parent. Th[illegible] regard [illegible] radiation is known, among [illegible] changes or mutations. The frequen[illegible] [illegible] to the amount of radiation re[illegible] [illegible] For genetic effects, the [illegible] before parenthood is important [illegible] duration of exposure.

Genetic [illegible] for a million genes about [illegible] mutate [illegible] without assignable cause in ea[illegible] genes are exposed to one unit of ra[illegible] more genes may mutate.

The average [illegible] radiation [illegible] atomic weapons to date is about [illegible] This instead of 5,000 mutations [illegible] may [illegible] 5,000 mutations in a billion genes [illegible] organisms.) It should be re-emphasized that [illegible] rates may be either too low or too high [illegible] they are [illegible] experiments.

Gene mutations [illegible] are usually deleterious. Since the term [illegible] meaning here, it should be explained [illegible] term refers [illegible] the genes on development, [illegible] animals. It is also important to [illegible] between [illegible] first, when a gene with deleterious [illegible] and, second, when it occurs in one [illegible] gene mutation is induced and if an [illegible] from both parents, it may have [illegible] In large outbreeding populations [illegible] mankind [illegible] receiving identical radiation-in[illegible] very, very small. The occasional [illegible] may [illegible] of present levels of ra[illegible] from [illegible] rare and spread out over so many [illegible] effect on birth and survival rates is unlikely [illegible] receives a deleterious [illegible] from only one [illegible] parents it may be totally unaffected, [illegible] cases [illegible] observable harm, or its chance [illegible] may be [illegible] percent. This is the more [illegible] case. [illegible] these may still be so few as to be lo[illegible] the variety [illegible] offspring being produced as a consequen[illegible]. S[illegible]ng as the amount of radiation [illegible] he genet[illegible] correspondingly low.

STATEMENT BY MR. MERRILL EISENBUD
MANAGER, NEW YORK OPERATIONS OFFICE, AND
DIRECTOR, HEALTH AND SAFETY LABORATORY
UNITED STATES ATOMIC ENERGY COMMISSION
BEFORE
THE JOINT COMMITTEE ON ATOMIC ENERGY
APRIL [illegible], [illegible]

Fallout [illegible] has been [illegible] systematically by the AEC since early [illegible] Two basic [illegible] collecting data have been employed:

a. Intensive monitoring [illegible] relatively close to the sites of detonation [illegible] about [illegible] from the test site in Nevada. In [illegible], [illegible] gathered after each blast by a variety [illegible] techniques [illegible] aircraft which are equipped with instruments [illegible] measure [illegible] level radiation; (2) instruments that [illegible] automatically transmit the data to a headquarters [illegible] and (3) manually operated radiation detectors [illegible] system in this region is primarily [illegible] with [illegible] short term dose from fallout. Being [illegible] the [illegible] the fallout may occur in this region within a few [illegible], at a time when the radioactivity [illegible] decaying [illegible] most of it is delivered in a day or [illegible]

b. In contrast at more [illegible] the monitoring system is designed [illegible] that is insignificant so far as immediate dose [illegible] when tests are under way in Nevada [illegible] network [illegible] provide a continuous record of [illegible] beyond 200 miles.

At other times the number [illegible] reduced to 41 because fewer locations [illegible] sampling of radioactive dust which [illegible] beyond the continental limits. The [illegible] tests are listed in Table #1. [illegible] smaller network when Nevada tests [illegible] by an asterisk.

This network [illegible] radioactive dust. Only on infrequent [illegible] determination be made directly with instruments [illegible]. The normal radioactive background [illegible] from about .01 to .05 milliroentgens per hour. [illegible] levels of activity the Geiger Mueller [illegible] operated by a skilled observer [illegible] 50 percent over the normal background [illegible] be known whether this increase was [illegible] variations in radioactive background [illegible] these small elevations of radioactive [illegible] not be a sufficiently sensitive [illegible] it has been possible to develop [illegible] exceedingly simple and relatively inexpensive [illegible] than direct instrumental [illegible] would be more difficult, as noted [illegible] roentgen per hour with even the best [illegible] method which we have used routinely [illegible] a measurement of fallout equivalent [illegible] per hour.

Our procedure [illegible] gummed surface about 3 ft. from the ground. The sticky surface [illegible] adhesive properties when wet: thus, dust particles are retained [illegible] during a rain. These gummed films are tended by personnel of [illegible] Weather Bureau. The films are changed each day and are mailed [illegible] AEC Health and Safety Laboratory in New York where their radi[illegible] assayed by reducing the gummed film and the adhering dust [illegible] ash which is then assayed for radioactivity [illegible] conventional [illegible] counting equipment.

Since [illegible] we have assayed [illegible] samples in this way. An interim cumulative account [illegible] was published in the scientific literature in 1952 [illegible] summary up to January 1, 1955, has been compiled [illegible] publication during the next few weeks. The information has been [illegible] request to many interested persons who have wanted the [illegible] variety of purposes. These individuals include representatives [illegible] photography industry and scientists working in fields [illegible] carbon 14 dating.

The cumulative fallout [illegible] States from early 1951 to January 1, 1955 varies from [illegible] per square mile in Arizona to 120 millicuries per square mile [illegible] New Mexico. As a basis for comparison, it is [illegible] interest [illegible] the upper foot of soil in the United States contains [illegible] millicuries of radium per square mile

The isotope Strontium 90 [illegible] present in fallout, is regarded as the constituent of [illegible] significance. This is because like radium it follows [illegible] into biological systems and may be deposited in the skeleton [illegible] which it would be removed very slowly. The strontium content [illegible] there in eastern United States now [illegible] per square mile of Strontium 90. Thus, from all tests [illegible] isotope is present in an amount about one thousandth the [illegible] natural radium, the natural radioactive substance to which [illegible] chemically and biologically similar.

[illegible]

| | |
|---|---|
| [illegible] | [illegible] |
| [illegible] | [illegible]a |
| [illegible] | [illegible] Hampshire |
| Eureka [illegible] | [illegible], New Mexico |
| [illegible] | [illegible] N.Y. |
| *Grand [illegible] | [illegible] Carolina |
| [illegible] | [illegible] Island |
| *Des [illegible] | [illegible] Dakota |
| [illegible] | [illegible] Dakota |
| Aurora [illegible] | [illegible] |
| *Kansas [illegible] | [illegible] |
| [illegible] | [illegible] |

*[illegible] [illegible] [illegible]ted in [illegible]