

TENTATIVE PROGRAM FOR THE NEXT NEVADA TESTING SERIES

Proposed by

The Radio-Ecology Division

Atomic Energy Project, U.C.L.A.

PROJECT I: LARGE DOMESTIC ANIMAL STUDIES

This is a proposed cooperative project between the University of Tennessee, Atomic Energy Commission Agricultural Research Program and this Division. This joint project, now in the initial planning stages, is Phase III of Dr. Cyril Comar's proposed project for "The Study of the Effect of "Fall-out" and Ionizing Radiation from Atomic Detonations upon Domestic Animals."

The study as outlined in Phase III is as follows:

In order to compare data already obtained in controlled total body irradiation studies from Comar's laboratory at Oak Ridge, as well as retention of some of the fission products in large animals, it is proposed that burros, cattle, and sheep be placed at various distances (maximum of forty miles) from Ground Zero for several Test detonations. The locations of the test animals will be determined according to the best available "Fall-out" predictions.

This phase will study the effects of "Fall-out" on burros, cattle, and sheep, with respect to:

1. Amount of fission products from actual "Fall-out" available to the animal by ingestion and/or inhalation. If possible, a differentiation of which mode of entry into the animal body should be made.
2. Amount of radiation entering the animal body and its organs from external sources of radiation due to "Fall-out," as well as ingested and inhaled radioactive materials.

3. Effective rates of body clearance of radioactive materials after a twenty-four hour exposure to the various components of "Fall-out."
4. Histological and hemotological studies of various tissues from exposed animals will be made.
5. Several of the animals which have received maximum exposure will be shipped to Comar's laboratory at Oak Ridge for periodic observation and study for one year or less.
6. In each general area of animal exposure during a "Fall-out," the following physical data will be obtained (to be proposed as an integral part of the Dust and Particulate Project).
 - a. Amount of air-borne concentration of radioactivity will be measured.
 - b. Determination of the particle size of "Fall-out."
 - c. Energy spectrum of radioactive "Fall-out."
 - d. Total radioactivity per unit area of surface.
 - e. Time of arrival of "Fall-out" per location.
 - f. Pattern of "Fall-out" and isodose curves within the selected exposure area will be made.
 - g. Attempted evaluation of the light intensity initially of the bomb detonation as an evaluation of possible induced blindness in animals.

This project should be ready as a formal proposal to D.B.M. by January, 1954, if the respective administrative problems are jointly approved.

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PROJECT II: INFLUENCES OF RECENTLY CONTAMINATED ENVIRONMENTS ON NATIVE
FLORA AND FAUNA NEAR THE NEVADA PROVING GROUNDS

This is a proposed project to be carried out as a part of the Biological Field Section's program.

A biological survey of areas adjacent to the Nevada Proving Grounds was conducted during the Upshot-Knothole Test series. This was the first biological monitoring and radiological evaluation to be attempted during and immediately after an initial contamination by Fall-out at distances greater than ten miles from Ground Zero along the predicted line of Fall-out. It also represents a successful attempt to study the problem of Fall-out in terms of the total environment with respect to time. This was made possible by the coordinated operations of the Dust and Particulate Section and Biological Field Survey Sections operating under Program 27.

The biological data obtained thus far may be briefly summarized as follows:

1. Certain fission products were immediately "available" to native rodents as indicated by uptake of activity at μc levels.
2. The decay of residual environmental activity, decay of activity found in individual animal tissues and tissue activity found in animals serially collected from one location in a single Fall-out pattern was remarkably similar, suggesting:
 - a. The animals were initially contaminated during the first day of Fall-out only, or
 - b. The level of metabolized activity was at equilibrium with the available activity in the environment.
3. The total amount of metabolized activity was a fraction of one per cent of the total activity in the animal's immediate environment; the environment studied was less than twenty miles from Ground Zero.

4. Inhalation probably can not account for the total metabolized activity but its contribution may be significant.
5. No evidence of gross pathology or lesions were noted as a result of extreme radiation exposure to native animals living in environments contaminated at levels of several hundred R, infinite dose.
6. A correlation did exist between environmental contamination and uptake of activity by native rodents suggesting the valid use of native rodents as indicators of biologically available activity resulting from Fall-out deposited at distances less than twenty miles from Ground Zero.

This Division suggests a five point project to obtain specific field data to answer questions posed by the above summary and concurrent laboratory work.

1. Biological Monitoring

This would involve the sampling of native rodents from selected areas of maximum contamination by Fall-out, at various distances (less than 120 miles from Ground Zero), to determine relative animal uptake as a function of the physical characteristics of Fall-out; and to provide refined data with which to compare environmental decay rate, tissue decay rate, and decay rates determined by serial sampling of native populations, to better define the true relation of metabolic activity to environmental activity.

2. Availability of Activity

An effort will be made to determine the metabolic availability of both primary Fall-out and air-borne particles of early fission materials. This includes the identification of isotopes involved, degrees of contamination of forage crops, the uptake

of early fission materials by agricultural crops and clay mineral influences.

3. Effects of Radiation

Histological preparations of selected animal tissue and plant samples will be made, as well as observations on native rodents removed from contaminated environments and maintained in the laboratory.

4. Method of Uptake

The role of inhalation in the contribution of metabolic activity found in animals will be undertaken.

5. Exposure

Determination of actual radiation exposure of animals as a function of micro environments, and correlation of dose to physical measurements of activity will be established.

It should be noted that these undertakings are dependent upon obtaining data during the first twenty-four to forty-eight hours after Shot and are, therefore, logical field undertakings. At the same time the successful interpretation of biological data necessitates the availability of data pertaining to the physical characteristics of Fall-out, i.e., total residual environmental contamination; particle size distribution; physical characteristics of particles; relation of biological sampling areas to over-all Fall-out pattern; and rates of accumulation or dispersion of activity in the environment. The above proposal is therefore predicated on the fact that the Dust and Particulate studies will be activated and function as a separate project.

PROJECT III: DUST AND PARTICULATE STUDIES

Based on previous work in this category, it is proposed that the next Fall-out studies include the study of the several problems outlined below:

1. A study of the gaseous derived air-borne radioactive materials as measured at surface level and their potential biological availability. It is proposed to emphasize the obtaining of data on the concentration of radio-iodine, radio-strontium and radio-yttrium components of several Fall-out patterns, particularly in the selected biological study areas. This study may also provide information on the mechanism as to why air-borne material of less than one micron in size has been found at distances less than forty miles from Ground Zero.
2. Continue the study of Fall-out particles with respect to their chemical and physical characteristics and potential biological influence as a function of distance from Ground Zero (less than 200 miles).
3. Study and correlation of various methods of predicting "Hot Spots" and associated particle sizes at distances less than 200 miles. For each Fall-out pattern, the various methods of prediction will be confirmed by radiological survey and particle size distribution as determined from residual contaminated soil fractionation. The Atomic Energy Project, U.C.L.A. has recently conceived a method of predicting "Hot Spots" which is apparently different from the two methods previously used. This study is to include the determination of the particle size distribution of soil collected pre and post Shot at very near distances from Ground Zero. This particle size distribution will be compared

to residual radioactive particle size distribution found in the various "Hot Spots."

4. Furnish information on the physical characteristics of Fall-out for the two previously proposed biological projects, including:
 - a. Total residual environmental contamination.
 - b. Particle size distribution of both air-borne and primary Fall-out.
 - c. Physical characteristics.
 - d. Air-borne material concentration.
 - e. Activity per unit area.

The estimates of budgets, etc. for the above three projects will be set up on the following assumptions:

1. These proposed projects should function in three consecutive Tower or Surface Tests of more than ten K.T. estimated yield, one detonation per seven days.
2. A period of seven days for Project I and a period of fourteen days for Projects II and III prior to participating in the Test functions will be required to set up the facilities, indoctrination and training of personnel.
3. A period of fourteen days is required for delays in Shot schedule and for the termination of the projects.
4. The total period under consideration is therefore approximately two months.

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