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JOINT OFFICE OF TEST INFORMATION

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PUBLIC HEALTH AND SAFETY PRECAUTIONS FOR ENIWETOK TESTS ANNOUNCED

Protection of the public health and safety is a primary consideration in the conduct of the nuclear tests which will begin in the Spring of 1956 at the Eniwetok Proving Grounds.

Various precautions have been taken to keep significant radioactive fallout within the confines of the danger area in the Pacific which was announced on March 1, 1956. With the exception of Joint Task Force facilities, there are no inhabited places within the danger area.

There is no reason to expect that ~~hazardous~~ heavy fallout will occur outside the danger area, and it is highly unlikely that any inhabitants of atolls will have to be moved. However, complete plans have been made for transportation of the inhabitants should such action have to be taken.

Elaborate systems have been established to detect and measure radioactivity in the vicinity of the Proving

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Grounds, in the United States, and in other parts of the world. In addition, extensive marine surveys will be conducted to measure radioactivity in sea water and marine organisms.

More detailed information on health and safety measures relating to the test series follows:

Fallout Predictions

Tests will be conducted only when the forecast pattern of significant fallout is entirely within the danger area, in which there are no inhabitants. In forecasting fallout patterns, scientists will make use of improved methods of collecting and evaluating data which have been developed as a result of intensive study of the problem of predicting fallout in the vicinity of the Proving Grounds.

Fallout predictions are dependent upon the accuracy of weather information. The weather reporting network which will be utilized for the 1956 tests will be larger than those in effect during any previous operation. Additional surface and upper air observing stations have been established, and improved equipment and techniques have been developed to increase the altitude and improve the accuracy of weather observations. As a result, more complete and earlier weather information will be provided.

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Research has been conducted in the special field of tropical meteorology, and weather observers and forecasters have been instructed in the new methods of forecasting which have been developed as a result of these studies.

Trained personnel have been organized into a fall-out prediction unit. They will utilize newly-developed fallout computers, will assist in predicting fallout patterns by mechanizing most of the mathematical procedures involved. Use of the computers is expected to allow forecasts to be made much more rapidly than heretofore, so that the final decision to conduct or postpone a test can take last-minute weather observations into account.[1] Models of the clouds produced by large-scale nuclear detonations have been developed as a result of experience gained from the 1954 and subsequent testing operations, and these also are expected to improve fallout predictions.

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[1]The fallout computer, designed by the National Bureau of Standards, works in the following way:

Weather information and estimates of the diameter and height of the cloud and the distribution of radioactivity within the cloud are fed into the computer by setting various dials. One-twentieth second after the data is set up, the machine visually displays a predicted fallout pattern on the face of a television-like tube. The predicted radioactive intensity at any point up to 250 miles or more from ground zero is indicated by the brightness of the pattern at the particular point in question.

With better weather information, more accurate cloud models, and faster procedures made possible by computing machines, the fallout prediction unit will be able to make much more rapid and accurate forecasts of fallout patterns than was possible two years ago. Tests will be conducted only when significant fallout is predicted entirely within the danger area.

Energy Release of Detonations

As announced on March 1, 1956, the 1956 tests will involve weapons generally smaller in yield than those tested during the 1954 series. The energy release of the largest 1956 test is expected to be substantially below that of the maximum 1954 test.

Danger Area

The danger area is generally rectangular in shape and comprises roughly 375,000 nautical square miles. Its boundaries were announced on March 1, 1956. While slightly smaller than the danger zone used in the latter part of the 1954 series, the area is many times larger than the initial danger area used in 1954, and has been reoriented slightly for increased safety. Outside of the test facilities, no inhabited atoll is within the area.

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All ships, aircraft and persons have been cautioned to remain clear of the danger area by notices which have been given the widest possible distribution through United States and international marine and aviation organizations. The Department of State has notified all Diplomatic Missions in Washington of the extent of the area.

Regular air and sea searches of the area will be conducted in advance of the start of operations. Before each shot, the patrol of the danger area will be intensified, particularly in the area where fallout is forecast.

Radiation Monitoring in Proving Grounds Region

After each detonation, aircraft will track the radioactive cloud. In addition, aircraft using aerial monitoring equipment will survey populated areas south and east of the Proving Grounds to detect any radioactivity on land masses and on the surface of the sea.

Radiological safety personnel, equipped with radiation detection and measuring instruments and two-way radios to enable them to communicate with the central Task Force Radsafe Office, will be stationed on the nearby inhabited atolls to the east and south of the Proving Grounds, and at weather stations of the weather reporting network. In the unlikely event of significant fallout in an inhabited

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area, the monitors would warn the inhabitants and advise and assist them in taking safety measures. The monitors also will train Marshallese medical practitioners and health aides in basic emergency measures.

Emergency Planning

As a result of the monitoring procedures described above, the Task Force will have warning should an unexpected wind shift carry the cloud toward an inhabited area, and also will receive information by radio on the levels of radioactivity on the inhabited atolls.

It is not expected that there will be need to move any of the inhabitants at any time during the test series. However, as a precaution, complete plans have been prepared for transporting persons from populated atolls in the event that such action were considered advisable.

Radiation Surveys of Sea and Marine Life

Outside of the testing area, the detonations are not expected to produce levels of radioactivity in the ocean which would be hazardous to marine life or to persons eating food fish. However, an extensive program of measurements of radioactivity in the sea water and in marine organisms will be conducted.

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Beginning about June 10, a fast U.S. Navy vessel will work westward from the test site, making sweeps between 10 and 14 degrees North latitude west as far as fallout radioactivity can be detected.

Continuous readings of radioactivity in the surface water will be taken by means of a device which pumps water around a detection instrument in a tank on the deck of the ship. The ship will stop each 25 miles to take samples of the water at the surface and at depths of 25, 50, 75 and below 100 meters.

Personnel aboard the ship also will make tows for plankton -- tiny marine organisms which tend to concentrate radioactive materials in their tissues. Fish will be caught, and analyzed for radioactivity.

After the series, when test radioactivity will have moved further away from the test site, a similar survey will be carried out as far west as radioactivity can be detected.

The Commission also has entered into a contract with the George Vanderbilt Foundation at Stanford University, under which scientists will collect samples of water, plankton, marine invertebrates and fish in the vicinity of the Palau Islands. These samples will be sent to the biological laboratory at the Hanford Engineer Works for analyses.

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In addition to these investigations, land and marine biological surveys will be conducted on Eniwetok and Bikini Atolls and in their lagoons. Samples of water, lagoon life, and animal life on the atolls will be collected and analyzed for radioactivity.

Fallout Monitoring in United States

The heavier particles fall out of the radioactive cloud at early times after a detonation, while their radioactivity is still high. Therefore, the highest levels of radioactivity occur over a local area downwind from the point of detonation. The area of significant fallout is expected to occur entirely within the uninhabited danger area surrounding the Eniwetok Proving Grounds.

As the radioactive cloud is transported away from the point of detonation, it is widely dispersed by air currents and diluted by normal air. Its radioactivity also decreases rapidly because of the normal process of radioactive decay.[2] By the time the cloud from an

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[2]Radioactive fallout consists of a mixture of radioisotopes, with varying half-lives. The mixture as a whole decreases in radioactivity in such a way that for every seven fold increase in age, the total radioactivity is decreased 10-fold. Thus, the radioactivity at seven hours after the explosion is only one-tenth that at one hour, and in 49 hours is one-hundredth, etc.

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Eniwetok test has traveled eastward across the ocean, it will have become a dispersed, invisible air mass, which has lost much of its original radioactivity.

As a result, the levels of radioactivity in the United States from the Eniwetok tests are expected to be low. Levels of 10 or more times the normal background may be reached in some localities at some times. However, these increases in background will be temporary, and will result in exposure far below amounts which would affect the health of exposed persons.

As it has in the past, the Commission will conduct extensive radiological monitoring operations within the United States during the test series. These operations are not conducted in the expectation of possible hazard, but for scientific purposes and to keep the public informed on levels of radioactivity.

Two types of monitoring operations will be conducted within the United States. One will consist of a network of U.S. Weather Bureau stations, which collect fall-out samples at selected locations throughout the nation. The collection method is simple. A sheet of film covered with an adhesive is exposed outdoors on a tray for 24 hours, and then is mailed to the Commission's New York Health and Safety Laboratory. There, the sample is reduced to ashes,

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and the ashes are monitored with sensitive laboratory instruments. Very minute amounts of radioactivity can be measured by this technique.

During the 1956 series, the following Weather Bureau stations will make fallout collections:

Albuquerque, New Mexico
Atlanta, Georgia
Billings, Mont.
Binghamton, New York
Boise, Idaho
Boston, Mass.
Chicago, Illinois
Cincinnati, Ohio
Cleveland, Ohio
Concord, N. H.
Corpus Christi, Texas
Dallas, Texas
Des Moines, Iowa
Detroit, Michigan
Grand Junction, Colorado
Hatteras, N. C.
Jacksonville, Fla.
Knoxville, Tenn.
Las Vegas, Nev.
Los Angeles, Calif.
Louisville, Kentucky
Medford, Oregon
Memphis, Tenn.
Miami, Florida
Minneapolis, Minn.
New Haven, Conn.
New Orleans, La.
New York (La Guardia), N.Y.
Philadelphia, Pa.
Pittsburgh, Pa.
Rapid City, S. Dakota
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Calif.
San Juan, P. R.

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Scottsbluff, Nebr.
Seattle, Washington
Tucson, Ariz.
Washington, D.C. (Silver Hill, Md.)
Wichita, Kans.

This collection system does not provide immediate information on dose rates, since the samples must be mailed to the Health and Safety Laboratory and counted there. However, the information collected has varied scientific uses. It is needed by the Commission to compute and record the overall accumulation of radioactivity as a result of tests. It is needed by the photographic industry and by scientists conducting experiments with low-level radiation, since these activities can be affected by even a very slight increase over the normal background. The data also are used by meteorologists to trace air masses and check predicted trajectories.

More rapid information on radiation levels will be provided by 39 monitoring stations located in cities across the country.

Twenty-seven of these stations have been set up by the U.S. Public Health Service, which has been furnishing fallout monitoring services to the Commission for the past two years in states near the Nevada Test Site. At the Commission's request, the Public Health Service has established

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an expanded monitoring program which will be in operation in connection with the forthcoming test series.

The monitoring stations established by the Public Health Service will collect daily readings of radioactivity and forward the data to a central collection office in Washington. The monitoring stations also will report data to the State Health Officers of the states in which the stations are located.

The primary purposes of the network are to give State and local health departments more experience in studying fallout and normal background radiation levels, and to obtain daily records of radioactivity. The stations will be manned by trained technicians from State health departments, local universities, and scientific institutions.

Monitoring stations in the Public Health Service network will be located in the following cities:

Lawrence, Mass.	Oklahoma City, Okla.
Hartford, Conn.	Jefferson City, Mo.
Albany, N. Y.	Cincinnati, Ohio
Bethesda, Md.	Indianapolis, Ind.
Gastonia, N. C.	Springfield, Ill.
Atlanta, Ga.	Des Moines, Iowa
Jacksonville, Fla.	Lansing, Mich.
New Orleans, La.	Minneapolis, Minn.
Austin, Texas	Las Vegas, Nevada

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Berkeley, Calif.

Salt Lake City, Utah

Richmond, Va.

Los Angeles, Calif.

Portland, Oregon

Seattle, Wash.

Trenton, N.J.

Denver, Colo.

Honolulu, T.H.

In addition to the Public Health Service network, monitoring stations set up by the Commission will collect data at 12 locations, listed below:

Atomic Energy Project, Salt Lake City, Utah

University of California Radiation Laboratory, Berkeley, California

Argonne National Laboratory, Lemont, Illinois

Atomic Energy Project, Rochester, New York

Los Alamos Scientific Laboratory, Los Alamos, N.M.

General Electric Co., Aircraft Nuclear Propulsion Dept., Evendale, Ohio

Oak Ridge National Laboratory, Oak Ridge, Tennessee

Atomic Energy Project, University of California at Los Angeles

Sandia Corporation, Sandia, New Mexico

Hanford Operations Office, U.S. Atomic Energy Commission, Richland, Wash.

Idaho Operations Office, U.S. Atomic Energy Commission, Idaho Falls, Idaho

New York Operations Office, U.S. Atomic Energy Commission, New York, N.Y.

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Measurements of Radioactivity Outside the U.S.

Samples of airborne dust will be taken at approximately 70 various localities throughout the world, in addition to the U.S. stations. Previous studies of this kind have shown that the average gamma ray dosage delivered to world inhabitants by all tests to date is less than the dose they have received from natural background radiation during the same period of time. All of these dosages are believed by radiologists and radiobiologists to be harmless.

Radiostrontium-90 has been demonstrated to be potentially the most hazardous of bomb products which compose airborne dust or fallout. As in the past, soils will be sampled on a world-wide basis, and samples of other materials such as milk and cheese, field crops, and human and animal bones, will be taken for analysis of their radiostrontium content. These samplings are carried out, together with radiochemical analysis, for a 2-fold purpose: 1) to ascertain the world-wide distribution of radioactive fission products - particularly strontium-90 - in the air, water and soils of the earth as a result of atomic tests to date; 2) to ascertain the relationship of man to his environment, particularly as regards strontium-90. These observations, when combined with studies on the biological

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hazards of strontium-90, have disclosed that nowhere in the world are there concentrations of this isotope remotely approaching hazardous amounts. The average concentration observed in human bone is less than 1/10,000 of the concentration which might be expected to show ill effect on human beings. The highest concentrations found in any individuals are less than ten times the average.

Summary

Elaborate precautions are being taken to limit significant fallout to the uninhabited danger area surrounding the Eniwetok Proving Grounds.

Information on radioactivity on inhabited atolls in the Marshall Islands will be obtained rapidly and transmitted to the Task Force Headquarters.

Should there be significant fallout on an inhabited atoll, monitors will advise the inhabitants regarding basic emergency measures, and the inhabitants could be moved away from the atoll quickly if such action were considered necessary.

Ocean water and marine life will be analyzed for radioactivity, and measurements of radioactivity will be taken within the United States and in other parts of

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the world. Levels of radioactivity outside the danger area are expected to be far below those which would be a significant hazardous to exposed persons.

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