be made an integral part of the activities of United Nations specialized agencies. The resolution made these recommendations: (i) the World Health Organization should provide contraceptive information as a part of its health program; (ii) the Food and Agriculture Organization should combine a family-limitation campaign with its efforts to increase food production; (iii) the Economic and Social Council should consider family planning as a "major means" of improving living standards; and (iv) the Human Rights Commission should include voluntary parenthood and freedom to obtain family-planning education in the listing of basic human rights.

Fallout of Strontium-90

On 23 March new information about fallout of radioactive material from nuclear tests was released in censored form by Senator Clinton P. Anderson (D-N.M.), chairman of the Joint Congressional Committee on Atomic Energy. The information appeared in part in letters by Maj. Gen. Herbert B. Loper (retired), special atomic energy assistant to the Secretary of Defense, and Willard F. Libby, commissioner, Atomic Energy Commission. Following are the texts of the letters.

Letter from Loper

Feb. 19, 1959

DEAR MR. CHAIRMAN:

The following is a brief status report outlining the present programs for analyzing and evaluating the radiation hazards resulting from atomic detonations.

Fallout reports from Operations Redwing (1956), Plumbbob (1957), and Hardtack (1958), are currently under preparation.

The hazards of local contamination from nuclear-weapon detonations have been fairly well delineated. However, the difficulty in accurately predicting the rapidly varying atmospheric conditions results in uncertainties as to the area of fallout. Predictions of local fallout contours from enemy bombs must be based on a large number of assumptions such as the type of weapon, height of burst, and yield. These unknowns do not allow accurate prediction of fallout from enemy bursts during wartime. Delineation of contaminated areas by airborne radiac instruments after deposition of the fallout is presently practicable and will be of considerable military and civil value during wartime.

The deposition of world-wide fallout or world-wide surface contamination is now beginning to be accurately measured . . . (Classified portion deleted) . . . Recent indications are that the radioactivity in the stratosphere has a residence half-life of two years (in contrast to the previously assumed value of about seven years) and the present amount of Sr^{90} in the stratosphere would be maintained by the injection of about 6 megatons of fission products per year. The concentration of the Sr^{90} on the surface of the earth is greater in the United States than in any other area of the world. The danger of carbon-14 and cesium-137 has been examined, and the immediate probability of any one individual being affected is about 1 in 500,000.

The risk of damage resulting from the testing of weapons is therefore extremely small and much less than other common occurrences such as x-rays, automobiles, chemical contaminants, household cleaners, etc. However, the probable casualties attributable to radioisotopes from weapon testing when summed over the populations of thousands of years create a moral issue that could be of considerable propaganda importance.

The distribution of the radioactive debris in the stratosphere as a result of the detonations to date is not clearly defined as to its altitude and latitude variation. The altitude dependence partially determines the drip-out rate and the latitude dependence influences the extent to which the world-wide fallout is uniform over the earth. Tentative conclusions to date indicate that three-tenths of the quantity of radioactive debris leaves the stratosphere each year, that the north-south diffusion of radioactive particles in the stratosphere does exist, and that in both hemispheres there is a latitude band of maximum drip-out which is from 35 degrees to 50 degrees north or south.

There is a need for more experimental and collecting programs in the following areas of the effects and behavior of fallout from nuclear weapons:

(a) Amount of fallout deposited locally from a low height of burst.

(b) More accurate determination of the drip-out rate of radioactive particles from the stratosphere.

(c) Further define the estimate of the amount of radioactivity formed per kt [kiloton] of fission yield.

(d) The refinement of measuring techniques to account for all radioactivity produced from a nuclear yield.

(e) Advancements in the knowledge of fireball chemistry, physics and particle behavior.

(f) Response of biological systems to radiation.

Sincerely yours,

(s) HERBERT B. LOPER

Assistant to the Secretary of Defense (Atomic Energy)

HON. CLINTON P. ANDERSON

Chairman, Joint Committee on Atomic Energy

Letter from Libby

Feb. 27, 1959

Hon. Herbert B. Loper, Chairman,
Military Liaison Committee.

DEAR GENERAL LOPER:

In connection with your letter to Senator Anderson of Feb. 19, 1959, concerning radiation hazards resulting from atomic detonations, I have just completed a study of data . . . which you kindly made available to us last December. I am sorry that, because of the complexity of the problem and my preoccupation with other duties, I have been so slow in finishing my consideration of the data and in sending on my comments. . . .

I think your letter to Senator Anderson is an excellent exposition of the present position we are in. There are, however, one or two points you make on which I believe further words are necessary in order to resolve some questions.

The extensive data that have already been published by Project Sunshine and the United Kingdom study group, together with your beautiful . . . work, still leave us, despite their great volume and complexity, in some uncertainty, as you say, as to the distribution of the radioactive debris in the stratosphere to both altitude and latitude variation, since the altitude variation determines in part the drip-out rate and thus the residence half-life in the stratosphere, this quantity is left in some doubt. My own present conclusion is in agreement with yours as stated in your letter, in that my previous value of seven years for this important number is too long and that it should be reduced. In a restudy of this question being released March 13 in Seattle, a copy of which will be sent you as soon as it is printed, a new value of about four years rather than the earlier seven is arrived at. I find it difficult to push it down to the two years you give as an indicative value.

On the amount of strontium-90 in the stratosphere, at the present time there is a somewhat larger difference in our estimates which may be due to your not having included the Russian series of last October, which in itself alone, according to my estimates, increased the stratospheric inventory by about 50 percent. . . . You give the present inventory as requiring 6 mt (megatons fission equivalent) per year to be maintained at its present level. For a half-life of two years this corresponds to only 17 mt total and appears to leave too little room for the injections from tests before last October, which I estimate still have left some 25 to 30 mt and a corresponding required rate of injection for steady maintenance of about 7 mt per year. The closeness of this figure to your 6 mt per year number shows how badly we need further information on the actual stratospheric content.

You indicate that the stratospheric fallout occurs at maximum rates in the 30 degree to 50 degree bands of latitude in both hemispheres. This old argument still is not quite settled, I believe, although the evidence in favor of your conclusion is increasing. My principal difficulties with it at the moment are that we know that a considerable part of the peak in observed fallout in these latitudes in the Northern Hemisphere is due to tropospheric or local fallout which was never in the stratosphere and the evidence for a corresponding peak in the Southern Hemisphere seems to be rather weak.

With respect to the carbon-14 and cesium-137 hazards, the laboratories measuring radiocarbon dates in various parts of this country, in Europe and New Zealand have sent me data on the present increase in the carbon-14 content of living matter which amounts to about 10 percent of the natural level of carbon-14 from the cosmic rays which in itself corresponds to about 1.5 milliroentgen per year—about 1.5 percent of the average total natural dose rate. Turning to cesium-137, Dr. E. C. Anderson in the Health Division at our Los Alamos Laboratory has just reported data on the human level in the United States and Europe for the late summer and early fall of last year which amount to an average of about 75 micromicrocuries per gram of body potassium for an internal dose rate of about 3 milliroentgens per year. The total cesium-137 fallout in the United States now amounts to about 50 millicuries per square mile. This adds about 1 mr/yr of external dose for a total of about 4 mr/yr due to cesium-137, which is about 3 percent of the natural average radiation dose rate from natural radioactivity and the cosmic rays. I can't tell whether these numbers are in strict keeping with your estimate that the immediate probability of any one individual being affected by bomb-test carbon-14 and cesium-137 is about 1 in 500,000 but I think your estimate looks reasonable.

On the many other points in your letter I find myself in complete agreement, particularly about the importance of more experimental and collecting programs on the amount of fallout deposited locally from a low height of burst. Since it may be that we will not again have the opportunity to test devices, at least above ground, it is particularly important to consider whether we may not collect more information at this point from past tests. I believe there are some possibilities of doing this and I suggest that we undertake such a program jointly right away.

Sincerely yours,

W. F. LIBBY

Commissioner, Atomic Energy Commission

Young Research Workers for Government Laboratories

As the result of its first use of the Research Scientist Examination, the Civil Service Commission has 105 of the 200 young research workers it started searching for last December. The successful applicants, selected from a group of 370 who took the test, are now qualified to be considered for assignment to 11 federal laboratorie in the Washington, D.C., area. They will be given opportunity to begin research work with a starting salary of $5430. Placement has already begun. A second and last test was administered to 690 persons in late March; 100 additional applicants are expected to qualify.

New Program

The two tests are part of a new personnel program conducted by the Civil Service Commission for 11 Washington area laboratories which need young research workers. The National Bureau of Standards, the National Institutes of Health, the Naval Research Laboratory, and 8 other agencies compose the interested group. The recruiting program is unusual in that it offers high starting salaries, direct entry into research positions, and thorough and imaginative testing of the applicant's research potential. Persons taking the positions will be given the opportunity to continue their formal education beyond the bachelor's degree. The 11 scientific facilities plan to devise means by which advanced study can be undertaken; in some cases it is expected that the worker's laboratory project will be applicable to his degree requirements.

Unlike other Civil Service programs, which use academic records as the primary basis of selection, the new recruiting system requires the applicant to take two tests. The first examines for knowledge of the subject matter of either chemistry, physics, or mathematics, or a combination of the first two. The second test examines for skill at mathematical formulation, an ability that has been found to have a high correlation with creative research potential.

Wide Range of Colleges

A remarkably wide range of colleges was represented by the first group of applicants for the commission's test given last February. More than 150 institutions were listed as the last school attended; 73 colleges had educated the 105 applicants who passed. The major universities of the country had only a limited representation on the list, which was composed to a considerable extent of small colleges such as Alverno, Loras, Wofford, and Canisius. Albert Maslow of the commission's test development section has speculated that this preponderance of smaller institutions might have been caused by two things, among others; the fact that the large colleges and universities have large and effective senior placement services, and the fact that the small colleges are probably less often visited by industrial and governmental recruiting teams. The small college man, in other words, has to go out and look for a job, and the commission's program, with its high salaries, was apparently quite attractive.

Success of Test

Working with preliminary data, the Civil Service Commission's testing experts feel that the tests, collectively called the Research Scientist Examination, show promise of considerable success. Although the final evaluation can only be made after the successful applicants have been working for a number of years, other information now available indicates that two major aims have been accomplished. The first is that the test drew persons from the age group that the designers had in mind. The great majority of the applicants were 22 or younger, and were in their last year of college or their first year of postgraduate work. A questionnaire, which was given with the tests, shows that the majority of the applicants, particularly those taking the physics subject matter, want to do postgraduate work. Success of the test is also indicated by the fact that among 35 percent of those that received high scores in the examination reported themselves to have been in the top quarter of their college class. Similarly, 44 percent of those who did well in the test had received Phi Beta Kappa citations, had graduated with honors, or had received other recognition for scholarship. Those with lower class standing and those with no scholarship citations did not do as well. In the view of the commission's experts, these findings suggest that the subject-matter tests gave an accurate measure of the applicant's knowledge of his field. The mathematical formulation test is another case. Only time will tell if it successfully identified those with creative research potential in this group as it has in past groups.

Commission personnel also feel that the combined tests effectively compensate for the differing standards at various schools. This problem, difficult with just two different institutions, was compounded by the great number of parent institutions listed by the applicants.

Also, the tests showed that a small number of people who were in the lower half of their class did very well on the examination. In the physics examination, for example, three of the 16 persons who received the highest scores were in the third or fourth quarter of their class. For these reasons, and because of the heavy response to its new program the commission believes that it will be able to