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- - - - - - - - to provide information and to stimulate discussion. Not to be attributed as official FAS policy unless specifically so indicated.

ARMS CONTROL AGENCY ONE YEAR OLD

The United States Arms Control and Disarmament Agency was born on September 26, 1961, in the midst of adversity. The 1961 Berlin crisis was at its height, the Berlin Wall had just been constructed, and the Soviet Union had just resumed nuclear weapons testing. In spite of these adverse circumstances and an expressed desire on the part of Congress to give no suggestion to the Soviet Union that the US might be weakening in its resolve, the Arms Control and Disarmament Act of 1961 passed the Congress by a greater majority than any other major act that session except the Defense Appropriation Act. That it passed a all, much less by such a majority, is due not only to the special quality of disarmament as an unassailable goal, but also to the political acumen and hard work of Mr. John J. McCloy and his staff and to the efforts of the many private organizations, including FAS, which lobbied effectively for the bill.

Mr. McCloy had been appointed by President Kennedy at the time of his Inauguration to be Special Assistant to the President for Disarmament. In that capacity Mr. McCloy directed a review of US policy on the nuclear test ban and managed the negotiations for a test ban which resumed in March of 1961, developed and guided through the government a new comprehensive disarmament program which was presented to the UN on September 25, negotiated a bilateral agreement with the Soviet Union governing the principles for disarmament and, lastly, prepared and guided through the Congress the legislation establishing the Arms Control and Disarmament Agency.

To assist him he had utilized a small organization known as the U. S. Disarmament Administration, a segment of the State Department established in September of 1960 by President Eisenhower. Although Mr. McCloy did not hold the official title, he acted as director of the Disarmament Administration, and gathered together specialists from a number of other agencies and several persons from outside the government. This became the nucleus of the new Agency.

When the Arms Control and Disarmament Act was signed, the President appointed William C. Foster as Director of ACDA. Mr. Foster had served as Deputy Secretary of Defense during the Truman Administration and headed the U. S. Delegation to the Surprise Attack Conference in 1958. At the time of his appointment he was vice-president of the Olin Mathieson Co. and chairman of the board of the Aerospace Corp. He has largely shaped the direction that the Agency has taken, a direction that has been viewed with mixed feelings by many specialists in arms control outside the government as well as by persons involved in disarmament matters within the government.

The Director of ACDA is advisor to the President and the Secretary of State for arms control and disarmament matters. Policy recommendations developed by ACDA are first passed on by the Committee of Principals, composed of the Secretaries of State and Defense, Chairman of the AEC, Directors of CIA and USIA, and representatives of the White House staff, before presentation to the President. An Executive Order released August 2, 1962, gives the Director of ACDA the responsibility for coordinating policy formulation and research in arms control and disarmament matters within the government. Until now ACDA has apparently restricted its role to the consideration and development of negotiating proposals but has not played a role in other aspects of arms control policies including its relation to defense policy. The Executive Order does not specifically provide for a broader role, for it says that "The Secretary

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NON-COMMUNIST AFFIDAVIT NO LONGER REQUIRED FOR STUDENT LOANS

The President has signed a bill (Oct. 17) revising the controversial loyalty oath and non-communist affidavit provisions of the college student loan program. The student loan programs of the National Defense Education Act and the National Science Foundation Act will no longer involve the execution of the affidavit, in which the applicant is required to swear that he has never joined and would not join any organization advocating violent overthrow of the United States. Many colleges and universities refused to take part in the National Defense Education loan program because of this requirement.

The bill retains the loyalty oath, and adds provisions for both programs requiring detailed statements of any crimes of which the applicant has been convicted since reaching his sixteenth birthday, with the exception of traffic violations carrying a fine of less than twenty-five dollars. The bill also makes it a crime for any member of an organization identified as communist-controlled by the Subversive Activities Control Board to apply for or use any scholarship or loan. In addition, the NSF is given authority to revoke or refuse any loan or fellowship for reasons it judges to be "in the best interests of the United States." (NYTimes 10-6).

TO ALL FAS MEMBERS

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DISARMAMENT AND DEFENSE

The following excerpts are from the remarks of Roswell L. Gilpatric, Deputy Secretary of Defense, at the Aerospace Symposium, held at the Air Force Academy, Aug. 13, 1962 (Department of Defense, Office of Public Affairs Release No. 1308-62):

"Directly in the area of arms control and disarmament, the first task of our Defense Department, and of the defense establishments in other countries, is the technical one of evaluating the national defense implications of the various proposals that are being considered. For all of the governments involved have agreed that steps toward general disarmament must be designed so that no one side gains a significant military advantage from the disarmament process. Furthermore all sides must have reasonable assurance that the agreed steps are being faithfully adhered to.

"These requirements are not minor issues which can be brushed over in order to get on with the real business of disarmament. The real business is not disarmament as such but reducing the risk of war. It does not take much foresight to see that an improperly designed or inadequately controlled disarmament agreement could increase rather than diminish tension and danger. No nation should be put in a position where it, or some important segment of its leadership, believed that it could move aggressively to achieve a decisive advantage in world affairs. Nor would it be tolerable for another nation to feel its security so seriously threatened by an imbalance in the disarming process or by imperfections in the inspection procedure that it must repudiate the agreement and rearm.

"This does not mean we should reject any disarmament agreement in which we perceive some risk, any more than we should accept any agreement in the name of disarmament without realistically assessing the risks involved. Rather we should seek to balance the risks involved in accepting or failing to accept each proposal. This approach leaves the extremists at both ends unhappy with the result that we may be called warmongers by one side and appeasers by the other. But between the alternatives of being called names or of blundering into a situation where either nuclear war or surrender is virtually inevitable, it is better to be called names.

"The present balance of military power effectively eliminates the likelihood that any nuclear power could deliberately provoke a nuclear war. But we still live in danger. War by accident or misunderstanding, or folly of one kind or another remains possible. Formal disarmament and arms control agreements are one, although only one, of the approaches through which we can work to reduce the danger inherent in the existence of modern weapons technology. So long as cold war tensions exist—that is.

"The Soviets can to a large extent react to what we are actually doing rather than to exaggerated fears of what we might be doing. But, unfortunately, so long as we have so little knowledge of what the Soviets are doing, we must base our preparations to a significant extent on what we think they are capable of doing. This is an important consideration in view of the relatively long lead-times required for the development and production of weapons systems. We cannot wait until Soviet weapons have been developed, produced and deployed in such quantities as to be evident before we begin our own cycle of development and production. Thus the Soviets are forced to work hard to match the efforts that they **know** we are making to match the efforts that we **think** they are making.

"It is too much to expect the Soviet Union will move swiftly to an open society. But perhaps they can be brought to appreciate the way in which their passion for secrecy not only makes disarmament extraordinarily difficult but also is itself an important cause of the arms race.

"All of this does not add up to a cheerful outlook for disarmament, particularly for any immediate approach to the long-term goal of general disarmament. We can take comfort, nevertheless, in the increasing interest and understanding of the problems of disarmament and arms control which is apparent in this country and which is being paralleled in other countries. Likewise, we can reasonably hope for at least a beginning to progress in this field at the current Geneva Conference.

ROLE OF DEFENSE ESTABLISHMENTS

"Here I go back to the need for all of us in the defense establishments of the countries involved to play a useful and affirmative role in the field of disarmament and arms control. It is a role going beyond simply recommending a yes or no to various points on the proposals we are asked to consider. We must come forward ourselves with constructive proposals.

"We must be asking ourselves not merely, "What can we stand in the way of disarmament and arms control without weakening our security," but "What can we suggest that will add to our security." This is an enormously difficult area. It is easier to think merely in terms of building ever stronger defense. But I have no doubt that if the defense establishments on both sides face up to the situation, arms control proposals can be developed which will add to the security of all nations without significantly jeopardizing the legitimate interests of any. . . .

"In some areas related to disarmament and arms control, I think we have been doing very well. We have worked out elaborate precautions to reduce the chance of war by miscalculation or accident. We have designed our systems in ways to make extremely unlikely the unauthorized firing of a nuclear weapon. We are trying hard to achieve the most reliable command and control systems, so that even in the event of a nuclear exchange there would be some hope of being able to limit the extent of the exchange and to minimize, to the extent possible, the damage to civilian targets . . . so long as the distrust and aggressive tendencies that first caused the arms race exist, the political leaders on both sides will necessarily look to their defense establishments for advice on the military significance of the proposals that are being considered. This alone clearly gives the defense establishments on both sides an important role in the area of disarmament and arms control.

"It does not mean, however, that the defense spokesmen should hold a veto over the judgments of political officials. Political leaders must always make the final decision. Specifically they must decide whether broader considerations of statecraft shift a balance of risk that may seem unacceptable from a narrowly technical, in this case military, point of view. But unless the political leaders have before them a carefully thought-out evaluation of the technical considerations, they cannot reach a judgment on the broader balance of risks. That is because they do not know, with any confidence, how great or how small the technical risks are. Thus foot-dragging is almost bound to occur on one or both sides as negotiations progress.

"The point here is not to argue that the defense establishments should be consulted, for this is being done here and in other major countries involved in disarmament negotiations. The point is rather that the responsible defense officials, military and civilian, and their scientific and engineering advisers, such as many of you here today, must come to know the special problems of disarmament and arms control. Only thus can they properly perform in this area and in the broader area of minimizing the chance of a nuclear war and of the damage that might be done should deterrence fail. . . .

Disadvantages of Secrecy

"I would also suggest that the passion for secrecy is far from an unqualified asset to Soviet security. To the extent that they agree with us that the national security of all countries is threatened by the danger of war, they should realize that secrecy has the unavoidable effect of increasing tensions and the arms race, and so adding to the risk of war. By simply reading material published openly in the American press, the Soviets know within quite reasonable limits what the United States is doing in the field of armaments. The West, on the other hand, must guess, to an important extent, what the Russians are doing. The situation is not wholly unlike that of a foot race with one runner blindfolded. Such a race tends to be all-out because the blindfolded runner can never be sure that he is not falling behind.

"To understand the impact of Soviet secrecy, one must understand the dynamics of the arms race between the great powers. Much thinking about the present arms race is colored by historical experiences with arms races which were primarily open and quantitative. Known quantities of known armaments were built up. Today the arms race is still quantitative in a sense, but to a larger extent it is qualitative. As this audience well knows, it is a matter of coninuous technological innovation, of moving into newer weapons systems more than multiplying older ones.

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RADIATION STANDARDS AND FALLOUT

The following excerpts are taken from a Summary of Hearings on "Radiation Standards, Including Fallout" held before the Subcommittee on Research, Development, and Radiation of the Joint Congressional Committee on Atomic Energy.

In the past under special circumstances, iodine 131 initially injected into the stratosphere or upper troposphere as a result of nuclear wapons tests has been brought down to earth unpredictably in the form of locally deposited fallout or "hot spots." Fresh fission debris which was originally held in the troposphere (lower atmosphere) is relatively high in iodine 131 and can if brought to earth contribute to relatively high levels of I^{131} unevenly distributed in localized areas across the country.

No consistent relationship between the concentrations of fission products in air at ground level and I^{131} in milk has yet been discovered.

Cumulative levels of iodine 131 in milk are, in some areas, approaching or possibly exceeding the acceptable levels recommended by the Federal Radiation Council for environmental sources generated by peaceful applications. What levels of this nuclide can be tolerated for exposure of a population from fallout have not been established.

UPTAKE OF RADIONUCLIDES THROUGH FOOD CHAINS

Testimony presented at this year's hearings showed that the amount of strontium 90 appearing in the diet is only about one-half to one-third as high as previously predicted.

It was indicated that the absorption of cesium 137 from the soil might be as little as one-tenth to one-twenty-fifth that of strontium 90. The cesium levels in the diet, and thus in humans, is closely related to the rate of fallout during the growing season.

The natural body process for discriminating against strontium 90 in favor of calcium in the total diet is apparently two to four times less effective in the case of infants than was previously estimated. Thus, recent measurements indicate that this "discrimation factor" for newborn infants is not as favorable as originally estimated.

Sufficient information is now available to show that the strontium 90 to calcium ratio in milk has been lower than that of the total diet of individuals in the United States. This indicates that milk is a preferred food among the natural foods, since milk is a major source of calcium in the diet. If milk were removed from the diet, more strontium 90 would be taken in (ingested) through the replacement of the calcium otherwise obtained from milk.

In a typical American diet, more than 98 percent of the total radioactivity consumed with food each day is naturally occurring potassium 40, a normal constituent of natural potassium, an element essential to life, and found in all tissues of the body.

RESEARCH ON BIOLOGICAL EFFECTS OF RADIATION

Differences of opinion expressed at the 1959 hearings on whether there is a "threshold" level of exposure, below which somatic effects will not occur in the body, have yet to be settled within the scientific community. While radiation protection standards continue to be based on a linear or "no threshold" assumption, it is possible that the true radiation risk for somatic effects at levels near or several times higher than natural background may prove to be smaller than would be predicted by this assumption, and may possibly be zero.

FAS NEWSLETTER

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Chairman.....Freeman J. Dyson

The FAS Newsletter is prepared in Washington by FAS members. The staff for this issue were: Editor—Gary Felsenfeld; Writers: L. Gellert, F. K. Millar, N. Seeman, E. Shelton.

The FAS, founded in 1946, is a national organization of scientists and engineers concerned with the impact of science on national and world affairs.

There have been no basic changes in the 1959 conclusions on genetic effects but significant advances have been made in genetics research particularly in relation to genetic effects and dose rate.

It is estimated that fallout from all weapons tests conducted through 1961 would have the same long-term genetic effect on the U.S. population as that produced during 6 months to 1½ years of radiation exposure from natural sources. Similarly it is estimated that the possibility of leukemia or bone cancer from fallout as a result of these tests is comparable to the possibility of incurring such effects resulting from one-half to 3½ years' exposure to natural background radiation.

FALLOUT EXPOSURE FROM PAST TESTS

Past estimates of exposure to the population from fallout have apparently been somewhat too high. The more accurate and complete data that have become available since the 1959 hearings have resolved uncertainties in favor of lower exposure levels than previously predicted.

Testimony at this year's hearings indicated that long-term predicted levels of strontium 90 in the body from past weapons tests are about one-third to one-half the levels predicted in 1959. Estimates of internal exposure from cesium 137 have also been reduced.

These estimated reductions have been offset, in part, by an upward revision in estimated levels of other sources of exposure from fallout, particularly the short- and intermediate-lived isotopes (e.g., iodine 131). Present estimates of whole body and gonadal exposure from short- and intermediate-lived isotopes are about double the estimates made in 1959.

In 1959 it was predicted that the maximum concentrations of strontium 90 in bone within the United States from tests prior to 1959 would be about 6 strontium units and that these levels would be reached in the period of 1962 to 1965. It was also predicted in 1959 that if the test programs of the previous 5 years were to be repeated indefinitely, the levels would reach a value of 48 strontium units (S.U.). On this basis, it was suggested in 1959 that programs of continuous testing at this scale (40 years or more) might create a hazard to the world's population. It was pointed out in 1959 however, that since the initial values on which these predictions were based might be either too high or too low by a factor of two, the predicted level of 48 S.U. might be reached earlier and exceeded, or might not be reached at all.

Testimony presented at the 1962 hearings showed that the predicted initial level of 6 S.U. from tests conducted prior to 1959 was indeed too high by a factor of about two, according to present estimates, therefore, strontium 90 bone levels of about 25 S.U. instead of 48 S.U. are predicted for a program of continuous testing at the old rate.

PREDICTIONS FOR FUTURE TESTING

Methods were presented by which one can predict the probable population exposures for atmospheric testing under three conditions: (1) At low altitudes in polar latitudes, (2) at low altitudes in equatorial latitudes, and (3) at high altitudes in any latitude. The predictions were based on the assumption that all of the fission debris is distributed in the same pattern as strontium 90. These methods are considered valid only for stratospheric, worldwide fallout.

The distribution of tropospheric fallout was considered to be unpredictable on the basis of attempting to set up a standard method divorced from a consideration of meteorological conditions at the time tests are conducted.

A new concept, called the dose commitment concept, was introduced during the hearings to explain the significance of fallout. The fundamental hypothesis of this concept is that the risk of biological damage to a large population is proportional to the average radiation exposure level produced by radioactive contamination in the environment. Thus, it is not necessary to specify the biological effect, because the same effect should be produced by an equivalent exposure to radiation from natural sources. Previous comparisons have been based on a 30-year exposure for genetic effects and a 70-year exposure for somatic effects compared to natural background during 30 and 70 years, respectively.

For the fission products from 1 megaton (MT) of fission yield injected in the low stratosphere at polar latitudes, the resulting average exposure of the population as a whole is equivalent to the radiation exposure received from natural background sources in a period of 1 to 2 weeks. Similar injections at the equator, or at high altitudes, lead to average exposures of the population equivalent to that received in 1 week or less from natural background sources.

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ARMS CONTROL AGENCY

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of Defense shall keep the Director informed with respect to the planning of armed forces levels and armaments and, for consideration in connection with such planning, the Director shall furnish the Secretary of Defense statements of existing and projected arms control and disarmament policies." On the other hand, ACDA has not taken the initiative in presenting its views in such areas as the defense budget or NATO policy, or in relating US actions in these areas to arms control objectives.

When Mr. Foster assumed directorship of ACDA, he acquired a staff of about 80 persons from the Disarmament Administration and a budget of $2.0 million. By June 30, 1962, the Agency had grown to a total of 115 persons, compared to its budgetary allocation of 126. The slow rate of growth was due in part to the rigid security regulations written into the act creating the Agency; these require full-field background investigations by the Civil Service Commission or the FBI and impose standards no less stringent than those utilized by any other agency. This has prevented ACDA from utilizing Defense Department or State Department clearances and from giving interim clearances. The 3-to-4 month delay necessitated by the clearance procedures has discouraged many prospective employees.

The first few months of the Agency's existence seem to have been a period of adjustment to its new status, with little growth or productive activity. There was little hiring of new personnel until several Assistant Directors had been appointed. Ambassador Jacob Beam, former Ambassador to Poland, was appointed head of the International Relations Bureau; Rear Admiral Edward N. Parker, head of the Weapons Evaluation and Control Bureau; and Dr. Franklin A. Long, former chairman of the Chemistry Dept. of Cornell University and member of the President's Science Advisory Committee, head of the Science and Technology Bureau. Today the Science and Technology Bureau has 9 technical people, while the Weapons Evaluation and Control Bureau has 6 civilian employees and 11 military officers on loan from the Defense Department.

After an agreement had been reached between Amb. Stevenson and Mr. Zorin on the negotiating forum for new disarmament talks, ACDA began developing the general disarmament program of Mr. McCloy into specific negotiating proposals. This effort, conducted via working groups established among the various bureaus of the Agency, resulted in a series of proposals which were presented to the Geneva Conference in March. These elaborated on the McCloy plan and, in particular, envisioned a 30% across-the-board reduction of major armaments during the first three years accompanied by inspection utilizing the zonal inspection concept.

The US presented these proposals to the Geneva Conference on March 15. At the same time the Soviet Union introduced a "Draft Treaty on General and Complete Disarmament under Strict International Control". The US was apparently aware that the Soviet Union would introduce such a treaty, but it was not prepared with a similar document. Caught in a position in which the Soviet document was the only one available for use as a basis for negotiations, ACDA began a "crash" drafting period which resulted in the introduction of an "Outline of Basic Provisions of a Treaty on General and Complete Disarmament in a Peaceful World" on April 18. This document presented in somewhat more detail the original 30% proposal with a general description of the zonal inspection scheme but no details on specific inspection procedures. The Soviet Union has rejected this proposal, claiming that it simply freezes the present relative balance of forces while requiring extensive inspection. Since the introduction of this treaty outline there have been few additional details presented concerning the US plan, and there is no public evidence of Agency study directed at seeking a more negotiable modification of it.

The Arms Control and Disarmament Agency's record on the nuclear test ban has been mixed. No new initiatives were taken in the November negotiations. Prior to the resumption of negotiations in Geneva in March, the President introduced the concept of "inspection for preparations" at a news conference. This was followed by a letter from Mr. Foster to the Washington Post, attempting to explain that the President was not introducing a "new element" into the negotiations. A general disarray was suggested by these statements, by the succeeding statement of Mr. Foster on "Meet the Press" that no methods of inspecting for preparations were then available, and by he final backdown to a position asking periodic declarations by heads of states that there were no preparations for testing and the right to inspect declared test sites.

Several other new test ban proposals were presented at the opening of the Eighteen-Nation Conference, and two major new treaties were presented to the Conference in late August. One of these treaties was a new treaty calling for a ban on nuclear weapons tests in all environments to be monitored by a network of internationally-supervised national stations. While the US did not state the number of stations or the number of on-site inspections which it required, it was understood that in each case the number would be smaller than prescribed by the original US treaty of April 18, 1961. The US also presented a treaty banning without inspection tests in all environments other than underground. The presentation of the comprehensive treaty was preceded by extensive briefings and hearings before a number of Congressional committees. In these hearings, and in its public presentations before the Geneva Conference, the Agency based its new position on the "new data" produced by the Vela Program.

The Agency's research program has begun with several industrial contracts and a number of smaller study contracts. The first contract to be let was for $150,000 with the Bendix Sysems Division for a study of techniques for monitoring production of strategic delivery vehicles. Several other inspection studies were also undertaken including a study of progressive zonal inspection of the use of statistical techniques in inspection and a study of the military risks from violations and associated verification requirements for restrictions on strategic delivery vehicles. ACDA has supported several non-technical studies including a symposium on political control of an international police force and partial support of a summer study on the sociopolitical implications of disarmament.

The first study to be completed by the Agency was a summer study conducted by the Institute for Defense Analyses at Woods Hole, Massachusetts. This study of inspection and control in disarmament agreements was headed by Prof. Owen Chamberlain of the Physics Department, University of California, Berkeley, and an FAS Council member. The participants included nine physical scientists, five lawyers and five political scientists. The members of this study took a general look at the problem of verification including the need for information supplied by an inspection system and the various responses that would be taken to information indicating a violation. The results seemed to demonstrate the usefulness of such an interdisciplinary approach to disarmament problems. (FAS was well represented: members Wm. Higinbotham, Louis Sohn, Hans Morgenthau, and David Frisch were participants.)

The Agency has received its full requested appropriation of $6.5 million for this fiscal year. $4.0 million of this is allocated to contract research. The programs suggested for 1963 include studies of the strategic implications of particular arms control measures, numerous studies of inspection requirements and techniques, and a number of studies of international institutions and methods of settling disputes.

The existence of the Agency seems to have had a stimulating effect upon other agencies of the government. There has been more discussion of arms control and disarmament within the government during the past eighteen months than during the previous fifteen years, and a good deal of progress has been made.

DISARMAMENT

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the long-term goal of general disarmament. We can take

"Finally, let me say a word about the hazards of slogans in the arms control area. A few weeks ago the President made a speech at Yale on the American habit of carrying on our domestic debate over economic policy in terms of myths that may never have been valid and which certainly cannot be validly applied to the American economy today. The same can be said about the problems of reducing the risk of nuclear disaster. This area is difficult enough without being confused by discussion carried on in terms of vaguely defined and sometimes meaningless slogans. For responsible governments—and the world is in a sorry fix if any of the governments with access to nuclear weapons are irresponsible—do not act on simple-minded slogans. To the extent that the arguments over arms control and disarmament are forced into terms of conventional myths and cliches, productive communication and exchange of views are inhibited."

RADIATION STANDARDS AND FALLOUT

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The significant thing is that estimates of exposures per megaton of fission yield detonated have been going steadily downward as more experience is gained, while the number of megatons of fission yield detonated have been steadily increasing. Therefore, the estimated exposures have remained relatively constant.

MAJOR PROBLEMS RELATED TO FALLOUT

The major problem areas in this field appear to be:

1. While our ability to predict the general pattern of global fallout appears reasonably well developed for certain patterns of testing, it is quite clear that many local situations exist for which prediction is not well worked out.
2. There are still major gaps in basic information on what biological effects relate to what levels and rates of radiation exposure. These gaps can be expected to remain for some time.
3. Development of an approach toward evaluating transistory high dietary or air levels of one or more short-lived nuclides is needed. The committee believes that recurring periods of such levels will be experienced from time to time in the future.
4. Definition of an adequate Federal program of radiation exposure assessment and protection. The elements listed below are urgently required.

A. Broad examination of approaches to the general problem of radiation hazards within the political, social, and economic system of this country.

B. Information gathering activities:
   1. Research.
   2. Surveillance-monitoring.
   3. Supplementary data-gathering (census data, agricultural data, and so forth).

C. Analysis and evaluation of information, such as:
   1. Assessment of exposure levels.
   2. Assessment of the concomitant biological risks.
   3. Development of rationale for benefit-risk evaluation.
   4. Evaluation of methods of exposure control or reduction.

D. Control, including:
   1. Clarification of official guidance.
   2. Organization for decision-making.
   3. Authority for action.

MAJOR PROBLEMS RELATING TO RADIATION PROTECTION STANDARDS

Based on an analysis of the current status of radiation protection standards as reflected in our various hearings, and considering the wide variety of radiation producing sources, including fallout, the subcommittee believes that the following identifies the main problems which exist in this area:

1. The major issues in the field of radiation protection standards involve their application to the population from an increasing variety of sources, particularly those leading to radioactivity in the environment; for example, fallout, waste disposal, space application, and so forth. Although problems remain in the area of standards for occupational exposure, the major deficiencs appear to lie in population exposure standards.

2. Some fundamental questions related to exposures of the population appear to be unanswered; for example: What purposes are the radiation standards supposed to achieve? Just what are radiation protection standards trying to do? Control sources? Control industrial practices? Eliminate a present threat to health? Prevent a future threat to health? If none of these, what? Under present philosophies of radiation protection is there some fixed value of radiation exposure from all sources which cannot be exceeded without undue risk to health? As a matter of national policy or philosophy, should radiation protection standards be applied to all programs of the Government, including those required by national security and new applications under development? Is it either necessary or desirable for population standards to have a fixed numerical relation to occupational standards? In the opinion of the subcommittee, lack of clear-cut answers to these questions is the reason for many disputes and confusion in this area.

RADIATION STANDARDS AND FALLOUT

THE EFFECTS OF NUCLEAR WAR ON THE PITTSBURGH AREA

The Pittsburgh Study Group for Nuclear Information has published a 61-page report, "The Effects of Nuclear War on the Pittsburgh Area," a detailed quantitative discussion of the physical and social effects of a nuclear attack on Pittsburgh. Copies of the report may be obtained from Dr. Dan Bolef, Westinghouse Electric Corp. Research and Development Center, Beulah Road, Churchill Boro, Pittsburgh 35, Pa. The cost is fifty cents.

The following non-technical summary, released by the Group, presents the conclusions reached in the report:

It is a bright sunny day in late summer. The streets of downtown Pittsburgh are crowded with shoppers; the parks and swimming pools are jammed with shouting children. The tensions and anxieties of the latest international crisis headlined in the unsold newspapers seem very remote. A large crowd cheers the Pirates on to victory.

It is D-Day and Forbes Field is ground zero. Without warning twenty-megaton hydrogen bombs are about to drop on every major city in the United States.

What would it be like for an individual in the Pittsburgh area if such a nuclear attack were to occur? A group of leading Pittsburgh scientists has studied this question for many months. This is a summary of their findings.

The first result of the bomb explosion is a bluish white ball of fire which appears 30 times brighter than the sun at noon even 60 miles away. It is probable that every child at play in Allegheny County who turned to look would be blind thereafter.

A tremendous wave of heat would travel outward igniting fires within a minute everywhere within twenty miles of the blast. Any person out in the open even this far away—for example, in **Murraysville, New Kensington, North Park, Carnegie,** or **McKeesport**—would suffer third-degree burns. There would be practically no chance to get medical aid.

Following the explosion, a wave of pressure and accompanying high winds move outward at the rate of 12 miles a minute. At distances up to 6 to 10 miles, all houses would be

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ORGANIZATIONAL AND POLICY PROBLEMS

3. Effective leadership for developing radiation protection criteria and standards to cover new operational problems such as fallout is not adequately exercised by any government agency or group at present. The committee urged that increased attention be given this matter in its report on the 1959 hearings. Assertion of initiative by the Government in this area is essential to clarify present public confusion and to provide advance guidance for special situations which may arise in the future.

The fundamental concept that no radiation exposure should be accepted unless there are good reasons for doing so, means that radiation exposure standards must be related specifically to the purpose for which they were derived. Reasons for accepting exposures are related to many other factors, including national requirements and social, ethical, and economic considerations.

4. There continues to be no effective means by which social and economic factors can in fact be applied in concert with other major considerations in the development of radiation standards for application to fallout unless this can be achieved through the staff or by other mechanisms of the FRC. At noted in the summary-analysis of the 1960 radiation standards hearings, "The subcommittee considers it essential that a basis of agreement be established on the social, economic, and policy aspects of radiation protection because of the importance of the subject to the Nation and the public as a whole." The subcommittee believes that there is an increasing urgency for Government action in this area and that the Federal Radiation Council is neither adequately staffed nor organized for this purpose.

RADIATION STANDARDS AND FALLOUT

(From Page 5)

demolished and 150 mile-per-hour winds would literally lift people from the ground, hurling them to injury or death.

In built-up areas within ten to fifteen miles of Forbes Field the greatest danger would be the probable firestorm. This consists of a growing together of many small fires into one vast conflagration accompanied by hurricane force winds. Such firestorms developed after much smaller bombings during World War II in Hamburg, Dresden, Leipzig, and Munich with losses of life estimated at 60,000 for Hamburg and 300,000 for Dresden. People who sought protection inside shelters died from heat stroke or carbon monoxide poisoning. Because of the firestorm alone it seems probable that **very few people inside the city of Pittsburgh at the moment of a nuclear attack would survive.** People in **Wilkinsburg (5 miles from ground zero), Penn Hills (6 miles), Monroeville (6 miles), McKnight Village (5 miles), McKees Rocks (7 miles), Mt. Lebanon (6 miles) and Duquesne (8 miles) would** also be within the firestorm and the great majority of them would die within the first few hours. The possibility of escaping safely within the half hour before the firestorm is fully developed would be small because the streets would be piled with the rubble from the blasted buildings and the level of radioactivity would most likely prove fatal to those trying to escape on foot.

For those who might be outside or on the edge of this firestorm area there is little comfort. Let us look at the fate of the people of **New Kensington (16 miles from ground zero), Murraysville (14 miles), or Irwin (16 miles)** to the east of Pittsburgh. Here, too, there would be great fires everywhere, collapsing houses, and gusts of wind up to 100 miles per hour. Anyone out in the open would be seriously injured by flying pieces of glass or masonry and would suffer third-degree burns. Those who might survive these dangers within the basement of a strong building face an incredible intensity of radioactivity from fallout (in the case of a ground burst), most of which descends within half an hour. The intensity is so great that even fifteen minutes exposure would mean almost certain death. For those who would be protected by basements completely underground the intensity would be diminished but might still prove fatal within 24 hours. While the fallout is greatest in the eastern suburbs of Pittsburgh because of the prevailing westerly winds, the truth is that the fallout would be dangerous even as far as a hundred miles away and western suburbs would also receive deadly doses of radioactivity. The fallout level in **Allison Park (8 miles), West View (7 miles), Carnegie (7 miles), and South Park (10 miles)** would be so great that even those who immediately proceeded to underground basements would most likely suffer serious radiation illness within a few days.

To what extent could survival become possible by means of a shelter program? Within the city of Pittsburgh and many nearby suburbs only a shelter that protected against blast, fire, and fallout would be of use in the case of a direct attack. Such a shelter program—far more extensive than any present government proposals—would cost as much as 200 billion dollars if it were carried out on a national scale. Even then unless there were a warning time of 15 minutes or more, the great majority of the people would not be likely to reach the shelters safely.

In the more distant suburbs mentioned above, such as **Murrysville, New Kensington,** and **Carnegie,** less expensive shelters primarily designed for protection from fallout, with provisions for a stay of a month, would save a large fraction of the population from lethal or dangerous doses of radiation. It is practically impossible to imagine the world that these people would face as they dug their way out from the rubble blocking the entrance to their shelter. Each individual during those hours he allowed himself in the outside radioactive environment would be struggling to find water and food for himself and his family. Destruction of pumping stations, water mains, and electric power lines would make it likely that the public water supply would not be available for many weeks. The destruction of crops and livestock and the contamination of soil would make nearly everyone dependent for as long as one or two years on obtaining foodstuffs which had previously been stored. Subjected to epidemics, contaminated food, psychological despair, etc., many of the "survivors" would not survive for long. The complexity of the large number of interrelated problems make it impossible to predict when, if ever, some kind of normal living could be reestablished.

Conclusion

It is estimated that in case of a direct attack on Pittsburgh with one twenty-megaton weapon, as a result of blast and fire alone about a million people in Allegheny County would be killed and of the half-million survivors, 40 per cent would be injured. A shelter program to protect against blast and fire is extremely expensive and its value is limited if there is insufficient warning time. Most of the half-million initial survivors (in the more distant suburbs) would suffer lethal doses of radiation from fallout unless they found protection in a fallout shelter for the month following the attack. It is impossible to estimate what fraction of such protected people could survive in the primitive and disorganized world they would have to face in the following months.

These findings, like the results of any such study, are subject to many uncertainties. It is likely that they err on the optimistic side rather than the reverse. The situation of a nuclear war is unparalleled in human history and may bring with it completely unforseen dangers. Furthermore, costly burdensome plans for survival based on the assumption of one kind of attack might be rendered of little value by a difference in the type and magnitude of an actual attack. The uncertainties are such that detailed predictions regarding the destruction and recovery from a nuclear attack are almost sure to be grossly misleading.

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