

# F. A. S. NEWSLETTER

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April 9, 1959

## FALLOUT CONTROL—AEC OR PHS?

Two moves in Washington may lead to a shift in authority over radiation safety from the Atomic Energy Commission to the US Public Health Service. Senator Lister Hill (D, Ala.), chairman of the Labor and Public Welfare Committee, announced that he plans to introduce a bill to shift primary responsibility for radiation protection from the AEC to the PHS. A few days later (NYT, 4/4), the White House confirmed that a study has been under way by the AEC, the Dept. of HEW, and the Budget Bureau to determine what Government organization should be responsible for protecting the public against atomic radiation.

The White House statement said that "in view of the considerable public attention which has been focused recently on the radiological health studies of the Federal Government, the President has asked that the current plans of the Executive branch be made clear." Principal stimulus for the renewed interest in the AEC's role in radiological safety is the report by the National Advisory Committee on Radiation, a group set up by the Public Health Service in Feb. 1958, with Dr. Russell H. Morgan of Johns Hopkins University as chairman.

### Morgan Report

The radiation advisory group recommended that primary authority over the public health aspects of atomic energy be transferred from the AEC to the PHS. It also proposed an

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## "There Must be Some Way That's More Scientific"



## PROJECT ARGUS

The release of the news that the United States had exploded nuclear weapons above the atmosphere brought with it controversy in several fields. The story was broken by the New York Times without prior government approval (NYT, 3/19). The Defense Department then released the same information. The controversy raged around the perennial problem of secrecy, both with respect to scientific information and with respect to information relevant to policy-making in a democratic society. This was complicated still further by the feeling of congressmen on the Joint Committee on Atomic Energy that the way the information was released constituted an act of bad faith. Another controversy was over the effect such explosions might have on missiles, and on whether the official releases were deliberately misleading in this regard.

On August 27 and 30, and on Sept. 6, 1958, the United States exploded nuclear weapons of less than 20 kiloton yield at altitudes of about 300 miles above the surface of the earth. They were projected to that altitude from a point in the South Atlantic by a research rocket. One of the results of the explosions was to produce an intense band of radiation around the earth due to the trapping of electrons in the earth's magnetic field. These electrons are presumably from the beta decay of fission fragments and hence have energies up to several Mev. Electrons, whose velocities are partly aligned with the earth's magnetic field, then spiral around the magnetic lines of force and can be reflected back and forth along these lines by the increased magnetic field near the poles. (This effect is similar to the magnetic mirror principle employed in current plasma research.) In addition, the particles precess around the earth due to the falling off of the earth's magnetic field with distance; that is, the orbit is not a true circular helix, as it would be in a homogeneous magnetic field, but rather a helix which is twisted around the earth from pole to pole. As a result of this complicated three dimensional motion of the electrons the earth is surrounded by a band of radiation. The lines of force which pass through the stratosphere over the South Atlantic at 300 miles pass over the equator at about 400 miles. Thus this man-made radiation belt lies between the most intense regions of the two Van Allen radiation belts which are at 2000 miles and 8000 miles above the earth's surface over the equator.

The plan had been to use two satellites to help detect the radiation but the launching of Explorer V, which was to have had a polar orbit, failed. Explorer IV, which had been launched July 26 and was already providing data on the Van Allen Belts, provided much of the Argus information. In addition ground stations observed aurorae, and radio and radar interference was observed as the trapped electrons interfered with the ionosphere.

### Controversy Over Secrecy

Some of the newspaper accounts of the study gave the impression that the electrons were high energy and could be lethal to human beings or even damage an attacking ICBM. Although the Defense Dept. release did not directly produce the misleading impression, as pointed out by FAS Vice-Chairman Walter Selove in a letter to the NY Times, 3/23: "Comments on these matters could and should have been made by the Defense Dept. More candor in the statements from official quarters would lead to much less self deception by the public."

Although the Defense Department emphasized that the experiments had great military value, they refused to indicate in what area these were. The reasons given for secrecy in the Argus project by Deputy Defense Secretary Quarles

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## SCIENCE AND EDUCATION

Before Easter recess the House of Representatives took action on two administration proposals regarding the National Defense Education Act of 1958. It approved a request for \$75 million in supplemental appropriations for the fiscal year 1959, thus restoring a \$50 million cut voted by its Appropriation Committee (W. Post, 3/24). It also voted the budget request of \$150 million for next year. According to the officials administering the Act, the sums voted will provide sufficient funds to execute the plans made thus far to strengthen the areas in which our schools are weakest: instruction in science and languages, aid to college students, expansion of programs for graduate study, and guidance counseling and testing. Languages, for which there is a great current need, but little instruction available, have been determined by US Commissioner of Education Lawrence Derthick to be: Arabic, Chinese, Hindustani, Japanese, Portuguese and Russian. Institutes for intensive courses in these languages are being set up. In addition over \$7 million have already been paid to 14 States and D. C., to strengthen instruction in modern foreign languages, science and mathematics.

### Graduate Fellowships

One hundred fifty graduate fellowships have been awarded and the supplemental funds will allow the selection of an additional 850, thus reaching the 1000 fellowship-ceiling set for the first year. Six thousand applications were received. For guidance the States have planned to use \$11 million. Over \$3 million will be available to establish institutes for guidance training.

Among the proposed changes in the Act, two items are of particular interest. One concerns a more precise definition of the authority granted by the Act to the US Commissioner of Education. He now determines the allotment of student loan funds among the states, and the list of agencies and associations which shall have authority to decide on the quality of training offered in various institutions. The American Civil Liberties Union has pointed out the dangers inherent in these powers and that the wording of the provisions should be narrowed to guarantee for educational institutions their indispensable freedom (ACLU Bulletin No. 1988). A second proposed change in the Act concerns the loyalty provisions. The American Association of University Professors, in a letter to the Senate Labor and Public Welfare Committee said: "The Act seems to say to members of the educational community: You are an important part of American life and you have an admitted real need, but let there be no mistake about the fact that you are a particularly suspect part of the population and will have to pass a special test that other citizens need not take. This is a pre-judgment of the teachers and students of America which we cannot believe the Congress intended to make." Bills proposing repeal of the loyalty provisions have been introduced in both Houses of Congress.

Besides supporting the Education Act, Congress seems favorably disposed towards an Administration plan for Federal Aid for classroom construction, based on a deferred payment plan, by which, on a matching grant basis, needy areas would build schools for a total cost of \$2.5 billion over a 25-year period. The Murray-Metcalf bill, proposing federal funds for teachers salaries and school construction, and the "Student Aid Act" of 1959, introduced by Senator Humphrey, providing scholarship stipends seem to need more popular support before they will be enacted into law.

### Surplus Property

Readers of this Newsletter can render a real service to science teachers in their locality. Each year \$100 million in initial value of government surplus equipment, suitable for use in teaching science, is available. It includes electric motors, generators, photographic equipment, spectrometers, chemicals, lenses, electronic equipment. Only 20% reaches educational institutions. Schools should be urged to: (1) get in touch with its State surplus property agency, (2) send appropriate personnel to the warehouse, (3) inform the teacher of what is available, (4) pay only warehouse and transportation cost. Many items are now sold to surplus dealers who resell them to schools!

The US Office of Education suggests that a program of tests, covering aptitude, interest, personality and achievement could be established in order to determine the quality and quantity of talented students. Also, it might prove useful to stimulate gifted students by exposing them in their

## HEALTH ISSUES

The bill entitled "International Health and Medical Research Act of 1959" introduced by Sen. Hill (and cosponsored by 46 other Democrats and 11 Republicans) would establish a National Institute of International Medical Research with a \$50 million annual appropriation. The new Institute would join the present National Institutes of Health at Bethesda, Md., under the authority of the Surgeon General of the Public Health Service and the Dept. of Defense, Education, and Welfare. Co-sponsorship would seem to assure passage for the non-controversial measure which would encourage and support research projects with international implications as well as the exchange of scientists and information here and abroad. The Eisenhower administration, however, while approving the purposes and objectives of the bill, in an unexpected move asked revisions: 1. to vest authority in the President rather than the Sec'y of HEW; 2. to have funds appropriated to the President as part of Mutual Security appropriations; and 3. eliminate the mandatory provision for establishment of the International Institute. The main sponsors of the bill expressed strong disapproval of these provisions which they believe would inject cold war politics into international medical research (NYT, 3/11).

### Live Polio Virus Tests

Over 500,000 individuals abroad have received Dr. Albert Sabin's orally administered live-virus vaccine for poliomyelitis. Studies could not be performed in the USA because they required a population without the immunity acquired from the Salk killed-virus vaccine. Tests of the live virus vaccine have aroused great interest since doubt exists about the duration of the Salk-vaccine induced immunity as well as its effectiveness in preventing transmission of polio virus through the gastro-intestinal tract of immunized individuals. While active immunization by infection with modified live virus would presumably satisfy these doubts, it must be guaranteed that the vaccine virus which was attenuated by laboratory cultivation will remain safe after passage through a series of humans.

In the tests to date, the vaccine appears to be safe. Before the vaccine can be made available to doctors in the USA it will have to be approved by the Public Health Service. The New York Times (3/15), suggests that publicity on the live-virus vaccine is being toned-down because of fears that it would interfere with the PHS program to have every person take the Salk vaccine before the summer polio season sets in.

## RADIATION SAFETY

Public hearings held during March before the Research and Development Subcommittee of the Joint Committee on Atomic Energy produced evidence of widespread concern over the problem of employee radiation hazards. Labor leaders attacked the AEC for "not making a greater effort" to protect atomic workers and the general public from the hazards of atomic radiation by increased inspection and education programs. The responsibility for negligence in this field did not rest only with the AEC according to testimony given at the hearings. Thus uranium ore-concentrating mills were accused by one union official with allowing levels of radiation "2 to 100 times the permissible limit" (W. Post, 3/19). A Public Health Service official gave evidence of "excessive" radiation levels in U. S. mines and charged mine owners with failure to make conditions safer. The question of state versus federal responsibility in the protection of workers in atomic energy plants was argued vigorously before the subcommittee. Although representatives of the industry, the state manufacturers associations and the stock insurance companies pleaded against federal in favor of state control, representatives of labor as well as of various state organizations felt that the policing responsibility belonged in the AEC. They wanted responsibility for setting "permissible" limits of radiation exposure removed to a separate federal agency, preferably the Public Health Service (See NL article this issue) (W. Post, 3/26).

AEC policy with regard to review of safety aspects of Demonstration Power Reactors has undergone a recent change. AEC Chairman John A. McCone has announced that the public will be able to participate in the review of safety in all reactor projects. Heretofore public participation has been limited to privately owned reactors.

spare time, to lectures by outstanding scientists, in programs initiated by Columbia University and the Hebrew Technical Institute in New York.

## GENEVA CONFERENCE

On March 19, the three power conference for a ban on nuclear weapons testing—the Geneva Conference—was recessed until April 13. This is an appropriate time for a summary of the progress made at the conference.

During the seventy two meetings held since last October, seven draft articles have been approved. While none of these seven articles deals with key issues, they have cleared the way for further negotiation. James J. Wadsworth, leader of the U. S. delegation, said "We have in the period since our last recess passed from the threshold of negotiations to a stage at which positive decisions are required," (NYT, 3/20).

The three articles adopted by the conference before its current recess were 1) a U. S. proposal that the treaty be of indefinite duration; 2) a U. S. proposal that a review of the control system be made after 2 years to determine its effectiveness; and 3) a British proposal that the treaty be registered with the United Nations. The article on duration contained a provision that signers had the right to withdraw from the pact if they felt there were violations by other powers. The Russian delegation at first objected to this clause, and it was considered a concession on their part that they finally accepted it (NYT, 3/10).

Among the major obstacles to be overcome are 1) **Staffing:** The West feels that inspection to be effective should be conducted by opposites or neutrals. Russia fears espionage if non-Russians inspect in Russia. 2) **On site inspection:** Russia insists that teams be dispatched to the site of a suspected explosion only with concurrence of all three powers. The West insists that sites be visited by inspection teams whenever they think it necessary. 3) **Composition of control body:** The West proposes seven members, U. S., USSR, U. K., and four others to be selected by the parties in the agreement. Russia insists on equal representation, three seats to the West, three to the Soviet bloc and one neutral. A satisfactory resolution of these basic disagreements will be slow in coming.

### enate Poll

Recently, Nat S. Finney, Washington correspondent for the *Buffalo Evening News*, informally polled the members of the Senate with regard to the following question: "Disregarding five points that might raise questions later, and assuming a treaty for suspension of atomic weapons tests does not provide for an adequate, veto-proof control system, would you vote for its ratification?"

Of the 52 replies received as of April 1, 47 Senators replied "No" and 5 "Yes." The respondents were not required to identify themselves although 3 Senators did so.

## U. S. ATOMIC ENERGY PROGRAMS

Annual hearings on the status and future of the atomic energy industry got underway in February before the Congressional Joint Committee on Atomic Energy. The sessions began in an atmosphere denoting friendly cooperation between the Committee and the AEC, the latter represented by Chairman John A. McCone.

In his testimony regarding the AEC program for new power projects during the coming fiscal year, Chairman McCone said that the fundamental immediate change would be a shift from a diversified program to an emphasis on developing those types of reactors which have shown greatest promise. Specifically the commission plans to have designed and under construction by the end of fiscal 1960 six experimental reactors. The participation of industry in such a program would be sought and the AEC has further proposed that 50 percent construction grants be made available by Congress to industry as an inducement to participation.

This program was initially criticized by members of the JCAE. Senator Clinton P. Anderson, Chairman of the hearings, felt however that the AEC had progressed in its statement of objectives for the atomic power program and in its assumption of leadership in the planning of prototype reactor development. Although the hearings revealed differences of opinion between the Joint Committee and the AEC on the degree of leadership that the latter should exercise and the size of the atomic power program, there was evidence that the two groups were in fundamental agreement on basic issues.

The staff of the Joint Committee has made a study of the

## A-POWERED PLANES AND SHIPS

Major differences of opinion between the Joint Committee on Atomic Energy (JCAE) and the Department of Defense in regard to the Aircraft Nuclear Propulsion program (ANPP) have erupted publicly.

The objections of the JCAE are that even after 12 years the ANPP has no firm set of objectives which will culminate in the development and subsequent flight testing of a nuclear-propelled aircraft. The JCAE feels that the indecision of the Administration and the Administration cuts in the fiscal 1960 budgets proposed by the Air Force and AEC result in "a mere holding operation."

The Deputy Secretary of Defense, Donald A. Quarles replied that the basic issue in controversy was whether the Administration should concentrate in solving fundamental problems of creating a nuclear reactor for effective use in a military plane or whether current knowledge should be used to put a plane in the air, knowing that it would have no military application (W. Post, 2/7).

On March 12, Rep. Melvin Price, Chairman of the Research and Development Subcommittee of JCAE pointed again to the recommendations of Gen. T. D. White, Air Force Chief of Staff, calling for a step-up in work on the propulsion system. Price stated that White's recommendations indicate the importance of the ANPP to national security and that the program is sufficiently advanced technically to warrant the commencement of work on an airframe and propulsion system suitable for first flight.

Although the Maritime Administration has announced postponement of plans to build an atomic-powered cargo submarine, Maritime Commissioner, C. G. Moore, has stated that Congressional authorization for a 60,000 ton surface tanker, to be powered by a boiling water reactor, is being sought. (W. Post, 2/22). In addition, three private shipping companies have presented plans for conversion of an already existing conventional tanker, to one powered by a gas cooled reactor. C. S. Rockwell, president of Ford Instrument Co. (division of Sperry Rand Corp.), told the JCAE that the project would cost \$15 million and that Federal aid would be needed. (W. Post, 2/20).

## EXTENSION OF LOYALTY-SECURITY TO NON-SENSITIVE POSITIONS

Last year the 85th Congress failed to pass legislation which would have extended the Federal Security Program to cover non-sensitive as well as sensitive positions in the government. This January the legislation was reintroduced in the House. The bills are identical and are sponsored by Rees (R, Kan.), Murray (D, Tenn.), and Walter (D, Pa.). The legislation proposes to extend the loyalty-security program to all government agencies by stating that "all employees of any department or agency of the United States Government are deemed to be employed in an activity of the government involving national security." Thus, the bills would counteract the Supreme Court decision in *Cole vs. Young* which limited the program to sensitive positions in government. Murray has said that if his bill fails, he will attempt to extend the coverage of the program through a legislative rider attached to another bill.

The Washington Chapter of FAS has written to the congressmen from Maryland and Virginia re-stating the position of FAS in opposing the above legislation.

civilian power program which is now available as a Committee print. Entitled, "Proposed Expanded Civilian Nuclear Power Program," the report outlines a program for the development of nuclear power within the next five to seven years. As summarized in the report: "The long-range nuclear power program is intended to bridge the present gap between high cost first generation plants and economically competitive nuclear power which will supplement conventional fuels to meet expanding power requirements. As soon as economic feasibility has been established, normal business incentives would stimulate greater industrial financial participation and support activity. The ultimate goal of the entire program is to develop strictly commercial plants which would be economically competitive without financial assistance from the Government."

**FALLOUT** (Continued from page 1)

accelerated program of research under PHS auspices aimed at the development of improved standards in the \$2.5 million to be spent in the coming year, and \$50 million a year by 1965. The NACR report, released on March 26 without comment by Surgeon Gen. Burney, is concerned with radiation hazard in general, not just fallout. As pointed out in the report, the average dose from medical x-rays during 1955 was estimated to have been 35 percent higher than the average background in that year.

In connection with the question of state versus federal control and responsibility for radiation safety and standards, the Committee encouraged the traditional participation of local agencies in matters of this type. However, the Committee recommended that the federal agency charged with the overall responsibility "be granted supervening authority in these areas of enforcement where federal regulation seems more appropriate."

Senator Hill, in announcing on March 31 his forthcoming bill, which he has asked the PHS to draft, said "I find myself in complete agreement with the Committee's recommendations that responsibility for protecting the Nation's health from undue radiation hazards should be vested not in an agency such as the AEC, which has other and perhaps conflicting responsibilities, but in that one agency which has no other responsibility than that of protecting the Nation's health—the Public Health Service."

**AEC Position**

A moderate stand was taken by Chairman McCone who told the Joint Committee on Atomic Energy on March 24 that "we have no desire to pre-empt this area of activity and if Congress and the Executive Department wish to assign part of this activity to other Federal agencies, we will cooperate with them to the fullest." Mr. McCone spoke of the AEC's bio-medical radiation research which employs about 800 scientists and has cost \$125 million since 1946. He said he has requested a Government-wide conference on radiation safety to be arranged by the National Academy of Sciences for the end of May. Fallout hearings by the JCAE are also scheduled and will start May 4. If any FAS member has any special information on fallout that should be included in these hearings, will they please send it to the Washington Office promptly, so that it may be referred to the proper people and for possible inclusion into the record.

**The Libby-Loper Letters**

A difference of opinion between the AEC and the Dept. of Defense about the average time radioactivity remains in the stratosphere would have remained unpublished except for the efforts of Sen. Clinton P. Anderson, chairman of the JCAE. The DOD studies suggested that radioactivity falls out with stratospheric half residence time of two years, instead of the seven years previously estimated by AEC Commissioner Libby. Correspondence between Libby and Maj. Gen. Herbert B. Loper (Ret.), Atomic Energy Assistant to the Secretary of Defense, revealed that Sr-90 fallout in the US is greater than in any other area of the world. Libby doubted Loper's estimate but said he had revised his estimate from seven years to four years. A shorter residence time means that the fallout will be more radioactive as well as the fact that it will be accumulating on earth more rapidly.

The new information on fallout was to be presented to the UN Scientific Committee on the Effects of Atomic Radiation, which met in New York on March 23. The US delegate to the Committee is Dr. Shields Warren of Boston.

**Humphrey's Program**

Senator Hubert Humphrey (D, Minn.) reacted to the recent developments by making the following recommendations in a Senate speech on March 23: (1) Two scientists be appointed members of the AEC—a biologist and a nuclear scientist. Libby, the only present scientist on the Commission has resigned, and there will be two vacancies by June 30. (2) Transfer of research on fallout and its biological effects from the AEC to the PHS. (3) Granting the PHS request for \$3.4 million for radiation studies. (4) A strong effort to halt nuclear weapon tests.

Project Sunshine, the AEC's study of Sr-90 fallout, has some "man-in-the-moon" aspects to it, according to details given by the N. Y. Times on March 29. The Times story

**ARGUS** (Continued from page 1)

were that "... the scientific results that were expected from these experiments might very well have important implications in our military programs down the road. We also recognized that we were probing a lot of new science here and that it would take a substantial amount of time for the results to be correlated and analyzed, prepared for publication; and as all of you know, scientists like to wait until they have a chance to understand their data themselves and present it before they are required to spread it out for the public gain." Although it was announced that the "scientific" results will be "summarized" at the meeting of the National Academy of Sciences beginning April 27, it remained unclear how much information would be unclassified. (NYT, 3/20).

Sen. Anderson, chairman of the Joint Committee on Atomic Energy was perturbed that in releasing the Argus information the Dept. of Defense failed to honor a previous agreement to inform the committee if any release were planned. It was this that led him to insist on the release of the Loper and Libby letters on fallout. (See Fallout story, p. 1 this issue).

**Feasible Detection**

The fact that we have been in fact testing nuclear weapons in space makes it clear that some sort of arrangement with regard to such explosions will have to be discussed at Geneva. The testimony of Dr. Hans Bethe before the Humphrey subcommittee that such detection by means of satellites with radiation detectors is realistic, feasible, and within our capabilities indicates that this is a problem whose technical solution will not be a stumbling block. How Project Argus and its aftermath will affect the political situation at Geneva remains to be seen. The conference reopens April 13.

**Secrecy Issue**

The secrecy issue involved in this case has far-reaching implications. Secretary Quarles in the statement quoted above seems to feel that it is reasonable to use broad powers of classification to keep information secret until the scientist digests it. That this is not a primary motive however is indicated by the NY Times report that before it released the story there was a conference of the principal scientists involved in the project at Livermore. After a full day spent in discussing publication of the results, these scientists were preponderantly for publishing them. Among the arguments in favor of doing so, was the fact that much of the data was collected by stations participating in the IGY. The US had pushed through, over USSR opposition, a resolution that all IGY reports should be made in full including tabulated satellite data. For the US to fail to live up to this resolution might be disastrous. The Defense Dept. did not agree to release the data, however, until The Times broke the story on its own which evoked from Mr. Quarles the comment that that newspaper was not "playing the game" the way he liked to see it played.

said that the multi-million dollar program had only two scientists working full time on fallout in the AEC's Biology and Medicine Division. Much of the work is done in hospitals and collection stations throughout the world. Administration of Project Sunshine has been divided between Commissioner Libby and Dr. Charles L. Dunham, Director of the AEC Div. of Biology and Medicine. Dr. Dunham has said the AEC has not been able to find a scientist willing to leave his laboratory to take charge of the fallout project.

**Latest Libby Fallout Report**

In a speech prepared for delivery on March 12, AEC Commissioner Libby presented a detailed account of fallout effects. He noted that the Russian tests of October 1958 released a 20 megaton equivalent of radioactive material. These tests were made in the polar regions and, according to a theory advanced by Dr. E. A. Martell of the Air Force Cambridge Research Center, their fallout is expected to occur at a faster rate and to be localized in northern latitudes. On the other hand, equatorial tests, like those of the US, are expected to give a slower and more widely dispersed fallout pattern.

## BOOK REVIEWS

**THE ATOM AND THE ENERGY REVOLUTION** by Norman Lansdell. Publisher: Philosophical Library, N.Y.C. \$6.00.

This is a general review, with some technical information from engineering and economics, of the research and power prospects of atomic energy. It has a rather curious history, as it grew out of a study by a British firm of management consultants. The client was impressed with the breadth of the study and agreed that it should be released, after editing and revision, as a "contribution to the understanding of the Energy Revolution."

Somewhat more imaginative than most such reviews, this gives the basic technical potential and obstacles for various resources, solar energy, wind energy . . . and motor oil from algae! (It is estimated that 35 square miles of *Chlorella* could supply about a million barrels of motor fuel a year).

This general kind of book is getting to be so common these days that it should be shelved in libraries under the category, Science Fiction, along with Science Fiction. Logically, one could put this new shelf halfway between Fiction and Fact, and the book under discussion distinguishes carefully between now and then, the known abilities of the present, and the extrapolations people have made for tomorrow.

But this is not enough to help us understand "the Energy Revolution."

This book presents no thesis, novel or otherwise, and very likely is more useful as a survey because it does not let what ought to be, color its drawing of what is.

But this reviewer remains quite uncertain as to what kind of person may find this useful. Studies done over here, statements and reports from Congressional committees, and many excellent articles in *Nucleonics* or in the *Bulletin of the Atomic Scientists*, have reviewed these things very well. Or, as mentioned above, there is now a class of books peering into the future — studies by Harrison Brown, Richard L. Meier, and others. But this book attempts to cover everything from the basic structure of the atom to the number of reactors and uranium sources in all major countries. It is too much to cover. Some sections are sketchy and have the kind of simplified truth which might as well be false, like the entries in an over-condensed encyclopedia.

The book's introduction indicates this worried the writers, too, or perhaps the publisher. Who is this for? They suggest the specialist interested in other disciplines . . . the general reader . . . the businessman who must plan for a new age.

Judging most of the members of FAS to be PhD's in the physical sciences, this reviewer does not recommend this book to them. Moreover, this reviewer, like several persons known to him, will continue to wonder just where the Philosophical Library is going. There's no harm in a book like this. But why? What was the motive?

Michael Amrine

(The reviewer, a Washington science writer, is author of the current book, "THE GREAT DECISION; The Secret History of the Atomic Bomb.")

## RAND STUDY REVIEW

### REPORT ON A STUDY OF NON-MILITARY DEFENSE

The Rand Corporation. Santa Monica, 1958.

"Do you not know that unless an end is put to war by agreement . . . an end will be put to war by another and even more efficient method, namely the extermination of the human race?" (Bertrand Russell).

This study (privately sponsored by the Rand Corp.) attempts to estimate what protection civil defense measures could provide in a nuclear war. With no defensive measures, 90 million people would die as the immediate result of nuclear bombardment of the 50 major American cities but the casualties could be reduced to 30 million if a warning of 3-6 hours were given and if tactical evacuation of the population to fallout shelters could be arranged. An attack involving 150 cities could cause 160 million deaths but organized evacuation to fallout shelters could reduce this figure to between 60 and 85 million. If the attack occurred after strategic evacuation of the population (preparatory dispersal) the number of immediate casualties could be reduced to between 5 and 25 million.

Peripheral fallout shelters designed to protect the popula-

tion surviving the immediate effects of the explosions would cost \$17 billion and additional construction of blast shelters would bring the costs up to \$104 billion. Since the population should remain in shelters for 90 days, food supplies and other stockpiles would be required; their cost would be between \$3 billion and \$45 billion.

The report estimates that 90 days after extensive nuclear bombardment, radiation levels could still be dangerous in some areas. Following the hypothetical attack to 50 cities, the population emerging from the shelters would be exposed to radiation levels which, on the average, would accumulate to a lifetime dose of 3.4 roentgens, while average accumulation of strontium 90 would amount to 2 microcuries per person (1/50 of an MPC). However, in certain areas, doses of 73 roentgens and 42 microcuries would be reached. Following the heavier attack the corresponding average figures would be 48 roentgens and 26 microcuries and 310 roentgens and 180 microcuries (local maxima).

Significant increase in the incidence of bone cancer, leukemia and malformations, with appreciable decrease of average life expectancy, would occur but current understanding of long-term effects of radiation is insufficient for a quantitative appraisal. Agricultural recovery would not present insurmountable difficulties and food stockpiles supplemented by imports could probably support the population during the most critical period. Industrial recovery would offer more serious problems since 55%-85% of the manufacturing capital could be destroyed. Production of durable machinery to 25% of its present level may prevent production of consumer durables for a considerable period of time.

Since the summarized report for general distribution does not include documentation, it is difficult to form an opinion on the reliability of the figures presented. In any case, the discussion on the late effects of radiation appears to be misleading because it is there assumed that contamination starts 90 days after the attack, whereas the greatest dangers are likely to be present during the early periods. In their discussion of basic foreign policy problems the authors repeat the conventional themes of deterrence, retaliation and calculated provocation, even recognizing that, by following such policies, war may start as a consequence of miscalculation or accident. Their suggestion, that heavy armaments should be given a certain priority in the plans for industrial reconstruction after nuclear bombardment, is particularly discouraging.

M. G. F. Fuortes

The FAS is a national organization of scientists and engineers concerned with the impact of science on national and world affairs. The Newsletter is prepared in Washington by FAS members. The staff for this issue included, Editors: M. M. Elkind, M. G. F. Fuortes, H. Goldfine and M. Singer; Writers: H. Du Buy, H. Goodman, S. Rothberg, D. A. Melnick, F. K. Millar, E. Shelton and F. Stern; Production: I. Shapiro, of the Washington Office Staff.

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### F A S COUNCIL MEETS IN WASHINGTON

Session I: Wednesday, April 29, beginning at 7:30 P. M.

Session II: Saturday, May 2, beginning at 4 P. M. (dinner at 6 P. M.)

Member Observers Are Welcome  
at Science Service Conference Room,  
1719 N St., N. W., Washington, D. C.

### NEW F A S OFFICERS ELECTED

David R. Inglis, physicist at the Argonne National Laboratory, was elected FAS Chairman for '59-'60, and will take office at the Spring Council meeting in Washington (April 29 and May 2). New Vice-Chairman is Christian B. Anfinsen, Chief, Lab. of Cellular Physiology and Metabolism, National Heart Institute, Bethesda, Md. Both were recently elected by the membership in the Spring balloting, together with 12 new delegates-at-large to the FAS Council.

The newly elected delegates, who will serve two-year terms are:

Peter Axel, professor of physics, Univ. of Illinois  
Donald G. Brennan, Math. Dept., M. I. T.  
Martin Deutsch, professor of physics, M. I. T.  
Arthur W. Galston, professor of plant physiology, Yale  
Edwin N. Goldwasser, professor of physics, Univ. of Illinois  
David L. Hill, physicist, Exec. Security Program, New York  
Walter E. Meyerhof, professor of physics, Stanford Univ.  
David Pines, professor of physics, Univ. of Calif. (Berkeley)  
Arthur H. Rosenfeld, physicist, Univ. of Calif. (Berkeley)  
Matthew Sands, professor of physics, CalTech.  
Victor F. Weisskopf, professor of physics, M. I. T.  
Huge Wolfe, Head, Physics Dept., Cooper Union, N. Y.

The carryover delegates-at-large on the National Council, whose term will not expire until the spring of 1960 are: Edward U. Condon, Robert R. Wilson, Geoffrey Chew, Martin Kamen, L. C. Dunn, Judith Bregman, Maurice Shapiro, Salvador E. Luria, Jay Orear, C. B. Anfinsen, Edwin E. Salpeter and Leon Eisenberg.

### INTERNATIONAL A-ENERGY PROJECTS

Admiral Paul F. Foster has been nominated by President Eisenhower to be the US representative to the International Atomic Energy Agency, succeeding Robert McKinney, who resigned last Fall. The IAEA is the international agency that was formed in response to the President's Atoms-for-Peace proposal. Admiral Foster has served for the last five years as Deputy General Manager of the Atomic Energy

Commission where he has had much to do with the Commission's power reactor development program. He has also been credited with playing an important part in carrying out the Eisenhower Atoms-for-Peace program (NYT, 3/5). The Joint Committee on Atomic Energy and the AEC have felt that in the past Administration policy toward the IAEA has been inadequate (NYT, 3/5), and it has been pointed out (Edit., W. Post, 3/9), that Foster's appointment may signify an intention on the part of the Administration to give more practical support to the agency. (See report of statement by Sterling Cole, Director General of IAEA, in NL 59-3).

### EURATOM

Twelve European nations have signed an agreement to build a radically new type of nuclear power plant. The 38-million dollar experiment will be built in Britain with that country paying the largest share of the cost.

The new reactor is expected to produce electrical power at a much lower cost than previous nuclear power plants. Scientists hope that costs may be in line with hydro-electric and steam stations. The efficiency is expected to come primarily from higher operating temperatures. The experimental plant will have a gas cooled reactor designed to operate at temperatures above 2000° Fahrenheit.

### OPEN MEETING

Sponsored by  
THE WASHINGTON ASSOCIATION OF  
SCIENTISTS and THE FEDERATION  
OF AMERICAN SCIENTISTS

### "POPULATION EXPLOSION AND ENERGY NEEDS"

#### SPEAKERS

Dr. ROBERT C. COOK, Director, Population Reference Bureau; Editor, Journal of Heredity  
Professor N. B. CACCIAPUOTI, Scientific and Nuclear Counselor, Italian Embassy; Deputy Director, Department of Natural Science, UNESCO, 1951-58  
The Honorable CHET HOLIFIELD, Congressman from California; Chairman, Subcommittee on Legislation, Joint Atomic Energy Committee

#### MODERATOR

Mr. ALFRED FRIENDLY, Managing Editor, The Washington Post and Times-Herald

Thursday Evening, APRIL 30, 1959 at 8:00 P. M.  
Conference Room B, Departmental Auditorium  
Constitution Avenue between 12th and 14th Streets,  
N. W., Washington, D. C.

### FAS NEWSLETTER

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