

F. A. S. NEWSLETTER

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David R. Inglis, Chairman

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STEPS TOWARD DISARMAMENT

At the United Nations on Sept. 18, Russian Premier Nikita Khrushchev called for complete and total disarmament in 4 years with "strict international control," and brought forward the point that "so long as disarmament is conceived only as partial, . . . states would still retain the material possibility to launch an attack." This possibility "was in no small measure an obstacle in the disarmament negotiations. . . . No state could reveal its military secrets, the organization of its defense and war production, without damage to the interests of its national security." On the same day, the USSR delegation presented a declaration covering several stages in the process of total disarmament which included reduction of armed forces to specified levels, and liquidation of armed forces bases, destruction of nuclear and rocket weapons, abolition of war ministries, military training and military appropriations. The proposals sketched some control measures, including an "international control body [which] shall have free access to all objects under control . . . [and which] may set up a system of aerial observation." The declaration continued with "partial measures," in case "the Western powers do not . . . agree to general and complete disarmament," including (1) a partially disarmed zone in Western Europe; (2) a denuclearized zone in Central Europe; (3) withdrawal of foreign troops and bases in Europe; (4) a non-aggression pact; (5) an agreement to prevent surprise attacks.

Western Reaction

The immediate reaction in Western capitals was negative, but serious study of the USSR proposals was advocated by Secretary of State Herter, Adlai Stevenson and the Democratic Advisory Council, several British newspapers and the Italian *Il Popolo*, organ of the Christian Democratic Party. The Canadian Secretary for External Affairs called for detailed control proposals at the UN on Sept. 24, and this seems to be the watchword for this issue in the future.

Other disarmament proposals were almost lost in the shuffle. The Irish proposed on Sept. 23 that the nuclear powers should refuse nuclear weapons to the non-nuclear powers, who should in turn, agree not to make or accept them. The Irish also advocated a permanent UN police force.

Disarmament Commission

In mid-August, the proposal was made that a 10 nation disarmament commission be set up by the "Big Four" outside of the UN. The commission would consist of the US, UK, France, Canada, and Italy from the Western side and USSR, Poland, Czechoslovakia, Rumania, and Albania from the Communist countries. The even division was to overcome USSR objections to being outvoted in previous commissions. In spite of loud protests from UN supporters, the commission was organized on Sept. 7 and its establishment represents a major concession to Russia on the part of the United States. It was originally planned that a UN observer would attend the meetings but the idea was dropped and there is thus no direct connection with the UN. However, the commission will make reports to the UN and Hammarskjold has voiced "general satisfaction" with the arrangement if there is hope for real agreement. The important thing at stake is the resumption of arms talks after a two year deadlock with Russia.

Test Ban

In mid-August the Geneva conference recessed until Oct. 27. Despite appeals from Pentagon and AEC for renewed testing of nuclear weapons, and predictions from columnists and Senators, that tests would resume, President Eisenhower (Aug. 26) extended the US moratorium two months to Dec. 31. The UK followed suit on Aug. 27, and two days later the USSR pledged not to resume tests if the Western powers refrain.

CHEMICAL & BIOLOGICAL WARFARE

Twenty-five of the worlds leading scientists from both sides of the Iron Curtain met at Pugwash, Nova Scotia, from August 24 to 30 to discuss the potentialities of chemical, biological and radiological warfare (CBR) and the possibilities for international control of such warfare. During the conference Professor A. A. Smorodintsev (Soviet Union) stated that "The specialists in bacteriological war strive to sow despair and horror and to plunge the peoples of this earth into the Dark Ages with their terrible epidemics of plague, small pox and cholera. They forget that biological war, like atomic war, is suicide." The conference proposed that a permanent UN commission on CBR be set up, and that attempts be made to outlaw the use of such weapons.

American Policy

The American policy of using CBR for defensive purposes only was established in 1943 when President Roosevelt said "I state categorically that we shall under no circumstances resort to the use of such weapons unless they are first used by our enemies." Recently, however, there appears to be a drive by leading military officials to overcome public fear and revulsion at the thought of the use of these weapons and to establish CBR as primary weapons in our national arsenal (NYT, 8/9). The major arguments offered by the proponents of CBR are, first, that such warfare would be more "humane" in that war would not necessarily involve death, that there would be practically no destruction to property, that agents could be developed which could produce temporary mental aberrations or physical disability on populations without permanent damage to individuals, and second, that the Soviet Union already has carried out a great deal of research on CBR and defense against such warfare.

Current Status of CBR

In this country at the present time, two types of lethal gas are being stockpiled, nitrogen mustards and nerve gas. The only non-lethal gases being stockpiled are the relatively unspectacular vomit gas and tear gas. Many drugs are in existence which incapacitate individuals to greater or lesser degrees, however, these are for the most part available in laboratory quantities only, and it is unknown whether they would be suitable as weapons of war. For biological warfare purposes, stocks of insects are constantly maintained carrying yellow fever, malaria, plague, tularemia, cholera, etc. (The Reporter, 10/1). The military presumably would concentrate their future research efforts on attempts to develop the temporary incapacitating drugs as useful weapons. In keeping with these aims, the House Committee on Science and Astronautics urged a trebling of the budget appropriation for the Army Chemical Corps for research and development of CBR (NYT, 8/9).

Letter to Ike

On Sept. 16, FAS Chairman Inglis wrote to the President urging agreement for the "controlled cessation of . . . nuclear tests," saying that this "should not involve any lessening of our alertness against . . . aggression." He also suggested a joint US-USSR research project on detection of nuclear tests, starting with seismography and expanding to other techniques. "While this might seem to some to have the drawback that it would involve discussion of methods of hiding tests from detection, I wish to suggest that this is a field in which it seems unlikely that one side would be significantly more clever than the other in the long run, and that we would have little to lose and much to gain by complete openness and cooperation in all matters concerning test detection. Such a joint test-detection research project could well be combined with extension of the present test moratorium beyond Dec. 31, which we independently urge, and with initial stages of an agreement to monitor the cessation of tests."

CIVIL DEFENSE ARGUMENTS

The inter-related issues of what constitutes a realistic civil defense system and the strategic significance of such a system were brought to the fore once again in a report on the "Biological and Environmental Effects of Nuclear War," released on Aug. 31, by the Radiation Subcommittee of the Joint Congressional Committee on Atomic Energy. The committee, chaired by Rep. Chet Holifield (D, Calif.) held a series of hearings in June, and explored in detail the effects of a hypothetical nuclear attack on the North American continent. Some testimony showed that an effective system of shelters could reduce the number of fatalities in such an attack by a factor of 8. Several witnesses argued the point of view that the increased capability to recover and retaliate that would be provided by an effective civil defense system was a necessary component of our strength.

As a basis for investigation, the committee postulated that nuclear weapons with a total yield of 1500 megatons were detonated strategically over the United States and another 2500 megatons were set off throughout the Northern Hemisphere. "The expert testimony and supporting data presented . . . indicate that under present conditions such an attack would have cost the lives of approximately 50 million Americans, with some 20 million others sustaining serious injury." Three-fourths of the deaths would result from blast, thermal, and immediate radiation effects, while the other one-fourth would be due to fallout.

Group Shelters Needed

In further testimony, the committee heard that a system of group shelters capable of reducing the number of fatalities in a population of 200 million to only 6 million, could be provided for a cost of between \$5 and \$20 billion dollars; and that such a radiological defense system is necessary if the ". . . nation is to withstand and recover from an attack of the scale which is possible in an all-out nuclear war." Testimony was also given on the possibility of adapting existing facilities as shelters; and the specifications that OCDM has drawn up for home shelters were presented. The report did point out that our present civil defense activity is based on a law passed before the development of the hydrogen bomb and indicated that there is a ". . . need for an improved and more effective national program of civil defense. . . . The problem of survival of civilian populations faced with the threat of nuclear war and the decision as to whether the Federal Government, the State or the individual pays the bill remains and demands solution."

The strategic implications of the data developed in the committee's hearings were presented by a number of witnesses. The main statement was that of Mr. Herman Kahn of the Princeton Center of International Studies, who emphasized that by increasing America's ability to survive a nuclear war, the probability of such a war was greatly reduced.

The same point was made by Allen Dulles before the Conference of Governors in Puerto Rico in August where approval was voted of a report of the Rockefeller Committee on Civil Defense which urged: 1) an educational campaign to make people aware of the danger of nuclear fallout and 2) encouragement by Government officials of the building of home shelters and acquisition of survival kits. Senator Humphrey (D, Minn.) proposed an alternative plan of direct or matching Federal aid to the states for the construction of realistic shelters for protection against fallout.

PASSPORT RESTRICTIONS EASED

During the closing days of Congress, action was taken by both House and Senate on two passport bills. With little debate, the House passed the Selden Passport Control Bill (HR 9069) which appeared merely to "authorize continuance of the passport procedures now in effect as a result of recent Supreme Court decisions" (W. Post, 9/9). It authorizes the State Department to prohibit travel to certain countries and to deny a passport to anyone who has been a Communist party member or supporter since Jan. 1, 1951, if travel abroad by such a person was deemed harmful to the security of the United States. The bill provides for judicial review of passport denial. Members of the Foreign Affairs Committee, who drafted the bill, explain that if the State Department refused to disclose material relating to a denial and if the denial were not justified without such a disclosure, a passport would have to be issued. In the Senate, the Internal Security Subcommittee voted out an omnibus security measure containing a tougher passport section which would reinstitute the system of anonymous informers.

RADIATION RESPONSIBILITY RESHUFFLED

It appears that last spring's concern with increasing levels of fallout has resulted in legislative and executive action to assign the development of public safety standards to agencies other than the AEC. These actions come now, when encouraging reports of decreases in the level of fallout are being received. The decreased fallout is attributed to the year long hiatus in atomic weapons testing. On Aug. 14 the President issued an executive order creating a Federal Council on Radiation with the Sec. of Health, Education and Welfare (HEW), the Chairman of the AEC, the Sec. of Defense, and the Sec. of Commerce as members. The Council is to advise the President on radiation matters and to aid in the development of criteria for the protection of people from fallout and radiation.

The order contained nothing concerning a promised transfer of monitoring activities from AEC to HEW. Eight days later the President appointed Sec. Flemming of HEW first Chairman of the new Council and assigned HEW the task of determination of the effects of fallout and other sources of radiation. HEW is to define the acceptable limits of radiation exposure, measure the degree of contamination of the environment, determine the hazards of medical and industrial uses of isotopes and radiation, and enforce existing public health laws in these areas. The Food and Drug Administration was designated by the President the monitor of food and drugs and arbiter of permissible levels of radioactivity.

On Sept. 12 Congress passed a law which authorizes the AEC to withdraw its control over certain radioactive materials in certain less hazardous areas of activity and passes control of this to the respective states when the AEC deems a state capable of regulating such materials. The law also authorizes training programs to aid in developing the states' capabilities in these areas. The same law establishes the President's Radiation Council and increases its membership to include the Sec. of Labor.

The AEC announced that the concentration of radioactive debris in the air, which rose in the first months of the year, declined 30% in May and continued the decrease in June. The level of radioactivity was the lowest since Sept. 1958, when the US and USSR began intensive programs of tests.

Report of Radiation Subcommittee

In August there appeared a summary of hearings held from May 5 to May 8 by Rep. Holifield's (D, Calif.) Subcommittee on Radiation of the Joint Committee on Atomic Energy. The report contains many items covered by the F.A.S. Newsletter. The major conclusions of the report are:

Origin of Fallout—The total energy yield of all tests to date, including both fusion and fission is 170 megatons, of which 90 came from fission experiments. Sixty-five megatons originated in US and UK tests and 25 megatons from USSR tests. Of the total almost 50% was released in 1957-58.

Distribution of Fallout—About two-thirds fell in the Northern Hemisphere. The mean residence time of material in the stratosphere is now known to be 1 to 5 years (as opposed to the previously assumed 5 to 10 years).

Biological Effects of Radiation—The Committee still rates strontium 90 and cesium 137 the greatest potential hazards to mankind. The committee has also begun to note the importance of such short-lived isotopes as strontium 89, iodine 131, barium 140, etc., because they tend to play a greater role when the mean residence time is lower. In addition possible long-range genetic damage inflicted by carbon 14, half-life 5600 years, was considered to be of potential significance. C-14 is produced by neutron bombardment of nitrogen atoms. The estimate for the next 10,000 years is that genetic damage from C-14 will be 2 to 4 times greater than that from fission products.

The report recognized the importance of hot-spots, areas of greater than average concentration of radioactive material, resulting from uneven fallout, but dodged the important question of whether hot-spots constitute a greater hazard to local populations than present area-wide figures indicate.

The report recommends the assumption that "any dose, however small, produces some biological effect, and that this effect is harmful." No resolution was reached on the existence of a safe threshold level of radiation exposure below which cancers and leukemia do not develop. There is also criticism of the financial support the administration has been and is giving to fallout and radiation research.

SCIENCE AND EDUCATION

Congress has appropriated \$30 million to the Federal Student Loan Fund for the 1959-60 academic year. Requests for \$41.5 million were received from participating institutions. All institutional requests for more than \$20 per enrolled student were adjusted downward to meet the difference between requested and available funds. About 121,000 students are expected to apply for loans (averaging \$500) to the educational institution of their choice under the National Defense Education Act. This will represent about 5.5% of the full-time enrollment of 2,200,000 students at the 1372 participating institutions. Both the oath of allegiance to the USA and the loyalty oath are demanded.

Two hundred fifty million was authorized for the College Housing Loan Program in the third Housing Bill, which was not vetoed. Before August 1, 1959 more than \$215 million in approved and pending loan applications had already been received, leaving only \$35 million to be approved for further applications during the remainder of the fiscal year.

A. S. Flemming, Secretary of HEW, estimated that this nation will be short 130,000-140,000 elementary and high school classrooms and 190,000 qualified teachers. Furthermore, the US Office of Education has estimated that one third of the top quarter of the nation's high school graduates fail to go to college because they lack necessary funds. Obviously, a concerted effort must be made to remedy this situation, not only in view of the equality of opportunity a democracy is expected to offer all young citizens, but also in view of impending economic competition between the non-communistic and communistic nations. In the USA many people think that some form of greatly expanded federal aid to education must be given. However, opinions differ on how much money should be spent, how it should be administered, and with what aim in mind.

Concerning the differences in opinion and the lack of concerted effort, the writings of C. P. Snow, British novelist and Scientific Advisor to the Civil Service Commission have been recently in the news. In its Aug. 21 number, *Science* reprints under the title "Two Cultures," a prefatory note in *The Search*, a book by Snow; and Mary Simpson, under the title: "A Divided Culture" in the Sept. issue of the *Bulletin of the Atomic Scientists* also quotes extensively from his writings. Snow sees the Western World guided by two cultural trends—a traditional non-scientific trend, and an up-and-coming scientific one, with little integration of them. Mutual understanding must be established before a concerted effort in the educational field by leaders representative of either cultural trend is possible. The Russians, Snow believes, have done better: their novelists can expect in their audience—as we cannot—at least a rudimentary acquaintance with what industry is all about . . . an engineer in a Soviet novel is acceptable . . . as a psychiatrist in an American one. And the Russians have tried to determine the number and kind of educated men and women a country needs to come out on top in the scientific revolution.

EXECUTIVE SECRECY ON THE INCREASE

Administration policies regarding the release of information to Congress and the public have come under fire recently from two directions. The House Government Information Subcommittee charged in a 454-page report that the problem of executive secrecy is growing worse. Since Congress passed a law last year undermining usage of an old "housekeeping statute" as authority for holding back information, the Subcommittee reported, executive departments are leaning more and more on the undefined "executive privilege," which the Administration contends is an implied and unlimited constitutional power permitting the President to hold back information. The Subcommittee reiterated its charges that the Defense Department is managing the news with release dates timed to create a favorable public reaction.

A different controversy involving the Defense Department arose late in August when Defense Secretary McElroy disclosed that he had banned publication of a book entitled "Design for Survival" by Gen. Thomas S. Power, chief of the Strategic Air Command. Approval to publish was denied on the grounds it was inappropriate for a commander to write about his area of responsibility while on active duty in that command. Sen. Stuart Symington has disagreed strongly with DOD's action in apparently making "a deliberate effort to keep the truth from the people."

ACLU ACTS IN LOYALTY CASES

In its continuing struggle to test the constitutionality of the House Un-American Activities Committee, the American Civil Liberties Union has made public two briefs supporting the rights of freedom and association. One of these is a petition to the Supreme Court for a rehearing in the case of Lloyd Barenblatt, an instructor at Vassar College who refused to answer House Committee questions and whose conviction for contempt of Congress had been upheld earlier by the high court. The court had ruled that legislative investigations into Communism were proper because the nation's interest in defending itself against Communism were greater than the individual's interest in withholding information. The petition for a rehearing urged the Supreme Court to consider how the public interest is threatened by these investigations when they infringe the rights of individuals.

Despite the fact that the Barenblatt decision appeared to give the House Committee a free hand, especially in dealing with teachers, Chairman Walter announced in August that scheduled hearings on alleged Communist influences among California teachers had been called off and the names of subpoenaed witnesses would be turned over to local school boards for action under the State's Dilworth Act. The ACLU, which had sued to enjoin the hearings, immediately took legal action to bar this latter move.

SOVIETS IN SPACE

Space exploration has continued its lively pace as Soviet scientists were successful with two moon shots. Their latest space probe "Lunik III," launched Oct. 4, is expected to loop the moon and early data confirm the accuracy of the rocket's orbit. The vehicle should circle the moon at a distance of about 6200 miles and then swing back to the earth probably becoming an earth satellite with an extremely elongated orbit; perigee of about 1240 miles and apogee of about 240,000 miles.

There were a few interesting technical comments coming from Soviet scientists. Prof. V. Dorodinin stated that the energy required for launching just the payload "was 10 times that needed to launch the first Soviet sputnik." (The present launching came on the second anniversary of the first sputnik). There is still some confusion as to the weight of the payload. The initial announcement indicated a 614 lb. satellite. However it was subsequently announced that the third stage is also in orbit and contains 345 lbs. of instruments and batteries—a total payload of 959 lbs. As yet little is known about Lunik's instrumentation except that it contains solar batteries and equipment to photograph the far side of the moon. According to Prof. E. K. Federov, the launching velocity had to be calculated "with a precision of about one meter per second or one hundredth of one per cent"—presumably to give it the proper velocity to enable it to "boomerang" back.

Some measure of international cooperation was achieved in the last two Lunik shots when in each case a message from Moscow containing the track and coordinates of the vehicle was received at the British radio telescope installation at Jodrell Bank. The British scientists were able to pick up the rocket's signals almost immediately and because of this they were to bring evidence in support of the moon-strike by Lunik II. Their data indicated the proper acceleration of the vehicle as it approached the moon and was affected by its gravitational force.

In contrast to all this, on Aug. 8, the US put up its ninth satellite, "Explorer VI." The 142 lb. device was placed into an elongated orbit (perigee 157 miles; apogee 26,400 miles) equipped with 15 experimental devices. This is the "paddle wheel" satellite containing four large external vanes each of which contains about 2000 solar cells which use solar energy to recharge the satellite batteries.

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: J. Edgcomb, E. Shelton and Irving Shapiro, of the Washington Office Staff; Writers: H. G. Dubuy, H. Goldfine, E. Korn, E. Kravitz, V. Lewinson, F. K. Millar, G. Picus, N. Seeman, B. Stiller; Production: I. Shapiro.

A-WASTES PRESENT DISPOSAL PROBLEMS

One of the major problems of the oft-predicted atomic age will be the elegantly mundane one of waste disposal. Several related events occurring over the past several months have given a slight foretaste of the real and psychological problems involved.

Last June the Committee on Oceanography of the National Academy of Science-National Research Council recommended, after prolonged study, 28 possible sites for the disposal of suitably packaged low level radioactive waste (largely the trash of industrial, academic and clinical laboratories). One of the sites is as close as 2 miles to the Florida coast; another, near Rhode Island, is only 48 feet deep. The immediate unfavorable reaction of Congress resulted in the introduction of two bills which would restrict possible sites to those which were at least 200 miles from shore, 6000 feet deep, and not near areas used for commercial or recreational fishing. None of the 28 sites meets all three requirements (W. Post, 7/30).

AEC Position

AEC general manager, Alvin R. Luedecke, emphasized that there are no immediate plans for using any of these sites, that in any event before use a site would be subjected to a specific study of its physical and biological conditions and public hearings would be held after notification of the appropriate state and local officials (C&EN, 8/10). The AEC opposes passage of either of the two bills mentioned above.

A detailed and comprehensive study by the United States Public Health Service of a uranium mill on the Animas River at Durango, Colorado reveals another, more immediate, aspect of this same problem. People living downstream from the mill were found to be receiving 2.7 to 4.6 times the "permissible" level of radioactivity in the diet. The enforcement power of the PHS has been brought into action in this instance. Brief studies of several other localities indicate that even more serious problems may exist but a full check will not be completed for about two years, if sufficient funds are made available (W. Post, 8/15).

After extensive hearings a Congressional Sub-Committee of the Joint Atomic Energy Committee called for a "bold, imaginative, yet realistic" plan for disposing of atomic wastes. It especially focussed attention on the problem of high level radioactive waste which currently is stored in underground tanks. This is considered to be an unsatisfactory solution for an indefinite period. The report emphasized however that waste disposal thus far has "not resulted in any harmful effect on the public, its environment or its resources" (W. Post, 9/3).

International Problem

That atomic wastes are not only a problem for the United States was emphasized by US Delegate John F. Floberg in a proposal at the third general conference of the International Atomic Energy Agency. Emphasizing "our strong feeling that a high priority be given to the problem of dis-

PLANS FOR PROJECT PLOWSHARE

Under Project Plowshare, started by the AEC in 1958, scientists have planned three experiments to be carried out during the next two years, in which the energy released by a thermonuclear explosion would be harnessed for industrial purposes (W. Post, 8/23).

These experiments would:

(a) Produce a reservoir of underground heat for producing power, and also create large amounts of radioactive isotopes trapped in giant salt domes.

(b) Carve out a new harbor in Northwestern Alaska.

(c) Unlock oil from shale formations deep underground.

AEC Chairman John A. McCone has stated that no definite dates have been approved for these experiments because of the current US and USSR voluntary suspensions of nuclear weapons testing. It is his hope that the Geneva Conference on the permanent suspension of such tests will clarify the situation with respect to the use of nuclear explosions for peaceful purposes.

Professor V. S. Yemelyanov, Director of the Main Administration for Peaceful Uses of Atomic Energy, USSR, and John A. McCone, Chairman of the US Atomic Energy Commission, met shortly after the Soviet scientist arrived in Washington, D. C., to discuss closer cooperation between their countries in the development of peaceful uses for nuclear energy, and the sharing of this research with the rest of the world (NYT, 9/14).

Among the steps discussed was the possibility of an exchange of scientists and of research findings in the field of controlled thermonuclear reactions. It was agreed "in principle" that both nations would make every effort to utilize the International Atomic Energy Agency, located in Vienna, as the repository for all useful information on the peaceful application of nuclear energy developed by the two countries and to encourage and aid the IAEA in the dissemination of this information to interested countries.

The US is accelerating its development of gas-cooled atomic power reactors, the type which the British have so successfully used for generating electricity. Under criticism from the Joint Congressional Committee on Atomic Energy for having neglected this design, the AEC is building at Oak Ridge, Tenn., an experimental gaseous helium-cooled reactor, fueled with enriched uranium oxide. This reactor will produce 25,000 kilowatts of electricity and should be in operation by 1962.

posal of radioactive wastes" Floberg presented a 5-point plan. These involved determining the feasibility of establishing burial grounds, the investigation of specific sea disposal sites, a field study of radioactivity in international rivers, designing a standard procedure for radioisotope laboratories and a general analysis of the international disposal problem. The importance of the problem is indicated, said Floberg, by conservative estimates that more than 300 civilian reactors are or soon will be operating throughout the world (W. Post, 9/24).

FAS NEWSLETTER

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On Sunday, Nov. 1 at 1 P. M. over ABC T.V. and radio, FAS Chmn. David Inglis and other scientists will be on "College News Conference" to discuss future atomic developments, the Geneva talks, etc. Check local listings for time and station. Members are urged to write local newspapers commenting on the program.

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