

F. A. S. NEWSLETTER

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May, 1968

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

SATTERTHWAITE TAKES OVER AS FAS CHAIRMAN; RASMUSSEN IS VICE CHAIRMAN AND CHAIRMAN-ELECT

Incoming FAS Chairman for 1968-69, Cameron B. Satterthwaite of the University of Illinois, took over from retiring Chairman Jay Orear of Cornell at the FAS Council meeting held in Washington on April 23-24. It was announced that John O. Rasmussen of Yale University had been elected Vice-Chairman and Chairman-elect. The 1968-69 Executive Committee consists of Satterthwaite; Rasmussen; Orear; Lincoln Wolfenstein, Secretary; Jack M. Hollander; Dan I. Bolef; and NEWSLETTER Editor Harriette L. Phelps. The newly elected Council Delegates-at-Large with terms expiring in 1970 are: Halton C. Arp, Robert S. Cohen, William C. Davidon, John T. Edsall, Jerome D. Frank, W. A. Higginbotham, Philip Morrison, Harry Palevsky, Victor M. Sidel, Jeremy J. Stone, John O. Rasmussen, and Maurice B. Visscher.

FAS DEPLORES HIGH-YIELD NEVADA NUCLEAR TEST AND URGES SUSPENSION OF ALL NUCLEAR BOMB TESTS

Among actions resulting from the April 23-24 FAS Council meeting were a telegram on the impending Nevada test explosion (see News Items in this NEWSLETTER on effects of the test which occurred in spite of protests by the FAS, Howard Hughes, and others) and a separate press conference statement on that test and some implications of U.S. nuclear bomb tests.

The text of the April 25th telegram, sent to the President; Secretary Rusk; Ambassador Goldberg; AEC Chairman Seaborg; Michael May, Director of the Livermore Laboratory; and Robert Mayhew of the Desert Inn, Las Vegas is as follows:

The Federation of American Scientists places great hope in the nuclear non-proliferation treaty as a step toward control of nuclear weapons. We consider the discussions now in progress in the United Nations of high significance. We believe that such discussions will be impeded by actions of the nuclear powers which seem to indicate an unwillingness to limit their own nuclear power.

We believe that it is particularly unfortunate that the United States plans to make a record-breaking underground nuclear weapons test (in the megaton range) while these discussions are taking place. The non-nuclear nations can rightly view such a weapons test as an indication that the United States is determined to continue its development of new generations of nuclear weapons, especially since the non-nuclear nations are anxious to couple their consent to NPT to a US-USSR commitment to talk seriously about significant arms limitation. Thus, the planned test may jeopardize the non-proliferation treaty.

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RODBERG TESTIFIES FOR FAS AGAINST ABM DEPLOYMENT

Following is the text of a statement presented before the Subcommittee on Defense Appropriations of the House Committee on Appropriations on 13 May 1968.

My name is Leonard S. Rodberg. I am Treasurer and member of the Executive Committee of the Federation of American Scientists, an association of scientists concerned with the impact of science on human affairs. I am also Associate Professor of Physics at the University of Maryland.

The Federation of American Scientists believes that some of the expenditures included in this year's defense budget would lead this country toward a heightened arms competition with the Soviet Union that is irresponsible on fiscal grounds and dangerous on military grounds.

For the past several years both the United States and the Soviet Union have possessed secure, invulnerable strategic forces, and each has appeared confident that it has an effective deterrent to nuclear attack. The presence of well-protected missiles on each side, well tested and having a known effectiveness, has provided each side with a good deal of confidence that its force could survive an attack and inflict severe damage on any attacker.

This relatively stable situation is likely to be overturned if we proceed with the construction of the Sentinel missile defense system, for which funds are provided in this appropriations bill, and with the installation of multiple re-entry vehicles (or MIRVs) on our intercontinental missiles, for which funds are also provided. The future of the nuclear arms race is to a large extent up to the United States. We have led the way into new stages of the arms race. We appear to be doing this again in the case of the ABM system and the MIRV warheads included in the present budget.

Shortly before he left office, Secretary McNamara testified that the Soviet Union is moving very slowly in deploying its ABM system and, in fact, has thus far deployed only a limited defense in the Moscow area. We, on the other hand, are planning a very extensive—and expensive—defense of our entire country. The Soviet Union will be forced to respond to our deployment by some improvement in its offensive missile force, to ensure that they continue to maintain an effective deterrent. We in our turn will have to respond to them. We will then be in a classic offense-defense arms race.

At present, each side can feel confident with a fixed level of offensive strength, since it knows how effective its missile force is and knows that there is no defense against it. With ABM deployed, this confidence will disappear, and there will be no stopping place in the rising level of defensive and offensive armaments. Indeed, the kinds of weapons provided in this budget open a Pandora's Box of new weaponry which threatens the future stability of the strategic balance.

There is no doubt that both the Russians and the Chinese can respond to this ABM deployment so as to render it ineffective. The basic technical fact is that this system can be neutralized by using relatively simple and cheap penetration aids or by developing different means of weapons

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RODBERG TESTIFIES—from page 1

delivery, Hans Bethe and Richard Garwin, respected scientists and long-time advisors to the Government on military technology, have recently discussed the wide variety of tactics available to a country which wishes to overcome an ABM system. It can spread fragments of the booster rocket, metal wires, or decoys over the sky and present the defense with more targets than it can possibly handle. It can equip the decoys with electronic devices that jam the defensive radars. It can explode initial nuclear warheads at high altitudes and produce a "blackout effect," which will then prevent the radars from seeing warheads which follow to attack the cities. By all of these means, and others, even a country with the limited technical capacity of Communist China will be able to neutralize the proposed system.

Recognizing this, there will be enormous pressures to go beyond this initial investment in missile defense and to upgrade the system. Indeed, there have already been reports that the Pentagon is planning further extensions of the Sentinel system, to take account of possible responses by the Chinese. ~~The open-ended expenditures implied here are obvious.~~

Our plans to deploy MIRV warheads on our ICBMs illustrate also the dangers of this ABM-induced arms race. Initially, we developed these maneuverable warheads to ensure that they could penetrate the Russian ABM system. However, the Pentagon now claims that these new warheads will be more effective at destroying Russian missile sites than our present warheads. This should be no comfort to us, for the Russians will surely respond to this new threat by expanding their missile forces still further.

Beyond this, there is another danger posed by these new warheads, namely, the increased incentive they give for each side to initiate a first strike. If a single missile contains many highly accurate warheads, then it has the capability of destroying a number of the opponent's missiles, if it can be launched before the enemy's missiles have left their launching pads. This provides a dangerous incentive for launching this missile force first and would lead to severe tensions in a time of crisis.

As our development of the MIRV warhead has shown, possession of ABM by one side leads to the introduction of new offensive weapons to overcome this defense. As time passes, there is growing concern that the ABM system is being improved and it will be difficult to know whether this is true or not. Significant improvements in electronics, computer systems, and interceptor missiles can be made without changing the external appearance of the ABM system. Both sides will then inevitably make conservative estimates of the effectiveness of their own deterrent and will overbuild their offensive forces. The present budget already includes billions of dollars to upgrade our offensive forces, and this escalation of costs will continue on both sides if a defensive system is deployed. In the event of a nuclear war, there would be even more people killed than if the present situation could be maintained. A missile defense, far from reducing the damage in the event of a nuclear war, would instead have the effect of increasing it!

Even short of this apocalyptic situation, the deployment of ABM will lead to rising tensions. The defense will take on great importance, commensurate with its cost, and any act by the other side which tends to negate our defense will appear threatening. Now, when the Soviet Union or China appears to be developing a new weapon, we simply note that the arms race goes on, but we know that our deterrent remains secure. With a defense in place, each new development will appear as a threat to that defense and will generate great concern, pressures for new expenditures, and increased tensions.

As an example, the recent observation that the Soviet Union was developing an orbital nuclear bomb led to head-

lines, but not to great anxiety, since we knew that our deterrent was not threatened by it. However, with a defense in place, we would have seen that this bomb, with its relatively low orbital altitude and reduced warning time, would be more difficult to intercept than a ballistic warhead, and there would have been great concern. Indeed, the Pentagon has already noted that it will add new radars and interceptor missiles to the Sentinel system to counter this threat, and we already see the rising expenditures implied by a decision to move into missile defense.

The inauguration of this new round in the arms race would have further serious consequences for the stability of our governmental process. It will implant in our Defense budget a new item which cannot easily be cut off and which will inevitably expand. New requirements for defensive systems will be found as new offensive weapons are introduced. Greater funds will be allocated, and it will be more and more difficult for the Congress and the public to maintain control over the technological establishment which manages and disperses these funds.

In addition, it seems likely that, for the ABM system to be effective, there must be some prior delegation of authority to fire the anti-missile missiles when a target is sighted. Only a matter of minutes will elapse between the time when a target is first detected and the last moment before an interceptor missile must be fired. The urgency of launching these nuclear-armed interceptors reduces still further the ability of the Congress and of our democratic process to control the initiation of war, and makes it more difficult even for the President of the United States to exercise authority over the use of our vast military forces.

The Federation of American Scientists believes that the new weapons funded in this budget represent not only a beginning to a dangerous new round in the arms race, but also a waste of our scarce resources. Especially now, when worldwide confidence in the dollar is imperiled, it seems the height of fiscal irresponsibility to open ourselves to charges that we are initiating an enormous waste of resources in yet another area. The United States badly needs the confidence of those abroad who do not share our fixation with the arms race. In this proposed budget we are about to expend resources and prestige on a futile attempt to defend this Country against dangers which other countries have accepted as inevitable, and to pursue steps that will only lead to heightened tensions.

In sum, we believe that ABM deployment will move the nuclear arms race to a new and more dangerous level and will aggravate our domestic and fiscal problems. We urge the Congress to eliminate from the budget the funds for this dangerous new development.

Editor's Note—

I very much regret the delay in my production of the May and June NEWSLETTERS—reflected in the closing dates, May 31st and July 15th, respectively; and I hope the idiosyncrasies of the 2nd class mail system will not compound matters. I have been changing jobs, from NIH to the Federal City College in D.C., and have just been unable to keep NEWSLETTER matters up to date. The "Interesting Reading" section will be caught up in the September NEWSLETTER, which will indeed reach members in September.—H.L.P.

NEW FAS STATEMENT OPPOSING CB WEAPONS

Following is the text of a statement released on 10 May 1968, entitled "Statement Opposing Development and Production of Biological and Chemical Weapons of Mass Destruction."

The Federation of American Scientists believes that development, testing and production by the United States of biological and chemical weapons of mass destruction is pointless, dangerous and provocative and should be discontinued.

The national security interests of the United States are unlikely ever to require use of nerve gas—whether in a conflict in Asia, in Africa, in Europe, at home or elsewhere. Yet such weapons are being developed and tested, as was recently shown by the inadvertent destruction of 6,400 sheep near the Dugway Proving Ground. Nor will the United States find it necessary to attack the crops of entire nations with rice blast fungus—but Fort Detrick researchers receive medals for developing it. Why buy what no contingency will ever require?

Furthermore, whether designed for use against people or food, the development, testing and stockpiling of weapons of this kind is dangerous to our own people. The Utah sheep-killing demonstrated the potential for inadvertent loss of life. Otherwise, if Asian flu can sweep the world, so might the more virulent strains of a carelessly released and artificially cultured disease. Every few years there are exotic deaths at Fort Detrick that dramatically illustrate the thinly controlled hazards. The well-reported eagerness of the U.S. Army Biological Center to find a Pacific Island Testing site to which birds do not normally fly reveals the dimensions—and the dangers—of the problem.

More generally, it is foolish for a rich nation with the strongest deterrent on earth to encourage other nations to develop cheap weapons that might neutralize our power or destroy our people. Neither our acts nor our statements should increase the plausibility of chemical and biological warfare. Inevitable reports of the development of these weapons will quietly incite, encourage and justify similar actions by others not now engaged in such development.

Finally, these weapons are abhorred by the conscience of mankind. Why prepare superfluous weapons whose use could only be a decisive stain on national honor?

As a step toward a policy in better accord with our conscience and our real security interests, the Federation of American Scientists urges the Administration to eliminate from the military budget all funds devoted to the research, development, production or stockpiling of biological and chemical weapons for mass destruction either of men or of food.

FAS NEWSLETTER

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Chairman _____ Cameron B. Satterthwaite

The FAS Newsletter is prepared in Washington.

Editor: Harriette L. Phelps.

Approx. closing date for this issue: 31 May 1968.

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

Sources of information (given in the articles in parentheses) are for further reference. Items reprinted directly from other publications are designated as such in an introductory paragraph.

NEWS ITEMS

The draft is apparently a principal factor in stimulating a record number of Americans to apply for admission to Canadian graduate schools. The most pronounced increase is at the University of Toronto, 23% of whose graduate school applications are from U.S. citizens, compared with 7% in 1966-67.

It appears that many American graduate students are applying to Canadian schools so that they could be physically in Canada if called up by their local draft boards, even though they have not necessarily decided to resist induction by remaining in Canada. The U.S. students seem to be applying to schools on both sides of the border, leaving the choice of where they will go at the end of the summer depending somewhat on the Vietnamese situation, both on the battlefield and at the negotiating tables in Paris.

Enrollment in a Canadian university is no guarantee against being summoned for induction. Indeed—since local draft boards have great freedom of action in such matters—it might hasten an induction notice if the local board construed the enrollment as indicating unpatriotic motives. Draft evasion is not an extraditable offense in Canada. It is easy for graduate students to qualify as permanent immigrants and not difficult for high school graduates and college drop-outs.

Many of the U.S. applicants appear to be very highly qualified. Admitting American scholars could enrich some rapidly expanding universities such as Toronto. Indeed, a similar argument is voiced for Canada as a whole: a rapidly growing country of only 20.5 million inhabitants. As one Canadian university dean remarked, "We've talked a lot about the brain drain. Maybe this is the way to reverse it." (*New York Times*; 14 April 1968)

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A discernible, if not altogether, "science revolution" may be underway in China. Dr. C. H. G. Oldham of the Science Policy Research Unit at the University of Suffolk in England, a geologist who has traveled in China and closely observed clues filtering through Hong Kong and other sources, summarized his views in a recent lecture. Oldham believes over-eager and ill-considered applications of technology led to such economic fiascos as the introduction of backyard blast furnaces and unproved farming techniques. Nevertheless, he says, successes have far outweighed failures, the most dramatic being production of nuclear weapons fueled with uranium 235. Noting the number (seven so far) and variety of Chinese nuclear tests, Oldham suggests that the view is "gaining ground" that the Chinese have perfected a centrifuge technique for uranium isotope separation—gaseous diffusion and electromagnetic separation have been used almost exclusively in Western countries.

Oldham believes that the cultural revolution of the last two years or so has handicapped the development of Chinese science, but by no means halted it. China has not contributed many breakthroughs, although the synthesis of one form of insulin there was hailed in the West. China has recently completed a large radio-telescope, begun in 1958 but apparently long delayed for political reasons. Oldham cites a recent Chinese assessment, putting China five to fifteen years behind Japan in most areas of technology. In January 1966 China declared that its goal in science was to overtake the advanced countries within twenty to thirty years. This now seems unlikely but the new policy, according to Oldham, is "more likely to result in a greater concentration of effort on problems of direct relevance to China's development needs." It is suggested that there is a possible analogy with the current situation in the United States, in which urban, environmental pollution, and other problems, are stimulating a shift in emphasis from basic research to problems of immediate social concern. (Walter Sullivan in the *New York Times*; 21 April 1968)

NEWS ITEMS (Continued from Page 3)

The U.S. is puzzled by Red China's apparent delay in putting into the field nuclear weapons that it is believed to have developed and produced in modest numbers. Government analysts don't know whether the delays stem primarily from technical problems or from problems arising from the Cultural Revolution. There is some speculation that the country's leaders may be reluctant to place their first medium-range nuclear missiles in sites around China lest anti-Maoist elements seize some of the weapons. Also, China has apparently failed to date to test a booster rocket believed to be large enough for use in an intercontinental ballistic missile.

Since the first successful Chinese nuclear test on October 16, 1964, China has seemed to be moving at a brisk pace in nuclear weapons development. There was evidence that Peking was pushing the nuclear program rapidly, to gain prestige and other benefits. In June 1967 China detonated a 3-to-7 megaton weapon, by far the largest to date. Late in 1966, American experts expected the Chinese to start deploying ten to twenty medium-range missiles early in 1967. Now the expectation is that this deployment will be delayed by at least twelve months. (William Beecher in the *New York Times*; 22 April 1968)

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The large underground nuclear blast, set off in Nevada on April 26, reportedly carved out a cavern big enough to hold Hoover Dam and set the earth trembling in four states. [See the FAS telegrams appealing for a delay of this test, elsewhere in this NEWSLETTER.] The test had a yield of about 1.2 megatons, and was the biggest underground blast ever set off in the non-Communist world, although this latest test was only slightly larger than the previous record test set off in December 1966. The AEC said that the Russians had detonated an underground nuclear device in October 1966 in the same energy range.

The large Nevada blast was set off in a 3800 foot shaft. An hour and 46 minutes later the earth above collapsed and formed a crater 300 ft. across and 50 ft. deep. But the AEC said there was no radiation leakage and "all indications are that the performance of this important test and its effect were in accordance with our expectations." The test had been termed essential for the development of a U.S. anti-ballistic missile (ABM) system. It had been opposed by the Howard Hughes organization, and Hughes, who now owns over \$100 million worth of property in Las Vegas, had even appealed unsuccessfully to Vice President Humphrey to halt the test. The blast was felt by residents in Nevada, California, Utah, and Arizona. Buildings shook some in Las Vegas and in many other communities, but there was apparently no significant damage.

The Uppsala Siesmological Institute in Sweden recorded the Nevada test as having a magnitude of 6.5 on the Richter scale. Such a magnitude normally indicates "a heavy tremor." (*New York Times*; 27 April 1968)

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The Urban Institute, a government center for research into the problems of the cities, should be in business in Washington, with a professional staff between 25 and 75 researchers by the end of this year. The independent but largely government-supported center will be headed by William Gorham, a 37-year-old economist who has been serving as an assistant secretary in the Department of Health, Education, and Welfare.

The Institute will study problems common to cities, such as poverty, housing, education, and transportation, and advance ideas on how they can be solved; work with cities to develop plans of action for overcoming their problems; provide independent evaluation of the effectiveness of federal, state, and local programs aimed at overcoming urban problems; and serve as a center for knowledge and research about urban problems. The Institute will probably have some private foundation support in addition to governmental funding. It is the government's most ambitious entry so far into the

field of sociological research, patterned roughly after the various "think tanks" which have served government agencies, especially the Defense Department, for many years.

One of the purposes in setting up the new corporation was to bypass the limitations of government pay scales in hiring good researchers. "The success of the institute depends on the talent we can attract," noted Arjay Miller, Chairman of the Institute's Board of Trustees composed of 15 prominent citizens. Another and more important motivation is said to be the need for an independent research group that might overcome the built-in limitations of government agencies. With its broad mandate, the Institute should be better able to study the interrelationships of urban problems, such as transportation and employment, than are the government agencies with their more parochial interest. (*New York Times*; 27 April 1968)

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The National Academy of Sciences has added 50 new members, bringing its total membership to 806. The Academy is also moving toward the formation of a nominating committee to choose a new president to succeed Frederick Seitz. Seitz becomes head of Rockefeller University July 1st, but will continue as president of the NAS until its new president is elected early next year. The Academy also announced the election of 10 foreign scientists as foreign associates of the Academy. Emanuel R. Piore, of IBM, was elected to a four-year term as treasurer of the NAS, a position which he has filled since the death in June 1967 of Lloyd Brekner. (*National Academy of Sciences News Release*, 23 April 1968; *New York Times*, 28 April 1968)

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Pope Paul VI has called upon a group of scientists meeting in Rome to halt production of nuclear weapons. Decrying the "evil use" of science for war, the Pope denounced bacteriological warfare and all other scientific instruments of war. The Pope's speech came a day after an underground nuclear test conducted in Nevada, and Vatican sources indicated that the speech had been directly influenced by the Nevada test. The Pope declared that scientists as well as political leaders must bear responsibility for making weapons capable of destroying mankind. These were speculation that the Pontiff's words may have been timed to lend support to the joint plea by the U.S. and the Soviet Union for endorsements by the U.N. General Assembly of the draft treaty to ban the spread of nuclear weapons. (*New York Times*; 28 April 1968)

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The European space program appears on the brink of collapse. Within a space of three days, the European Space Research Organization announced the abandonment of two heavy satellites because Italy had refused to pay her share of the cost. This followed quickly upon a British announcement that Britain would not contribute to the proposed budget expansion of the European Launcher Development Organization. The two events appear to doom plans for a European satellite communications system, developed jointly by the two organizations. The French have been the most enthusiastic backers of such a program which could either complement, or rival, the American sponsored Comsat operation. The French and the West Germans have already agreed to build jointly a communications satellite called Symphonie. But it launching and operation pose a legal problem: both countries are members of Intelsat, in which the United States, as a major contributor, holds the dominant voice. (*New York Times*; 28 April 1968)

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Former Defense Secretary McNamara is expected to publish a book concerning his belief that the United States and the Soviet Union have reached parity in nuclear weapons, and that the time has come to take more positive steps toward disarmament. The book will be based on McNamara's major speeches and reports to Congress, together with an introduction he completed during his last day at the Pentagon, February 29th. Called "The Essence of Security: Reflections in Office," the book will be published by Harper and Row

on August 15th. McNamara observed that the book will represent a review of his public record during the seven years he served under President Kennedy and President Johnson, with special emphasis on his recent efforts to limit the nuclear missile race. In a telephone interview in connection with his forthcoming book, McNamara observed that "there are some people who believe in the concept of nuclear superiority," but he declared that there is no such superiority any more, that nuclear power alone does not project any nation's political will, and that this has obvious implications for foreign policy.

Speaking with great emphasis, McNamara said: "We are now embarked in crucial negotiations to ban the spread of nuclear weapons and there is even the possibility of bilateral talks with the Russians on mutual limitations of offensive and defensive weapons [which talks are now more definitely planned—H.L.P.] It is therefore essential that we develop a broader public understanding of these issues. I hope that the book will serve as a basis for such a discussion, particularly in the universities."

McNamara, who is now president of the International Bank for Reconstruction and Development (World Bank), said he would donate any earnings from the book to endow a series of annual lectures on foreign and defense affairs at a university, but he declined to identify the university. Some of McNamara's former Defense Department associates are reported to be surprised at his decision to publish a book which would inevitably become a controversial document in an election year. But several of his close friends indicated some time ago that they did not think he would remain silent while the future nuclear strategy is being discussed in Washington. McNamara said the book's only reference to the Vietnam war are in the context of America's global strategy "to deploy its forces on behalf of its national security, and to use those forces with restraint." (Henry Raymont in the *New York Times*; 12 May 1968)

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The Administration is approaching a difficult policy decision on whether the U.S. should continue to subsidize Britain's role in the nuclear club by providing assistance in the production of atomic weapons. It is clear that Britain would like to continue its "special relationship" with the U.S. in the atomic weapons field. But for the Administration the issue is not that simple: What might ordinarily be a routine extension of an existing arrangement has become entangled with considerations such as the historic friendship between the U.S. and Britain versus Britain's role in Europe, or the desire of Britain to remain a nuclear power versus the desire of the United States not to encourage other nations to become members of the nuclear club.

At issue now is renewal of a 1958 agreement under which the U.S. has been helping Britain in developing and producing atomic weapons. The original agreement, apparently stimulated by the first Soviet satellite launching, revived the special relationship the two nations had in atomic weapons development during World War II. In recent years the U.S. has provided weapons design information and fissionable materials, particularly enriched uranium, and the U.S. provided a reactor and fuel for construction of Britain's first nuclear submarine, the *Dreadnaught*. The materials part of the agreement expires at the end of 1969 unless renewed. The technical information part automatically continues for another five years beyond 1969 unless it is denounced before December 1968, by the United States, in which case it would expire in one year. The arrangement for atomic submarine cooperation expires this August. The overall arrangement has evidently been technically and financially advantageous for Britain. (*New York Times*; 12 May 1968)

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Speculation on a planned circumlunar manned flight by the Soviet Union continues. According to one report, the Soviets have attempted at least twelve times in the last seventeen months to launch advanced space craft designed to carry men around the moon. This appears to be far more extensive

preparation for manned flights around the earth and to the moon than Moscow has acknowledged. U.S. experts base their estimates not only on Russian statements about their flights but also on information that Soviets do not make public but cannot hide. Although each of the twelve flights is believed to have involved a reentry capsule capable of carrying several astronauts, the Russians have described only one launching test of a manned spacecraft. The Soviet flight named Zond 4, flown last March 2nd, is clearly believed to have been an attempt to send a passenger craft to the moon's distance and bring it safely back through the earth's atmosphere, although the flight was described by Russia only as a spacecraft intended to explore space between the earth and the moon. (Evert Clark in the *New York Times*; 12 May 1968)

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The AEC presented the Lawrence Memorial Award of 1968 to five young nuclear scientists on May 20th. The award winners are: James R. Arnold, a chemist at the University of California at San Diego; E. Richard Cohen of the North American Rockwell Corporation, Thousand Oaks, California; Val Fitch, a Princeton physicist; Richard Latter, Rand Corporation; and John B. Storer, Deputy Director of the AEC's Division of Biology and Medicine in Washington. The Lawrence Award, \$5,000 to each recipient, is made in the spring of each year to U.S. scientists under the age of 45 who have made recent and especially meritorious contributions to the development, use, or control of atomic energy in those areas of all sciences related to atomic energy, including medicine and engineering. [FAS Vice Chairman and Chairman-Elect, John O. Rasmussen, was one of last year's recipients of the Lawrence Award.] (AEC News Release; 18 May 1968)

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Industrial interest in underground nuclear tests appears to have been stimulated by apparently successful results from some tests. At a recent New York meeting on "Nuclear Explosives: A New Engineering Tool" a number of ideas were discussed.

A natural gas company is planning an experiment next year to use nuclear explosives to blast out a subterranean storage basin at less cost than surface tanks. Nuclear tests have been proposed to reach hard-to-tap gas in deep rock. Owners of copper mines are reported to be planning to blast out low-grade deposits with atomic explosives. And the AEC is analyzing test data to determine the feasibility of nuclear blasts for excavating harbors, roadways, and a possible new Panama Canal. [Various "project Plowshares" experiments have been noted in previous NEWSLETTERS, but the recent New York meeting and some test results appear to have stirred up new and diverse interests in peaceful atomic explosive applications.]

Late next year, the Kennecott Copper Corporation, cooperating with several government agencies, intends to detonate a 20 kiloton nuclear device 1200 feet underground in Arizona to "fracture" a deposit of 1.3 million tons of copper-bearing rock. The copper would be extracted by pumping it out in a diluted acid solution. In another experiment set for next year, Columbia Gas Systems, Inc. plans to dig a huge underground gas storage reservoir with a nuclear blast in Pennsylvania north of University Park. [See comments on Project Ketch in earlier NEWSLETTERS.] In Project Bronco, backed by some 18 oil companies, an attempt may be made to see if a hydrogen explosion could turn oil shale beds into an underground oven, unlocking new quantities of oil. Two other projects involve explosions to tap new reservoirs of natural gas in Colorado. These would be similar to Project Gas Buggy [noted in earlier NEWSLETTERS]. Two AEC blast experiments earlier this year are now being studied to determine the feasibility of digging canals and other waterways. One estimate indicates that a deeper and wider canal to supplement the Panama Canal could be excavated for about \$750 million with nuclear blasts compared with up to \$5 billion with conventional means. AEC officials said that so far no radioactivity problems had cropped up in any of the experiments. (*New York Times*; 22 May 1968)

SUSPENSION OF BOMB TESTS—from page 1

We therefore urge that this test be postponed at least until the United Nations discussions of the treaty have been completed.

The text of the Washington press conference statement, also released on April 25th, follows:

The Federation of American Scientists believes that the success of the Non-Proliferation Treaty (NPT) now under discussion before the United Nations is of the utmost importance to the future security of the United States. Should additional countries acquire nuclear weapons, the danger of nuclear war would grow and the maintenance of world order would be made far more difficult.

It will not be easy to obtain the agreement of non-nuclear countries to the NPT. The NPT prohibits the manufacture or acquisition of nuclear weapons by non-nuclear nations, and such nations must accept international inspection of their peaceful nuclear facilities. But the NPT does not impose corresponding restraints on the own armaments of the nuclear powers. The non-nuclear countries have objected to the one-sided nature of these obligations. Consequently, without some significant arms control step by the nuclear powers, several of the major non-nuclear countries may reject the NPT despite U.S. and Soviet efforts to secure their agreement.

In the face of this widespread concern by the non-nuclear countries, the USAEC's high-yield nuclear test schedule for April 26, 1968 has tended to spotlight the continuing nuclear arms race carried on by the nuclear powers. We believe that the U.S. should not continue to carry out such tests, which symbolize before the world the apparent importance we attach to nuclear weapons. Rather, the U.S. should explicitly recognize that the further development of nuclear weapons will contribute little to U.S. security, and that the spread of such weapons to additional countries will endanger the future of all mankind.

As a gesture of the importance the United States attached to the Non-Proliferation Treaty and to a halt in the spread of nuclear weapons, we call upon the President to suspend indefinitely all nuclear testing, and we encourage the leaders of other nations to do likewise.

We believe that the United States and the Soviet Union will also have to achieve some progress toward nuclear arms limitation if all non-nuclear countries are to be persuaded to

refrain from eventually acquiring them. The United States might begin by suspending further steps toward the deployment of the Sentinel anti-ballistic missile system. We believe these steps will be significant aids in achieving worldwide agreement on the NPT.

Livermore Director May replied to Satterthwaite on April 26th:

This is in response to your telegram of April 25, 1968. As you know, LRL-Livermore and the Los Alamos Scientific Laboratory are research and development laboratories. In the area of national security, their main responsibility is to advance the technology of nuclear weapons. Judgments about the relationships of the timing of these technical efforts and the timing of international affairs are made by the Executive Branch of the Government.

And in a May 10th letter to Satterthwaite, AEC Chairman Seaborg responded as follows:

Thank you for your telegram of April 25, 1968, suggesting that the underground nuclear test planned for the following day may jeopardize the Non-Proliferation Treaty and urging that the test be postponed at least until the discussions of the treaty by the United Nations have been completed.

The Atomic Energy Commission has been concerned, since its inception, with the proliferation problem and has consistently endeavored to formulate its policies and conduct its programs with the utmost attention to that problem. We have viewed the achievement of an effective non-proliferation treaty as a desirable extension of the efforts of the AEC and have rendered direct assistance in bringing the treaty to its present state. Thus, the commission has considerable interest, as an institution and as individuals who have been directly involved, in a favorable outcome for the treaty at the General Assembly and would be particularly sensitive to any action likely to place such an outcome in jeopardy.

There exist important national security commitments which require the carrying out of the AEC development program. We believe this is understood both internationally and domestically.

Before proceeding with the test, careful consideration was given to its necessity in the interests of national security and to its possible effect on the course of the deliberations by the General Assembly on the Non-Proliferation Treaty. The final decision included consideration of all factors.

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