Secrecy

LATEST DEC. 10, 1988

From Office Memo 31 March 1949 (FBI?) An interesting item related to UFOs "Studies of the various possibilities have been made by Dr. Langmuir of GE, Dr. Valley of MIT, Dr. Lipp of Project Rand, Dr. Hynek.." Sarbacher told Just Caus he was working for GE at this time. MIT had Project Whirlwind in 1949 at MIT and now we have the Rand memos.

Dr. York, an IDA trustee was picked by Killian (p. 129 Sputniks Scientists, and Eisenhower) as the first chief scientist for DARPA.

Secretary McElroy who set up DARPA "indicated that DARPA was to centralize the DOD's space programs." Another organization that was considered to manage the national space program was the AEC.

Dr. York as chief scientist was the link with the Science Advisory Committee.

"Although thousands of people were involved, the tests were conducted in almost perfect secrecy." Killian describing the atomic tests 300 miles in outer space in Sept. 1958.

Richard M. Bissell was according to NYT June 6 1951, "one of the chief architects of the Marshall Plan." He was also a professor of economics at MIT.

The DEW Line (Distant Early Warining) was a result of Project Lincoln. It was approved by Chiefs of Staff in both Canada and the USA in November 1953. It was made public in April 1954. The April 9, 1954 NYT states there was "an exchange of notes in 1951 between Dean Acheson, then Secretary of State, and the late Hume Wrong, Canada's embassador in Washington establishing the principal that Ottawa would pay one-third and Washington two-thirds the cost of such radar barriers." Sarbacher met with Smith September 1950 and again the Canadian Embassy was involved. However some of Sarbacher's story doesn't make sense. He stated he was working on the arctic radar but it wasn't built until 1955-56. I checked my father's log book as he flew support for the DEW Line. There was one experimental radar off the North Alaskan Coast prior to 1954 but the contract went to Western Electric. Bell Canada had contracts on the DEW Line. Still don't know where Sarbacher got GE or radar in the 1949-50 period. McGill University in Montreal was working the Canadian end of the radar program.

According to a biography on General McNaughton (Vol. 3 John Sweetham, Ryerson Press 1969) the Pinetree Radar system became operational in 1954. The Mid-Canada Line became operational in 1958 and the DEW Line became operational in 1957. From this radar network emerged NORAD in May 1958.

McNaughton was the Canadian representative on the Joint Board for Defense.

What is the board of visitors to the U.S. Naval Academy? Everybody seemed to be on it.

I had said military scientists were called Puffins. I have been corrected it is Boffins.

The 1963 director of WSEG was Air Force Lt. General Harvey T. Alness. WSEG formed in 1948. Newsweek 1963 stated 20% of IDA Scientists worked for WSEG.

Secretary of Defense Charles E. Wilson approached Dr. Killian in 1955 to take on "civilian staffing" for WSEG. MIT was reluctant but offered to join with other universities and the IDA was formed in 1956.

According to The Nation, January 12, 1970, Dr. Lewis M. Branscomb, a JASON member, was highly critical of huge expenditures for space stations, Mars landings, and lunar bases.

According to Killian (Sputniks Scientists, and Eisenhower p. 102) Dr. Jarrold Zacharias was "the inventor of summer study technique and demonstrated with a memorable skill how this could be done." The most influential of these classified summer studies was "Project Hartwell, A Report on Security of Overseas Transport". The Project was under a navy contract with MIT with Dr. Zacharias as director. Killian continues "for the navy the Hartwell report became, in the words of one of its senior officers, 'the bible of undersea warfare'." This leads one to wonder how many bibles the Navy has.

changes of scientific ideas and the stimulations that come from a comparison of experience.

This is not a purely speculative statement. It has been frequently remarked, for example, that at Oak Ridge, when every moment counted, related groups worked diligently on the same problem without the slightest awareness that there was duplication of effort. It is said, too, that because there was, and still is, a tendency to be especially secretive about information acquired at Los Alamos, the scientists at the gaseous diffusion plant at Oak Ridge (K-25) were at one time unintentionally exposed to great hazard. The staff at K-25 was uninformed concerning the critical mass of the uranium isotope, that is, the amount which will produce an explosion or a deadly burst of radiation. A possibly apocryphal but widely repeated story tells of a visitor from Los Alamos who discovered quite by accident that at one place in the plant the accumulation was approaching perilously near the critical point. By violating security regulations, he was able to give the Oak Ridge staff the information that averted disaster. Few examples so dramatically reveal the disadvantages of compartmentalization; but in terms of retardation of further research, the reported instance is of lesser significance than the daily accumulation of unspectacular delays which remediable ignorance causes.

It is especially disturbing to reflect that the practice of compartmentalization is continuing in this country despite the freshness of observation concerning its demerits during the past war. The National Defense Research Committee and the Office of Scientific Research and Development from the very beginning accepted the policy, initiated by the military, of compartmentalizing information on the grounds of security. This led to incredible difficulties in carrying forward the research upon which the success of our arms depended. One important research project, for instance, involved inquiry into

the effects of various types of projectiles upon structures. The members of this research group, who were students of the defensive properties of concrete and steel, were purposely kept in ignorance of the outcome of tests of the performance of shaped charges against concrete, and were long blocked in efforts to learn the results of projectile firings against reproductions of German pillboxes. Difficulties like this led an official recorder to conclude that "more harm in arresting research and development was done by this compartmentalization of information than could ever have been done by the additional scrap of information that the enemy might have picked up by a more general dissemination of knowledge." [16]

President Irvin Stewart of West Virginia University, executive secretary of the National Defense Research Committee before the war and subsequently the deputy director of the Office of Scientific Research and Development, has acknowledged that compartmentalization made for inefficiency: "In theory," he writes, "the Committee members and later the office of the Chairman had the responsibility for seeing that information crossed divisional lines whenever research would be speeded thereby . . . Unfortunately, however, there were cases in which information in the possession of one division of NDRC was not known to another division, although it would have been very useful to the second division." [17] If barriers had not occasionally been informally and selectively ignored by some of the working scientists, there is reason to believe that many wartime advances would have been delayed if not eliminated. Especially in view of the fact that there appear to have been no seriously indiscreet disclosures of information by American scientific personnel throughout the long years of the war, Dr. Stewart believes "in retrospect that compartmentalization of information to the extent practiced was not in fact needed," though he notes as a high probability that compartmentalization made the military men "more

36. The persistence of no longer defensible classifications is discussed by Stewart, note 20 above, p. 252.

37. The relevant orders about publishing information captured from the enemy are Executive Orders No. 9568, June 8, 1945, and No. 9604, August 25, 1945, CFR Supp. 1945, Vol. 3, pp. 78, 108.

38. At the end of June 1950, however, the Air Force through its School of Aviation Medicine released two volumes, 1,300 pages, devoted to *German Aviation Medicine, World War II*. These volumes reflected German researches during the years 1939–1945, and described equipment and data on "researches of general interest in physiology, biophysics, psychology and pathology." *New York Times*, June 27, 1950, p. 53, col. 6.

39. The fate of the "Summary Technical Reports" is discussed by Stewart, note 20 above, p. 291. On May 22, 1950, a portion of one volume of the "Summary Technical Reports" was declassified and was then published by the AEC as a *Handbook on Aerosols* because the wartime research on the behavior of dusts, fumes, and mists had an immediate bearing on preventing atmospheric contamination by radioactivity. AEC Release No. 285.

Chapter II

1. Vannevar Bush, *Modern Arms and Free Men* (published by Simon & Schuster; copyright, 1949, by The Trustees of Vannevar Bush Trust), p. 101.

2. A description of wartime research in connection with the nitrogen mustards appears in W. A. Noyes, Jr. (ed.), *Chemistry*, Science in World War II (Little, Brown & Co., 1948), pp. 166–168, 243, 247, 250, 251, 256–258.

3. The BAL story is pieced together from the following sources: R. A. Peters, L. A. Stocken, and R. H. S. Thompson, "British Anti-Lewisite (BAL)," 156 *Nature* 616 (1945); H. Eagle and H. J. Magnuson, "Systematic Treatment of 227 Cases of Arsenic Poisoning," 30 *American Journal of Syphilis, Gonorrhea, and Venereal Diseases* 420 (1946); W. T. Longcope and J. A. Leutscher, Jr., "Treatment of Acute Mercury Poisoning by BAL," 25 *Journal of Clinical Investigation* 557 (1946); C. Ragan and R. H. Boots, "Treatment of Gold Dermatitides with BAL," 133 *American Medical Association Journal* 752 (1947).

4. Dr. Compton's remarks on the retarding effects of secrecy appear in *Hearings before Senate Committee on Military Affairs on S. 1297*, 79th Cong., 1st Sess. (1945), p. 625.

5. The AEC commented on its compartmentalization policy in its *Fifth Semiannual Report to Congress* (published by the Government Printing Office as *Atomic Energy Development, 1947–1948*), pp. 83, 84.

6. Compartmentalization in radar research is discussed in L. N. Ridenour, "Secrecy in Science," 1 *Bulletin of the Atomic Scientists*, No. 6, p. 3 (1946); also in *Hearings before Senate Special Committee on Atomic Energy*, 79th Cong., 1st Sess. (1945), pp. 538, 539, 542. And compare E. U. Condon, "Science and Security," 107 *Science* 659, 662 (1948): "With the microwave field at the Radiation Laboratory in Cambridge, Massachusetts, there was no compartmentalization whatever . . . More than that, there were frequent secret conferences on special topics, attended by hundreds of staff members. People in all parts of the subject went to a great deal of trouble to keep those in other parts fully informed. I believe that a great deal was gained by this lack of compartmentalization in the field of microwave radar." Dr. Condon adds the observation that in the atomic bomb project, compartmentalization prevented the acquisition of data that were badly needed by project workers, but that the British scientists (who were not hampered by compartmentalization rules) were able to supply some of the desired information; he expresses the belief that "we would have had a much harder time with the atomic bomb project had our British friends not short-circuited compartmentalization for us."

7. Naval fire-control difficulties are discussed in Joseph C. Boyce (ed.), *New Weapons for Air Warfare*, Science in World War II (Little, Brown & Co., 1948), p. 95.

8. Dr. Manley's comments on compartmentalization appear in his article, "The Los Alamos Scientific Laboratory," 5 *Bulletin of the Atomic Scientists* 101, 105 (1949).

T. R. Hogness, director of the Institute of Radiobiology and Biophysics, University of Chicago, in an address on "Security, Secrecy, and the Atom Bomb," delivered before the American Veterans Committee on November 25, 1949, attributes the Los Alamos policy to its former director, J. R. Oppenheimer. Oppenheimer "argued that the design of a bomb was too great a responsibility for just a few men. He needed the ideas of many, and many of the best ideas came from unexpected sources. Had the hierarchic attitude been adopted at Los Alamos, we might not have had the bomb."

9. Mervin J. Kelly, executive vice-president of the Bell Laboratories, served as an AEC consultant in the early summer of 1949. He later testified before a Congressional committee that "within the remainder of the atomic energy activities area, by that I mean Oak Ridge, Argonne, Hanford, I found good liaison and good cross-connections of knowledge between the programs. Actually, the week after I left there was an internal scientific meeting at Los Alamos of the scientists from these different laboratories, all of them being cleared, and, therefore, they could talk about the basic physics that was fundamental to this job. They were having a meeting much like the physical society meetings, except on classified material, and the contacts on matters of business on the technical things that flow between these organizations were in very good standing and being well done." *Investigation into the United States Atomic Energy Project*, Hearing before the Joint Committee on Atomic Energy, 81st Cong., 1st Sess. (July 7, 1949), p. 812.

It is only proper to add, nevertheless, that the scientists at other installations have steadily maintained, contrary to Dr. Kelly's impression, that they do not receive adequate information concerning the work done at Los Alamos. The

What price security?

A National Academy panel evaluates trade-offs between dangers to national security that arise from technology transfers and threats to the openness of scientific communication that are caused by too much secrecy.

Dale Corson

"There is an overlap between technological information and national security which inevitably produces tension. This tension results from the scientist's desire for unconstrained research and publication on the one hand, and the Federal government's need to protect certain information from potential foreign adversaries who might use that information against this nation. Both are powerful forces. Thus, it should not be a surprise that finding a workable and just balance between them is quite difficult." So said Admiral Bobby R. Inman, then Deputy Director of the Central Intelligence Agency, in a speech at the 7 January 1982 meeting of the American Association for the Advancement of Science.

Dale Corson, a physicist and former president of Cornell University, led the National Academy panel.

Inman's speech has since sparked widespread discussions aimed at delineating the differing needs of these two forces and suggesting ways to balance them. In fact, the tension about which Inman spoke, and the dilemma it poses, were the focus for a study recently completed under my chairmanship, entitled "Scientific Communication and National Security" (PHYSICS TODAY, November, page 69). The study, conducted under the auspices of the National Academies of Science and Engineering, considered the interests of both national security and scientific communication; attention focused on the control mechanisms now being used to restrict the flow of information and on the application of these controls; the committee also recommended specific improvements to the system.

The underlying conflict between the drive for security and the drive to open communication is not a new issue. Recently, however, concerns about national security as well as concerns about the free flow of information among scientists have increased. Why?

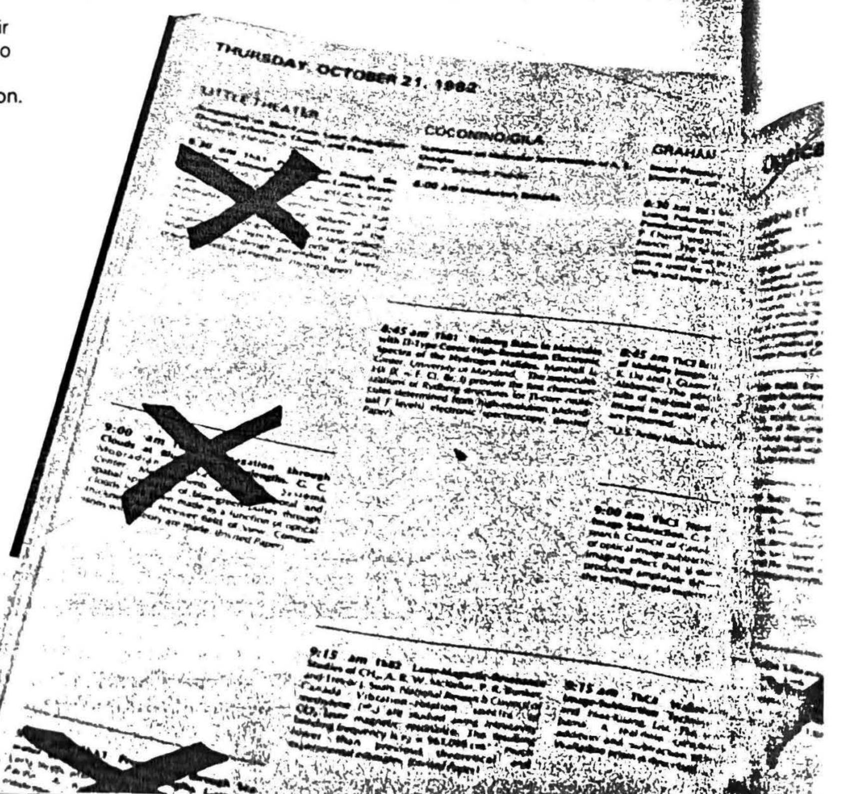
Recent events increase concerns

Although administrative concern over the technology-transfer problem increased during the last Administration, it has escalated sharply in the current one. This new sense of alarm has emerged, to some degree at least, from a change in perceptions. The US intelligence community, in fact, has identified four trends as significant.

▶ The US lead in at least some areas of military technology has diminished. The intelligence community sees this diminishing lead as a result of Soviet absorption of Western technology.

▶ Military systems are depending more and more on such high technol-

Optical Society program (right) from their November meeting in Tucson, is marked to indicate the invited papers on blue-green lasers that were withdrawn by the Pentagon.



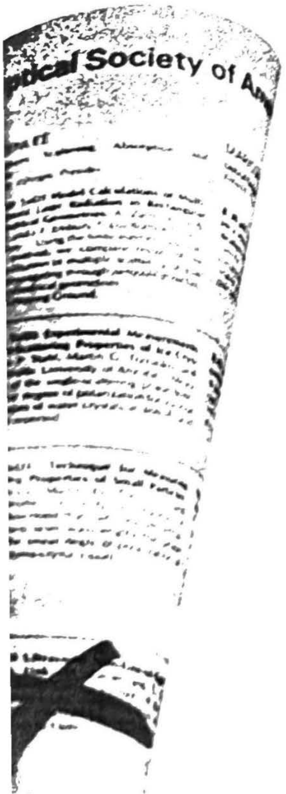
ogies as state-of-the-art microelectronics, lasers and so forth.

▶ A steadily increasing share of these technologies has both military and nonmilitary applications; there is substantial difficulty in controlling leaks in non-military systems.

▶ Recent American foreign policy has multiplied the number of routes for leakage. Significant expansion of East/West trade in the 1970s, for example, has resulted in a variety of agreements that further encourage the transfer of technology.

Adding further to the alarm is a sense that the Soviet Union is making a concerted effort to acquire scientific and technical information. This view was expressed strongly by Lawrence J. Brady, Assistant Secretary of Commerce, in a speech before the intelligence community last March. He said:

> Operating out of embassies, consulates, and so-called 'business delegations,' KGB operatives have blanketed the developed capitalist countries with a network that operates like a gigantic vacuum cleaner, sucking up formulas, patents, blueprints and know-how with frightening precision. We believe these operations rank higher in priority even than the collection of military intelligence... This network seeks to exploit the "soft underbelly"—the individuals who, out of idealism or greed, fall victim to intelligence schemes; our traditions of an open press and unrestricted access to knowledge; and finally, the desire of academia to jealously preserve its prerogatives as a community of scholars unencumbered by government regulation. Certainly, these freedoms provide the underpinning of the American way of life. It is time, however, to ask what price we must pay if we are unable to protect our secrets?



The question of what price the Administration is willing to pay to keep information out of the hands of adversaries, particularly the Soviet Union, is perhaps the central concern of the scientific community. And now this concern has been heightened, primarily because of recent events and what they imply regarding further restrictions on scientific communication.

Notable among these events have been efforts to elicit the cooperation of universities in restricting the movements of visiting Soviet scientists. In addition, there have been repeated instances in which the Pentagon or the Department of State has sought to prevent scheduled papers from being presented at scientific conferences. One such incident that recently received wide publicity took place at the Society of Photo-optical Instrumentation Engineers' conference in San Diego in August: The Pentagon had nearly 150 papers withdrawn several days before the meeting. It now appears that many of these papers will, after all, receive clearance and be included in the published proceedings from this meeting. Similar incidents in which scheduled papers have been withdrawn from scientific meetings have taken place before and apparently will continue to take place, as the Optical Society of America discovered in November when several papers were withdrawn from its meeting in Tucson. These events stem, in part, from a confusion over how to apply the Federal regulations to the scientific and academic community.

Panel studies key issues

Our panel of 19 people included a former Under Secretary of Defense, a former Under Secretary of Energy, a former Director of the National Science Foundation, a former Presidential Science Advisor, four former members of the President's Science Advisory Committee, five members or former members of the National Science Board, six current or former university presidents, one former Director of the National Security Agency, four executives of high-technology industry, several present or former members of the Defense Science Board and two lawyers.

Our charge included four tasks:

▶ An examination of national-security issues and scientific communication interests within the context of certain fields of science and technology

▶ A review of the controls used in restricting scientific communication as well as identification of the issues arising from the use of the controls

▶ A rigorous evaluation of the critical issues concerning the application of controls, and

▶ The development of ways to make the system operate more effectively.

Although the panel's mission was to investigate the effects of restrictions on scientific communication in general, it found in reaching its recommendations that the university requires separate consideration within the context of the US research community. Restrictions on open communication have categorically different implications for universities than they do for industrial, governmental and other realms of the community; there are two main reasons for this distinction:

▶ Universities integrate research and education; thus, any adverse effects on research will also adversely effect the quality of education for the next generation of scientists and engineers.

▶ Unlike other research institutions, universities have never established broad controls on access to information to ensure that sensitive information be protected. Such restrictions, therefore, would present an unfamiliar and unwelcome challenge to the university.

Because the potential national security concerns are most likely to arise in work that is funded by the government, the panel's conclusions concentrate on government-supported research.

While much of our report applies to basic industrial research just as much as it applies to university research, there are important questions bearing on industry that we have not addressed at all. For example, how does one treat the problem of communication with a multinational company that has laboratories abroad and foreign subsidaries? For many, this may be the most important question of all; I regret I cannot help, for this question requires study by a new group constituted in a different way.

Due to both the current level of concern and the panel's limited time and resources, study focused on technology transfer to the USSR from the US.

To study these issues, the panel had

exactly what

lem was: early on we would have to operate on a classified basis; consequently we arranged for security clearance for all panel members at the secret level. In addition, six of our members, who held security clearanes at the highest level, arranged for intelligence briefings and discussions at the very highest security levels and reported back to the full panel at the secret level. They also produced a Secret report which is on file in the National Academy of Sciences. In addition, they produced an unclassified report, which is included in our panel report as an appendix, and which gives a clear picture of the technology-leakage problem.

The panel is unanimous in its conclusions and recommendations.

Major suggestions and conclusions

The evidence from all sources suggests that indeed there is a substantial and serious technology-transfer problem. There is a continuing flow of products, processes and ideas from the US and its allies to the Soviet Union, through both overt and covert means. Although much of this unwanted transfer has mattered little to US security, either because the US did not enjoy a monopoly on a particular technology or because the technology in question had little or no military significance, a substantial portion of the transfer has been damaging to national security (See the table for some evidence presented by the Central Intelligence Agency). These damaging transfers have taken place through the legal as well as illegal sale of products, through transfers via third countries and through a highly organized espionage operation.

Although a good deal of information has been transfered through open scientific communication, the panel concludes that, in comparison with other channels of technology transfer, open scientific communication involving the research community does not threaten our near-term military position. Given both this conclusion and our concern for finding an approach that will maintain the vitality of our universities and their roles in education and research, while at the same time protecting the security of our advanced technology, how should we proceed?

The panel believes that scientific research and technological development are best nurtured in an environment where such efforts are dispersed but interdependent. Openness and a free flow of information are essential aspects of such an environment. The technological leadership that the US enjoys is based in no small part on a tion among scientists, and between scientists and engineers; the short-term security achieved by restricting the flow of information is purchased at a price.

After weighing the alternatives, the panel concludes that the best way to ensure long-term national security lies in a strategy of "security by accomplishment," and that an essential ingredient of technological accomplishment is open and free scientific communication. Such a policy involves risk, because new scientific findings will inevitably be conveyed to US adversaries. Nonetheless, the panel believes the risk is acceptable because American industrial and military institutions are able to develop new technology swiftly enough to give the US a continuing advantage over its military adversaries.

Against this general background, the panel comes to three specific conclusions:

▶ The vast majority of university research programs, whether basic or applied, should be subject to no limitations on access or communications.

▶ Where specific information has direct military relevance and must perforce be kept secret, it should be classified strictly and guarded careful- to accept or reject research projects, or to establish off-campus classified facilities, is a matter to be decided by individual universities.

▶ There are a few gray areas of research that are sensitive from a security standpoint, but where classification is not appropriate. These areas are at the ill-defined boundary between applications and basic research and are characteristic of fields where the time from discovery to application is short. (At present, a portion of the field of microelectronics is the most visible of these technologies.)

While it is impossible to specify these gray areas with precision, there are some broad criteria that help to define the few areas in question. The panel recommends that *no* restrictions of any kind that limit access or communication should be applied to any area of university research, basic or applied, unless it involves technology meeting all of the following four criteria:

▶ The technology is developing rapidly, and the time from basic science to application is short; and

▶ The technology has identifiable direct military applications, or is dual-use, and involves process- or production-related techniques; and

▶ Transfer of the technology would give the USSR a significant near-term

Acquisitions from the West affecting Soviet military technology

Key technology area	Notable success
Computers	Purchases and acquisitions of complete systems designs, concepts, hardware and software, including a wide variety of Western general purpose computers and minicomputers, for military applications.
Microelectronics	Complete industrial processes and semiconductor manufacturing equipment capable of meeting all Soviet military requirements, if acquisitions were combined.
Signal Processing	Acquisitions of processing equipment and know-how.
Manufacturing	Acquisitions of automated and precision manufacturing equipment for electronics, materials, and optical and future laser weapons technology; acquisition of information on manufacturing technology related to weapons, ammunition, and aircraft parts including turbine blades, computers, and electronic components; acquisition of machine tools for cutting large gears for ship propulsion systems.
Communications	Acquisition of low-power, low-noise, high-sensitivity receivers.
Lasers	Acquisition of optical, pulsed power source, and other laser-related components, including special optical mirrors and mirror technology suitable for future laser weapons.
Guidance and Navigation	Acquisitions of marine and other navigation receivers, advanced inertial-guidance components, including miniature and laser gyros; acquisitions of missile guidance subsystems; acquisitions of precision machinery for ball-bearing production for missile and other applications; acquisition of missile test-range instrumentation systems and documentation and precision cinetheodolites for collecting data critical to postflight ballistic-missile analysis.
Structural Materials	Purchases and acquisitions of Western titanium alloys, welding equipment, and furnaces for producing titanium plate of large size applicable to submarine construction.
Propulsion	Missile technology; some ground-propulsion technology (diesels, turbines, and rotaries); purchases and acquisitions of advanced jet-engine fabrication technology and jet-engine design information.
Acoustical Sensors	Acquisitions of underwater navigation and direction-finding equipment.
Electro-optical Sensors	Acquisition of information on satellite technology, laser range finders, and underwater low-light-level television cameras and systems for remote operation.
Radars	Acquisitions and exploitations of air defense radars and antenna designs for missile systems.

Table adapted from a Central Intelligence Agency report entitled "Soviet Acquisition of Western Technology," April 1982.

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military advantage, and

▶ Either the US is the only source of information about the technology, or other friendly nations that could also be the source have control systems at least as secure as ours.

The panel recommends that in the limited number of instances in which all of the above criteria are met, but where classification is unwarranted, the values of open science can be preserved and the needs of government can be met by written agreements or contracts no more restrictive than the following:

▶ Prohibition of direct participation in government-supported research projects by nationals of designated foreign countries but with no attempt to limit physical access to university space or facilities or to limit enrollment in any classroom course or study. The danger to national security lies in the immersion of a suspect visitor in a research program over an extended period, not in casual observation of equipment or research data.

▶ Submission of stipulated manuscripts simultaneously to the publisher and to the Federal agency contract officer, with the contract officer having 60 days to seek modifications in the manuscript if he so wishes.

The review period is not intended to give the government the power to order changes. The right and freedom to publish remain with the university as they do with all unclassified research. The government nonetheless is a powerful negotiator in these discussions; it has the ultimate power to classify the research or to cancel the contract.

Knottier problems

The panel recognized the difficulty of limiting the access of foreign visitors on campuses to sensitive information, particularly when universities typically have people who are not working on federally-funded projects but who have free access to the laboratories and all that goes on within the university.

Let me simplify the problem by suggesting what might happen in a specific case. Visitors come to universities with restictions on their visas. Such restrictions may include travel restrictions, restrictions on what they can work on, and currently there might also be restrictions on what they can see. The contract officer occasionally checks up on the visitor and he also asks the university to report on what these particular visitors are up to. Certainly, according to our recommendations, the university would be alerted to the problem and notified that the visitors should not be supported with project funds over an extended period of time.

In the case of the similar research laboratory next door, performing non-government-funded research, we suggested that it would not be inappropriate for the university to respond affirmatively to requests from government agencies for information about possible attempts by the visitors to gain support to work with the nongovernment-funded project over an extended period. We reasoned that if the researchers did obtain that type of support, in doing so they would be presumably violating the terms of their visas. Thus we think it's appropriate for the university to respond affirmatively if asked, when those visa restrictions are being violated. Such requests, however, should not require surveillance or monitoring of foreign nationals by the universities.

It is important for the welfare of the country that universities' educational and research programs remain vital. The procedures recommended by the panel for dealing with the gray areas of research are intended to protect university interests, and at the same time to be responsive to the government's requirements.

The panel believes that the provisions of Export Administration Regulations and International Traffic in Arms Regulations should not be invoked to deal with these gray areas in government-funded university research. Rather, the appropriate procedure should be incorporated in research contracts or other written agreements in those rare cases where some measure of control is required. Furthermore, the panel believes that universities and industrial research laboratories should be treated in exactly the same way insofar as EAR and ITAR are concerned.

Writing the contract ahead of time poses two problems. The first is that one never knows what is going to happen; perhaps something will come up that was not anticipated in the contract. The second is that Federal contracting officers may act overzealously in protecting themselves by writing in restrictions that are unnecessary. Both are real concerns. To address the first problem—not knowing what's going to come up—we'd like to have the rules clearly understood ahead of time, insofar as they can be, so that everybody knows what the rules are and can play by the same rules. When cases come up where it is necessary to elaborate, we believe that constructive discussion can take place and problems can usually be resolved if there exists an atmosphere of good communication.

As an example of such a resolution, I can cite the situation that began several years ago in the field of cryptography. There were several instances; one in particular occurred in about 1978. A young researcher at the University of Wisconsin in Milwaukee applied for a patent on a cryptographic invention he had made. He didn't hear from the Patent Office for a long time. Eventually he received a post card as the only response to the application—a post card saying that his research program had been classified Secret and that he was not to talk to anybody about it. This action was authorized under the Invention Secrecy Act.

Admiral Inman played a major role in resolving that issue and reducing a tense situation to one that is now handled on a voluntary basis. The American Council on Education also played a lead role by convening a study group on the cryptography problem, in which the mathematicians participated. I also participated in the very first discussion of that problem at the American Council on Education, where I first met Inman. As a result of these discussions, people working in cryptography now submit their papers to the National Security Agency for comment; simultaneously they submit their papers to the publisher. Some 50 papers have been submitted under this voluntary arrangement. I think changes or suggested changes have been proposed by NSA in a couple of cases, but I have not heard of any great dissatisfaction. I also believe that there are some people working in the field who have declined to cooperate and are going ahead on their own. We spoke both with the National Security people and with people from universities with researchers in the field, and all of them expressed satisfaction with the current system. This is an example of what can happen when people get together and talk about the problem.

The panel believes, however, that one cannot extend this particular system to other research. Cryptography is a very narrow field in which everybody working in it knows everybody else working in it, and the focus of the research is limited and generally well-defined. This is not true for most other fields of research.

The second problem—the overzealous contract officer writing in unnecessary restrictions—is harder to deal with. I suspect that this problem is part of what happened at the San Diego SPIE Conference in August. In that instance, however, it wasn't the contract officer who was overzealous, but rather it was somebody in the Pentagon; I don't know how to protect against Pentagon intervention.

The Defense Department supports a significant amount of first-rate basic research, their so-called 6.1 research. Traditionally, research supported by 6.1 funding is unclassified, unrestricted, and free for publication. I suspect that now there is a move to restrict 6.1 supported research in various ways,

and there are many contract officers who are writing individual contracts for this research. Consider, for example, a situation in which somebody in the 6.1 office in the Defense Advanced Research Project Agency decides to support a certain program but he personally doesn't write the contract. Somebody at Wright-Patterson Air Development Center writes the contract. The person who writes the contract is eager not to get in any trouble, so he writes restrictions in. I don't know how to deal with that problem, except by starting at the highest level, setting major policy issues and establishing educational programs for contract officers. I am glad that the Office of Science and Technology Policy is now interested in this kind of problem.

Although these are major problems, and we recognize them, the panel felt that if we could write the agreements ahead of time, so that everybody knew the rules, we would have gained something.

The panel has studied the control system now in effect, and the report has some substantial discussion of the system and its problems. The panel's suggestions apply equally to industrial and university research. The current system is undergoing rapid change. Because the perceived nature of the technology leak problem has shifted only recently, government control mechanisms themselves are still being adjusted to meet the new perceptions.

In a fundamental sense, government is still in the early stages of the learning process as it reorients existing laws, policies and programs—designed for other purposes—to achieve a new objective, the dimensions of which are not yet fully determined. The adjustment is particularly difficult because the current effort to understand and control unwanted technology transfer is unavoidably fractionated within the Federal establishment. Four intelligence agencies—the FBI, the CIA, the Defense Intelligence Agency and the National Security Agency—share the job of gathering intelligence on the nature, extent and significance of unwanted transfers.

Major regulatory authority is also split among three separate offices: the Department of Commerce's EAR administrators, the Department of State's ITAR administrators, and the Department of State's Visa Processing Office. These offices depend heavily on outside units in the defense and intelligence communities for advice as they reach their judgments.

Similarly diffuse is the government's authority for classifying information and for monitoring results from the research and development that it funds. Regulatory enforcement shows similar diversity and includes yet another agency, the Department of Treasury's Customs Service. The panel discovered, not surprisingly, that few people inside or outside the government truly understand the government's technology-transfer control effort.

The panel believes that there is much room for improvement in targeting the government's efforts to prevent unwanted technology transfer. Priorities must be set and communicated. The panel believes that the government should concentrate on the most feasible forms of control and should avoid regulations that impose compliance burdens without significantly affecting leakage. The government should concentrate its resources more systematically on those technologies that are of greatest relevance to near-term Soviet military strength.

Finally, the panel addressed problems of inadequate staffing in agencies that deal with control measures, as well as problems of inadequate communication between the research community and the Federal agencies. The panel also identified areas where the research community might help the government assess the nature of the technology-transfer problem more reliably.

In assessing the current policies and procedures, we heard the word "confusion" from just about everybody we spoke to about both the ITAR and EAR.

Let me give you an example of the complexity of the system. In the Export Administration Act of 1979, an act which has been revised regularly and is the underlying legislation for EAR, it was specified that the Commodity Control List should be based on something called the Militarily Critical Technologies List. The Commodity Control List is the basis for licensing exports and the Militarily Critical Technologies List is now undergoing its second revision. The third version of this list is going to be issued some time in the immediate future. The second version was a 700-page book, all of which is classified Secret. If one wants to take this to its logical end, it means that the people who are going to be subject to heavy fines through the implementation of these regulations will not be able know what it is that the violation is based on. The regulations are administered somewhat more intelligently than this sounds, but nonetheless individual parts of the Commodity Control List are classified individually. For example, some are Confidential, some are Secret and some are Unclassified. Regardless of classification, all are subject to export restrictions determined by EAR. Among the unclassified technologies are such things as high-vacuum technology, or manufacturing techniques for the mass production of ultra-high frequency generators, and techniques for making certain kinds of magnets which industrial people are making every day of the week.

The list has been developed by dedicated people who have taken a military system apart piece by piece to see what went into it; those people have taken their work seriously and they've done an excellent job of finding what underlies every military system that exists.

Due to the comprehensiveness of this list and its classification, however, there seems to be no way to start from that list and arrive at a straightforward and clear definition of what it is that the regulations are going to apply to. Thus one of our recommendations is to streamline the MCTL. Our general suggestion was to build high walls around narrow areas that are clearly defined, with priorities established in words that everybody can understand. I don't have any great hope, however, that tomorrow's mail will bring such a list to my desk. □

Security
Black Programs

According to Bill Sweetman

- existance of entire black program is classified
- new programs catagorized under black programs are automatically secret
- B.P are controlled by Special Access clearances based on "need to know" enough to get job done
- includes secure conference rooms and motion detectors
- wear special coded badges with various levels of clearance

Interview Gray by MACLYN P BURG
JUNE 25, 1975
for Eisenhower Library

the minutes of the National Security Council meetings. Well there were no minutes of the National Security Council meetings, at least as I knew it. Now I'll get into a little more detail on that and it may be that this is covered in the Hopper interviews--I'm not just sure--in terms of whether there were minutes or not. I've said all of this to indicate that I'm not speaking in a vacuum when it comes to the National Security Council.

Now, as to the organization in the White House when, for what--two and a half years I served as special assistant to President Eisenhower--that was a staff job and so considered by the President and by me, unlike, for example, [Henry] Kissinger's performance where he's an operator as well as staff. General Eisenhower never would have had, I think, anybody in that position in an operating capacity. It was purely staff and therefore a much smaller, more narrowly-based function than now. Now it gets a little confused because he's also secretary of state. But I suspect that it was more narrow even than the functions performed by McGeorge Bundy and Walt Rostow and other later special assistants. My responsibility was the National Security Council and such other responsibilities as the President chose to give me. And in those days, as you will probably find when you talk with General [Andrew] Goodpaster, he and I shared National Security responsibilities in a very happy way. In later years it was not Goodpaster and Gray; it was Bundy or Rostow or Kissinger--who else? The difference being this: I was more concerned with longer range policy planning, foreign policy, foreign military policy; whereas Andy, who had the title I think of staff secretary and therefore he had a lot of other duties with the respect to White House staff, he was sort of, if I can use a vernacular expression, he was sort of the spot man for the President. In other words, if the President wanted some message to go the chairman of the joint chiefs or if he was involved in something of immediacy, he would normally turn to Goodpaster. Goodpaster was his liaison with the military, to some extent with the intelligence agencies, and our duties therefore tended to overlap. And as John Eisenhower wrote in his book, I believe he adverted to this, he pointed out if Goodpaster and Gray had not been men of goodwill and mutual admiration, we could have had a constant donnybrook in the White House because our responsibilities did overlap and intertwine. We avoided difficulty by keeping each other fully informed. And I think he will tell you that anything he should have known he was told by me, and anything that he knew that impinged upon my responsibilities I was fully aware of. And we saw each other, I would say, practically on a daily basis.

BURG: The contact maintained basically through conversation.

GRAY: Yes.

BURG: Rather than memorandum.

GRAY: No, no. Practically nothing by the way of memoranda, I think. For example, I'd go into the President's office sometimes to discuss, well let me say, you read today about the Forty Committee. When I first became special assistant this committee was known as the Fifty-Four Twelve Committee. And it was called that because that was the number of the

Security Council paper which established the committee and gave it its charter for oversight of covert operations, Fifty-Four Twelve meaning that this was the twelfth paper adopted by the council in 1954. That committee began to get some visibility in the press and otherwise and so I changed the name of it. Let me digress to say that my cure for a lot of evils in government would be simply to change the name of the organization. And when I say evils, assumed evils, press imbued to the government. I'd just frequently change the names of these organizations. But in any event we called it then the Special Group, subsequently and after I left the White House it was called, I think, the Three-O-Three Committee because it met in Room 303 in the Old Executive Office Building. It may have had one other name change until it finally became now the Forty Committee. And if I were running the government, I'd change the name of it again. In any event, if I had, as I sometimes did, occasion to go and talk to the President about some proposed action of the Fifty-Four Twelve Committee or the Special Group, I would without fail stop on the way out in Andy's office and tell him that I discussed such and such with the President and his decision was so and so. And he did the same with me in almost everything, well, in everything that had any real relationship to our mutual and common responsibilities.

BURG: Could I ask you, Mr. Gray, did you come to this working relationship just because it was the very nature of your work that clearly this was a way to solve it, or had one of you advanced this solution to the other?

GRAY: Well I hope you'll ask Andy that question because his recollection may be clearer than mine. Let me say that he was in place before I was. In other words, he succeeded a man, an army officer whose name I think was Carroll.

BURG: Pete Carroll.

GRAY: Pete Carroll whom I really, I think, never knew or not well. And Andy was on board, and I've forgotten for how long, before I came into the job when I succeeded Bobby Cutler. So that my guess is that Pete Carroll had done--no I'm wrong about that because--I was going to say interview) the President spoke to Allen Dulles and me together, I think, giving me the instruction and Allen that there was to be only one copy of minutes, if you will, of what we then called the Fifty-Four Twelve Committee, now the so-called Forty Committee, and that one copy should be in the central files of the DCI [Director, Central Intelligence Agency], then Allen Dulles. General Eisenhower was perhaps more security conscious or as security conscious as any President we've had in history. He was well aware of the very sensitive nature of the subjects considered by the Forty Committee. And whereas he didn't want to block out history, in other words, whereas he felt there had to be a record of what was done by this committee, he didn't want copies of what they did floating around the government, even in the hands of a man--I have to say he trusted me or I wouldn't have been in that job--he didn't even want me to have copies of the minutes or records of the so-called, now, Forty Committee. So he instructed Allen and me that only one copy should be made of actions of this committee. I didn't chafe under this at all; in fact I thought it was a

April 7, 1955.

Dear Mr. President -

Today is the first Council day in 27 months that I shall not have been there to bring you into the Cabinet Room and, when you are seated, say: "Sir, the first item is ..."

All that I have said or written, or can say or write hereafter, will never serve to tell you what you have done for my life by this chance to be trusted in your service. The old tyrants forged their chains by fear. But in your service, the links are made tight by understanding and appreciation and human generosity.

The snapping of all these tensions sent my temperature the first two nights up to 101.5^0 plus - but penicillin and better behavior have got me back to normal. A beautiful place indeed to relax - sunshine, trade winds, a full Paschal moon - a little cycling - exquisite sea-colors. But by 20 days I will have had enough. I think I share one attribute with you: I was not made "to rust unburnished -- but to shine in use."

The pang of leaving your side at such a time is ameliorated by my strong belief that Dillon will do magnificently. His sharp, ferreting analysis should bring the Council mechanism to greater use to you. Less of formalized matters -- more of overall presentations, like the one I was working upon at my last meeting. The Council range of vision should be expanded by carefully worked-up comprehensive views of the wider scene: with more time to discuss what is being unfolded. Dillon will see this: and in his adequacy you will think only of me as (perhaps) one who got the engine turning over from its dead center.

I have a last promise I wish to make. From all quarters come in requests for me to speak, as if I were now released from a prison and would be able to "tell all." Well, that is not my concept of my duty to you. I have no more right to talk or write of the substantive matters in which I shared your confidence, at any time future than I did in the past. Of course, I may talk of mechanics and operations and of your own great spirit; but if I talk of those other things may a great Hand reach dwon from Heaven and squash me.

As I shall never forget, a single minute, your warmth and leadership and right course to steer, so I hope you will sometimes remember the possessor of Eisenhower's "The Mill by the Stream."

Your humble servant

Bobby

My love to Mamie

THE WHITE HOUSE
WASHINGTON

March 8, 1955

Dear Mr. President:

I ask to be relieved of my responsibilities as your Special Assistant for National Security Affairs on April 1, 1955. By that date, I shall have had the privilege of working with you for almost nine months longer than was contemplated when in December, 1952, you asked me to come to Washington.

You are familiar with the reasons for my resignation. They are wholly related to my personal and private concerns. For no other reason, so long as my duty was satisfactory to you, would I consider leaving your service.

It was your wish, upon taking office, that the National Security Council be developed into a mechanism more responsive to your use in determining national security policies. During the last twenty-six months I have exclusively devoted myself - with the fine cooperation of the Council agencies and with the skilled help of the Council Staff - to trying to meet your wish. The Council's activity and accomplishment since January, 1953, affords the best evidence how your objective has been met.

It is a source of real satisfaction that you have chosen as my successor a man for whose high qualifications we share a mutual appreciation. Today, more than ever, the United States requires an effective mechanism to integrate all aspects of Government in forming national security policy recommendations for your decision. My successor's abilities assure effective operation for you of this mechanism.

Being quite human, I have to say what these many months of close, personal association have meant to me as a person. You have given me more courage, direction, and appreciation of the right course in life than anyone I ever knew. Any fellow who works closely with you comes away a debtor for the rest of his life. I shall always carry in my heart and mind the imprint of your warm humanity, your broad judgment, and your inner strength.

In the appropriate phrase of an older but more accurate day, I am your affectionate and humble servant,

Robert Cutler

ROBERT CUTLER
Special Assistant
to the President

The President
The White House

~~TOP SECRET~~

THE WHITE HOUSE
WASHINGTON

November 3, 1958

MEMORANDUM FOR THE PRESIDENT

FROM: J. R. KILLIAN, JR.

SUBJECT: Preliminary Results of the ARGUS Experiment

Background and Summary

This historic experiment, probably the most spectacular ever conducted, provides the first verification of the existence of several phenomena of military importance when a nuclear explosion takes place in space above the earth's atmosphere. That these phenomena would result was first predicted by Nicholas Christofilos of the Livermore Radiation Laboratory. He pointed out that high energy electrons from the fission products generated by a suitably placed explosion would spread out into a broad belt around the earth covering the equatorial and temperate zones. These electrons might damage electronic equipment in space, render the space above the earth temporarily lethal to man, generate world-wide radio noise, especially in the HF and VHF bands, and produce strong localized disturbances of the ionosphere at great distances from the explosion.

These predictions were brought to the attention of the President's Science Advisory Committee in January 1958, and at its request a group of twenty outstanding physicists in the country was assembled at Livermore for an intensive two-week study of the subject. Their report, completed in March, confirmed and extended the theoretical findings of Christofilos.

This subject matter was presented to the National Security Council on March 6 by representatives of the President's Science Advisory Committee. The experiment itself, with the approval of the President, was planned during April and May under ARPA direction and was carried out by a team including elements of all three military services and the Armed Forces Special Weapons Project. W. H. Bradley of my staff has played an important coordinating role and has brought this information together.

[illegible]

~~TOP SECRET~~

[illegible]

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The results yielded by the experiment verified and confirmed the earlier predictions. They affect the design requirements for the electronic and warhead components of intercontinental and intermediate range ballistic missiles, the design of ballistic missile and air defense radar equipment, and, especially, military short wave communication equipment.

The successful performance of the experiment was in itself an extraordinary accomplishment. Especially notable was the successful launching of a large solid-fuel rocket carrying a nuclear payload from the heaving deck of a ship in the squally South Atlantic. Scarcely less so is the fact that the whole experiment was planned and carried to a completely successful conclusion in less than five months, including arrangements for coordinated measurements utilizing Explorer IV.

Impressive, too, is the fact that no leaks have occurred despite the large number of civilian and military personnel involved in the planning, in the Navy task force, in the preparation of Explorer IV and the analysis of its data, and in subsequent scientific studies.

The Experiment

A KT nuclear weapon, carried by a solid fuel rocket, was launched near 45^{o} South Latitude in the Atlantic by the USS Norden Sound and exploded in space at an altitude of about 350 kilometers. The expanding, glowing bomb debris was confined and guided by the earth's magnetic field so that after the first few seconds, the material moved mainly along the magnetic field lines. The action of the field resembled that of the barrel of a recoilless rifle. Half of the material plunged immediately into the top of the atmosphere near the launching site causing a man-made Aurora. The other half arched up 4000 miles above the equator and returned to earth, still guided by the field lines, near the Azores where another Aurora and radar reflections from it were observed from the USS Albemarle.

Along the trajectory, high energy electrons were emitted by the flying fission products. It was mainly with these fission-decay electrons in mind that the experiment had been planned. Physical principles had indicated that the electrons should rebound rapidly from north to south along the magnetic field lines, meanwhile progressing more slowly in longitude, circling the earth in a few minutes. This zigzag motion should continue until the energy of the electrons was dissipated by collisions with other slower electrons and ions which normally inhabit the space above the earth.

The experiment bore out the theoretical predictions of Christofilos in a beautiful manner and provided scientific information of great value about conditions surrounding the earth. The electrons were observed by means of four counters in the satellite Explorer IV, which had been prepared with this experiment in mind. The counting rate was transmitted by radio to microlock and minitrack stations on the ground and recorded on tapes.

Many other observations in connection with the experiment were made near the launching site and also near the so-called "conjugate point" to determine the effect of the phenomenon on the ionosphere. Not all of these results are yet available. A significant check on the Explorer IV data was provided by sounding rockets carrying radiation measuring apparatus. Three shots in all were fired from the USS Norden Sound, separated by a few days. The first was apparently low in altitude but the other two were placed as planned. The best observations were obtained from shot III.

Military Significance

A nuclear explosion in space produces three kinds of effects of military importance. The high energy radiation including particles from the explosion produces effects in space; the whirling high energy electrons generate radio noise; and the delayed radiation from the fission products can affect radio transmission.

All of these effects are matters of degree, depending on yield, location and geometrical considerations.

All of the effects are bounded by about 70° magnetic N. latitude. It is doubtful if any long-lived effects can be produced nearer to the pole than this limit.

The effects are also limited by the tendency of the pressure of the products of the explosion to "burst" the earth's magnetic field. Too large a nuclear explosion would expel the bomb debris through a temporary "crack" in the field. [redacted]

[redacted]

1. a. Effect in Space. The effect in space itself is of importance to apparatus such as satellites and ballistic missiles exposed to this effect. The high energy electrons generate X-rays when they strike any material object; these X-rays are very penetrating and can damage electronic equipment. Of course, they are lethal to man in such quantities.

The experiment indicated that the KT bursts caused about one million electrons per second having energies greater than about 1 Mev to strike a square centimeter target for a period of several tens of hours. During the first few minutes, a much higher electron flux existed in the vicinity of the shot.

b. Duration. The duration of the effect is such that the electron counting rate decays two to one in about one day.

2. Radio Noise Effect. High energy electrons in a magnetic field radiate radio noise over a band extending from a lower limit below the broadcast band up to an upper limit typically in the region of one hundred megacycles.

The yield and altitude of the ARGUS experimental shot were so planned that the noise should not have been observed. The amount of noise is reliably predictable from the number of electrons of each energy and magnetic field orientation and therefore the experiment provides a basis for estimating the amount of noise produced by larger explosions.

3. Ionosphere Effects. Spots of greatly increased ionization several hundred kilometers across, at each end of the magnetic field lines passing through the shot, are formed at the top of the earth's atmosphere. These spots should exhibit radar reflections, intense auroral glow, and various effects on communications equipment. The experiment confirmed the existence of these effects and the data when fully utilized will permit an estimate of their military consequences.

Scientific Significance

The experiment provided a great deal of information of scientific importance.

[redacted]

[redacted]

[redacted]

1. From the decay rate of the electron count, the density of the atmosphere at great heights above the earth can be inferred. The results so far seem to confirm the predictions that the "exosphere" is somewhat denser than had formerly been supposed, confirming recent clues from satellite drag data.

2. The experiment provides the first extensive experimental evidence concerning the structure of the earth's magnetic field above a thousand miles or so. The fact that the electrons emitted by the shot remained mainly confined to a layer about one hundred miles thick for two weeks shows that even 4000 miles above the earth the magnetic field is not unduly turbulent as some scientists had suspected.

3. Comparison of the man-made aurorae of the ARGUS experiment with natural ones may throw considerable light on the mechanism of those perplexing phenomena.

[redacted]

[redacted]