

THE MENACE VERSUS THE REMEDIES

12 May 1955

2271

CONTENTS

	<u>Page</u>
INTRODUCTION--Colonel L. R. Bartlett, Jr., USAF, Chief of the Mobilization Branch ICAF.....	1
SPEAKER--Professor Hornell Hart, Duke University.....	1
GENERAL DISCUSSION.....	30

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Washington, D. C.

Professor Hornell Hart, Duke University, was born in St. Paul, Minnesota on 2 August 1888. He received the following degrees: A.B., Oberlin (Ohio) College, 1910; M.A., University of Wisconsin, 1914; Ph.D., State University of Iowa. He became Civic Secretary of the City Club of Milwaukee in 1913. State University of Iowa appointed him research associate and research associate professor. From 1919-24, he served on the Child Welfare Research Station, State University of Iowa. He was Executive Secretary, Iowa Child Welfare Commission in 1924. In 1924, he became associate professor of social economy, Bryn Mawr (Pa.) College and in 1930, professor. Since 1938, he has been a professor of sociology at Duke University. In November 1948, he was a graduate, Field Arty, O.T.S. From 1930-31, he was investigator, in charge of measuring the change in social attitudes in President Hoover's Committee on Social Trends. Recipient of Edward L. Bernays Award for best study of social implications in atomic energy, 1948. Professor Hart is a member of the American Sociology Society, British Society for Physical Research. He is the author of the following books: Toward Consensus for World Law and Order, 1950; McCarthy Versus the State Department, 1952. He has contributed to various publications. His lectures are on social and religious subjects.

## THE MENACE VERSUS THE REMEDIES

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COLONEL BARTLETT: General Niblo, guests, gentlemen: Our speaker today lectured here in 1952 on the topic, "Social Influences on Technological Progress." I almost feel that the title of his lecture this morning could be called "Technological Influences on Social Progress." You will find his lecture in the library under the reference number L53-30. In addition you will recall you were given a copy of the article which he wrote last summer in the Bulletin of the Atomic Scientists. Professor Hart showed me this morning this copy of a current publication in which there is an article entitled, "How You Can Survive World War III." He assures me his lecture is not based on the cover.

Seriously, the possible or probable results of a nuclear attack on the United States is a matter of concern to a growing body of highly educated citizens. Consequently, the views of this latter group of individuals are of special interest to us.

It is a pleasure to introduce to you our guest, Professor Hornell Hart, of Duke University. Professor Hart.

PROFESSOR HART: Thank you, sir. Gentlemen: This is the second time when you, of the Industrial College of the Armed Forces, have extended to me the prized opportunity and honor of addressing you. The previous occasion was in 1952, on September 29. Let me today repeat, with enhanced emphasis, the admiration which I then expressed for the systematic and highly intelligent way in which you, our military leaders, are coming to grips with fundamental scientific problems.

The interval of two and two-thirds years which has elapsed since I last had the privilege of meeting with you provides an opportunity to check up at significant points the validity of certain generalizations which were presented in the 1952 lecture. In the transcript of that earlier address, the following statements appear:

"Of all the different fields of human endeavor, the swiftest acceleration in technological progress has occurred in the field of

military technology . . . . The area within which a given individual or military group could kill an enemy without contact with the earth between their base of action and the enemy (has increased from about three square miles at the time Columbus discovered America up to 198,000,000 square miles--the total area of the earth). . . . The power to kill, to destroy, is shooting skyward with appalling rapidity."

That passage in the 1952 lecture asserted the existence of a long-run trend in man's power to slay and to devastate which, during hundreds of thousands of years, up to the time of the Industrial Revolution, had been increasing along a gentle slope, but which has now accelerated to a point where the curve appears to be almost vertical.

#### Cultural Acceleration as a Basic Sociological Law

This acceleration in military destructiveness does not stand by itself, as a unique phenomenon in social evolution. Rather, the principle of accelerating technological change is as fundamental in social life as the law of gravitation is in physics. The law of cultural acceleration can be illustrated in quantitative terms in connection with the accelerating increases in speeds of transportation and of military airplanes, in the faster and faster increase in the wealth and income of Western nations, in the accelerating extension of the length of human life, in the accelerating growth of the number of college students, and in many other ways. This law of cultural acceleration may be generalized in some such terms as the following:

"Over the long sweep of history, man's power to carry out his purposes--particularly in the fields of technology and of natural science--has been growing more and more rapidly, and with faster and faster rates of acceleration. One of the swiftest and steepest forms of cultural acceleration is in the skyrocketing growth of military power to kill and to destroy."

#### Accelerated Destructiveness, 1952 to 1955

If the above generalizations, presented to you nearly three years ago, are valid, the power to kill and to destroy should have increased ominously during the period which has intervened since 1952. Has this implied prediction actually been fulfilled?

Before presenting a quantitative estimate in answer to this question, let me state my understanding of what has occurred since that first lecture in the development of super-bombs. The A-bomb, secured its explosive power through fission of uranium 234. The H-bomb as originally conceived, was to secure its explosive power chiefly by the fusion of hydrogen atoms, making use of deuterium and/or tritium. The plant constructed in South Carolina for the manufacture of tritium was planned to make this contribution, which would have been essential for the H-bomb. But the super-bomb which was exploded in 1954 was not a hydrogen bomb. Instead of employing the fusion of highly expensive tritium, it used newly discovered, complex series of reactions to achieve the fission of uranium 238, in combination with lithium. This super-bomb should not, therefore, be referred to as an H-bomb, but rather as a U-bomb, and I shall use the term U-bomb\* to refer to that type of explosive hereafter in this lecture.

Three major increases in destructive power and efficiency are involved in this development:

1. The blast power has been increased by virtue of transcending the critical mass-factor which restricted the size of bombs based exclusively on uranium 234 or plutonium.

2. The radioactive effect has been vastly increased. This factor was relatively unimportant in the A-bomb, which derived its destructive effects primarily from the blast, from heat radiation, and from conflagration. But the U-bomb increases the blast to such a vast extent that radioactive fall-out becomes a major factor.

3. The cost of U-bomb is radically cheaper per unit of destructive force than the cost of the A-bomb was, and also than the cost of the H-bomb would have been. It has been estimated that the raw materials for a U-bomb cost in the neighborhood of one cent per equivalent of a ton of TNT. Including all the accessory costs of creating the bomb, the expense is still less than ten cents per equivalent of a ton of TNT.

These cost figures are based on estimates by Dr. Ralph E. Lapp and these figures are his personal possessions. They must not be quoted for publication without his permission.

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\* The term "U-bomb" was taken from the writings of Dr. Ralph E. Lapp. Subsequently he substituted the term "N-bomb," the "N" referring to neutrons.

In relation to the question of whether the forecast made in my 1952 lecture has been fulfilled, the answer can best be given in terms of two charts. The first of these shows the trend in the number of persons who would have been located within the killing area of a single bomb if the world's most powerful nuclear weapon had been exploded on, above, or near Manhattan Island (or whatever other point would be most effective) at given dates.

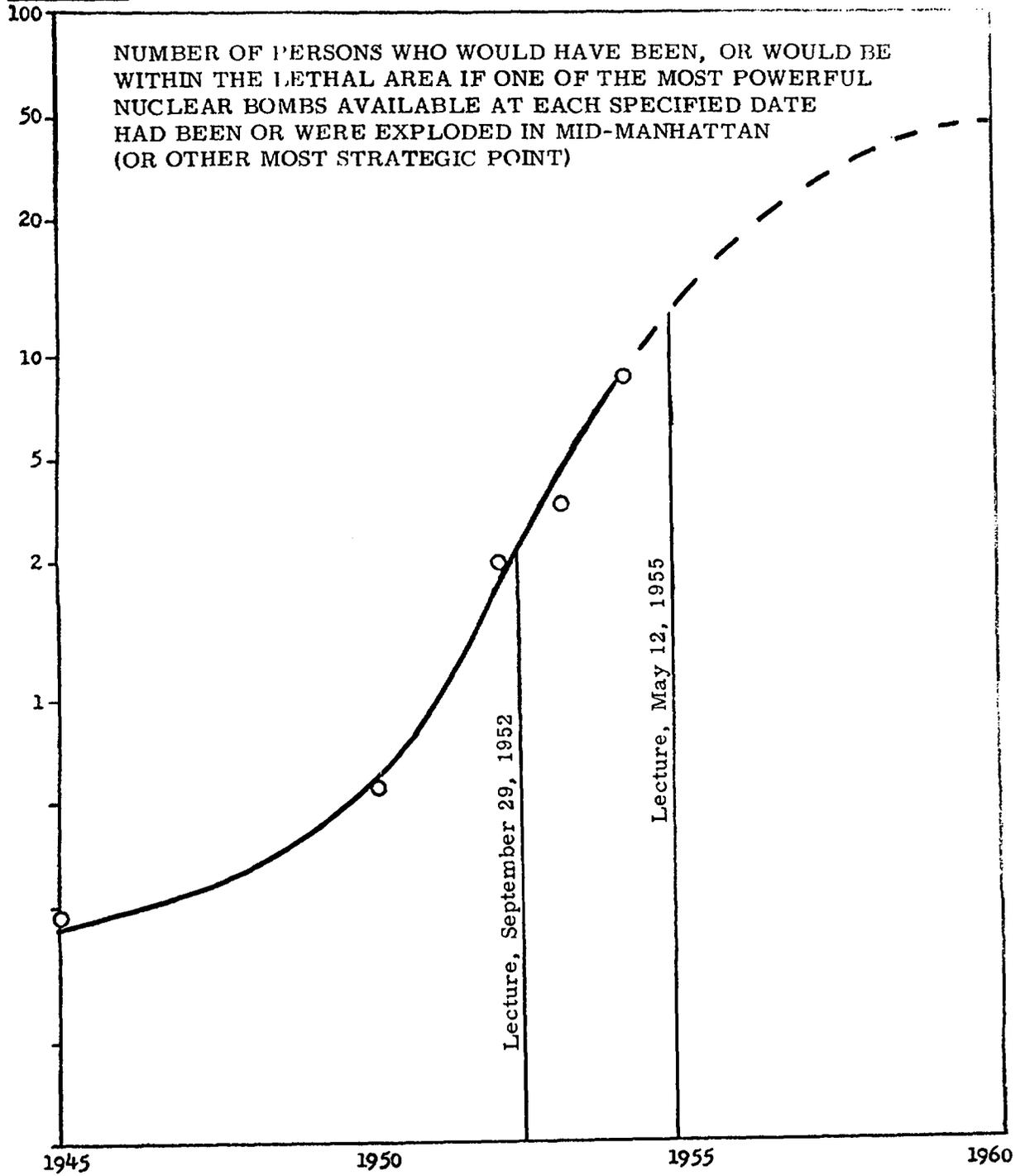
Chart 1, page 5. --Note that the curve on this chart has three segments. The first covers the period from the explosion of the first atomic bomb in 1945 up to the date of my previous lecture before this College in 1952. During those seven years the increase in population exposed to destruction by a given bomb was at an average rate of a little over 600,000 persons per year. During the second period, from 1952 to the present date, the increase was at the rate of five million per year--more than eight times as swift. This increase has been due partly to the expansion of the blast-damage and fire-storm area. But the blast area is only part of the story now. We have all heard how the radioactive fall-out from such a bomb would extend over an area on the order of 7,000 square miles. This would mean that not only Greater New York, but also Greater Philadelphia, and an area equal to the entire state of New Jersey would be within the killing range of a bomb dropped on Manhattan, if the wind were blowing from the northeast.

The third segment of this curve is an extrapolation. Any such projection of a trend into the future is, of course, speculative. But certain fundamentals seem inescapable. First, the tendency for indexes of technological mastery to accelerate--particularly in relation to military technology--may be accepted as basic in forecasting. Second, it is perfectly evident that the U-bomb dropped in 1954 was a mere first attempt, which is practically certain to be improved vastly. Third, it is evident that limitations of size and cost have now been transcended.

On the other hand, the upward sweep of the accelerating curve in chart 1, measuring population likely to be endangered by a single bomb, has certain limitations. For one thing, it seems likely that a 40-megaton bomb would be the maximum which could be carried aloft to be dropped from any bomber likely to be available by the year 1960. Such a bomb might be expected to render lethal--by lethal, as used here, is meant causing the death of unprotected persons if they remain exposed to the contaminated area a sufficient length of time--an area

CHART 1

Population (Millions)



of approximately 15,000 square miles. On the other hand, a far larger bomb might conceivably be constructed inside a submarine or surface ship, to be exploded in or near Boston Harbor at a time when strong northeast winds were prevailing. A single bomb of this type might conceivably contaminate a major part of the population core of northeastern United States.

The above discussion indicates, obviously, that the quantitative aspect of chart 1 must not be taken as precise. What we have is a swift past acceleration in the destructive power of individual bombs, and an obvious prospect of continued swift increases. The projection of the curve in the chart simply makes that fact graphic.

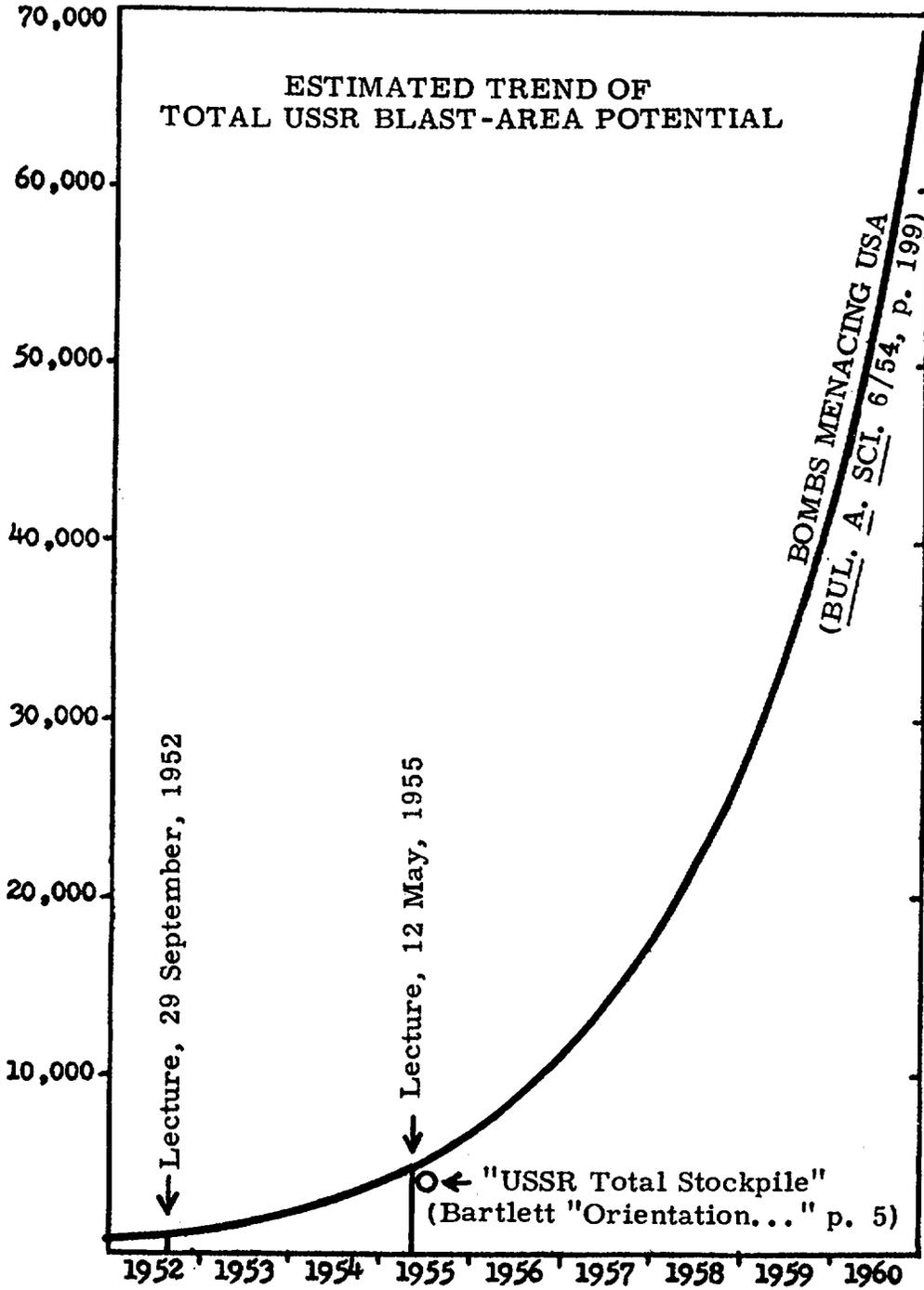
The chart at which we have just looked represents only one dimension of the accelerating increase in military destructiveness during the past few years. The first dimension has to do with the power of individual bombs. A second dimension consists in the accelerating increase in the number of bombs available.

Chart 2, page 7. --This chart shows estimates of the growth of the Soviet nuclear stockpile, in terms of square miles of potential blast-damage area. This chart is similar to one which was published in Bulletin of the Atomic Scientists for June 1954, based upon information available in non-classified sources. The small circle indicates the estimate presented by Colonel LeRoy Bartlett, Jr., in his lecture on "Orientation on Mobilization Problem" on 12 November of last year.

What does this chart tell us as to whether the technology of military destructiveness has continued to accelerate since the 1952 lecture? According to the estimates shown in this chart, the area which the Soviet stockpile of nuclear bombs would theoretically be capable of destroying, if dropped in the United States, increased from zero in 1948 to about 1,350 square miles in September 1952. During the less than three years since that earlier lecture, the estimated potential blast-damage area has increased to 4,700. If this trend continues until the end of 1960, the blast-damage potential of the Soviet stockpile will then be in the neighborhood of 70,000 square miles, nearly 15 times what it is now.

In considering this forecast, it should be borne in mind that when the basic trend indicated in chart 2 was estimated, it was not yet evident that the Soviet stockpile of atomic bombs could be transformed into U-bombs by using them as triggers, and adding as much as desired of such relatively cheap auxiliary nuclear-explosive materials as

Blast-Area Potential  
(Sq. Mi.)



uranium 238 and lithium. In Colonel Bartlett's paper of last November, on page 5, he stated the assumption that the USSR total stockpile in June of this year would consist of 200 bombs of 50 kilotons each and 50 bombs of one megaton each. By using the 200 smaller bombs as triggers for bombs of the new U-type, their respective blast-damage areas could be increased fivefold or more, jumping the total available blast-damage area of that date from a little over 4,000 to something over 12,000 miles. Even such an increase is, if anything, a grossly conservative under-estimate.

Moreover, chart 2 is based on blast-damage area, with no allowance for radioactive fall-out. To take fall-out area into account would expand the killing area of the 1954-type U-bomb by more than tenfold. Hence the probable growth of Soviet killing-area potential has undoubtedly been much steeper and more menacing than indicated by the curve shown in this chart. Once again, therefore, the basic forecast about the continuation of accelerating increases in military destructiveness appears to have been substantiated by the subsequent facts.

Thus, nearly three years ago, in September 1952, it was predicted from this platform that the power of military technology to kill would continue to accelerate. It has done so. These charts reflect the fact that the prediction was correct. Where do we go from here?

#### Is a Soviet Mass Raid Already "Checkmated" ?

The facts which have been summarized relative to the accelerating increase in the power of individual bombs, the super-acceleration in the size of the area which the Russian stockpile of nuclear bombs could destroy or render deadly to human life, and the startling increase in the cheapness with which these instruments of destruction can be manufactured, all would seem to point toward a towering growth in the threat to the life of the American nation.

But the trend of publicized opinion seems recently to have been moving in the opposite direction. About the middle of March 1955 articles began to burst forth in various periodicals, asserting that there would be little or no danger of a mass nuclear-bomb attack on the United States during at least the next few years. Let us summarize briefly the major points in this recent wave of optimism, and then consider with you the extent to which such hopes are or are not justified.

On 18 March, U. S., News and World Report published an article (pp. 21-25) under the title "Russia Checkmated: U. S. Bases Now Set--Knockout if Reds Move." On 28 March, Newsreel published an article (pp. 42-44) entitled: "The Reds and the Facts: Ignore the 'Scare' Talk--We Have a Ten-Year Edge." As far back as 20 February, 1955, Ansel E. Talbert, Military and Aviation Editor of the New York Herald Tribune (Sec. II, p. 2, cols. 1-2), seems to have anticipated this drift. He said:

"Most of our strategists . . . do not believe there is more than an 'outside chance' of a surprise attack by the Red Air Force on North America at any time in the foreseeable future-- but they do not rule out all possibility of such a stroke."

Reasons given for this new wave of optimism can be summarized in five points:

1. The optimists argue that Soviet forces could not neutralize the far-flung circle of Strategic Air Command bases and of aircraft carriers from which Russia would be devastated if the Soviets undertook a surprise raid against the United States.

2. The optimists argue that the striking power of the United States is now roughly 20 times that of Russia in terms of nuclear bombs and power to deliver them.

3. The optimists argue that not until 1959 will the Soviets have sufficient long-range jet bombers, able to reach the main American bases in Florida, Texas, and Arizona, and that until they do, they are likely to risk war.\*

4. The optimists argue that the internal struggle for dictatorial power, the disastrous unsoundness of Soviet agricultural policies, and other internal weaknesses have reduced Moscow's present and prospective overall capabilities for major war.

5. The optimists argue that a mass raid against the United States would be radically out of line with Russian military tradition, which has been to use nibbling and creeping aggression, to take advantage of weaknesses wherever they occur around her boundaries, and to react powerfully against any massive attack against her own territory.

\* After this lecture was delivered, reports on long-distance bombers flown in formation over Moscow, changed the tenor of discussion on this point.

It is not in my province to express an opinion as to whether the Soviets could organize and carry out a comprehensive action which they would expect to be successful in neutralizing our reprisal bases sufficiently to remove their intimidation and release the forces which they have been preparing for a mass attack against America. The answer to such questions lies in the field of military strategy. But obviously there must be incorporated into that problem a recognition of a basic fact in an area to which I, as a civilian, have devoted a good deal of study--namely, the problems of social change, and particularly the phenomena of steep acceleration in military technology. The incontrovertible fact which emerges from such study is the overwhelming swiftness in the multiplication of destructive power. The range of Russian guided missiles, the accuracy of their aiming, the explosive power of their warheads, the abundance of their numbers, and other aspects of their efficiency and quantity may all be expected to go on doubling, trebling, and quadrupling in brief periods of time.

The accelerating gains which the Soviets may be expected to make in their supply of U-bombs, and on their guided missiles, may be expected to be paralleled by developments of other methods for delivering nuclear assaults. It seems likely that the Soviets are acquiring or will soon acquire fleets of atomic-power submarines and aircraft from which SAC bases in the United States might be reached by U-headed missiles. It also seems reasonable to assume that Soviet military leaders are seeking to develop effective methods of neutralizing the flat-tops.

Of the five reasons given by contemporary optimists for brushing aside the danger of nuclear aggression against the United States, the first three are likely, then, to be quite swiftly eliminated by the fact that the acceleration of military technology is giving to the aggressor a greater and greater potential striking power for a surprise attack.

In his address to the House of Commons on 1 March 1955, Prime Minister Churchill said that he felt assured that Russia could not, at that date, launch a full-scale hydrogen-bomb attack. But Churchill's reassurance carried with it a reservation. He evidently expected that the Soviets would be equipped for a thorough-going U-bomb assault in three or four years. If an assault were to be carried out against the United States in somewhat the way which I shall outline a few minutes from now, the vast superiority which we possess in the size of our stockpile and even in the efficiency of our weapons would be of no help to us. The man with a machine gun has no advantage over the man with a revolver if the man with the revolver gets the drop on the

## CHART 3

A RAID COMBINING THE MOST EFFECTIVE FEATURES

In a raid combining Lapp's "small-scale" plan and the essential features of the paralysis raid outlined in June 1954, one hydrogen bomb might be dropped on each of the following targets:

<u>Major Metropolitan Centers</u>		<u>Other Oil Ports and Pipeline-Junctions</u>	<u>Lapp's Supplementary Fall-Out Bombings</u>
New York	Minneapolis -	Atlanta	South Bend
Chicago	St. Paul	Denver	Grand Rapids
Washington	Akron	Providence	Fort Wayne
Philadelphia	Pittsburgh	Portland, (Me.)	Elmira
Los Angeles	New Orleans	Houston	West of D. C.
Detroit	Baltimore	Corpus Christi	West of N. Y. C.
Cleveland	Buffalo	Port Arthur	Springfield (Mass.)
St. Louis	Toledo	Wood River (Ill.)	Albany
San Francisco	Cincinnati	Lima (Ohio)	Allentown
Kansas City	Milwaukee	Paroka (Ind.)	
Boston	Memphis	Greensboro (N.C.)	
Gary	Columbus		
	Omaha		
Bombs:	24	11	9

Leading Coal Carrying Railways: One Bomb on a strategic point in each of the following: Chesapeake and Ohio, Norfolk and Western, Baltimore and Ohio, Pennsylvania, Louisville and Nashville, Illinois Central, and Reading.

Bombs: 7. Total bombs: 51.

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PROBABLE RESULTS OF THE MOST EFFECTIVE RAID

A. Immediate Casualties:

1. Ten to thirty millions dead.
2. Ten to thirty millions more in need of emergency medical care.

B. 3. Demolition of the most vital structures of the 24 most vital cities in the United States.

C. Paralysis of Transportation and Communication:

4. Destruction of railway transportation.
5. Cessation of all automobile and air traffic.
6. Reduction of telephone, telegraph and radio communication to a trickle.
7. Cessation of practically all newspaper circulation.

D. Pin-down by Fall-out.

E. Starvation.

8. Destruction of existing food stocks in warehouses of target cities.
9. Cessation of practically all food shipments.
10. Paralysis of motorized farms.

F. Anarchy:

11. Rioting and looting.
  12. Obliteration of the Federal Government.
  13. Destruction of the nation's legal system.
  14. Smashing of the financial structure of the nation.
-

Let us examine briefly the particulars under each of these five heads.

A. Immediate Casualties:

1. Immediate death would come to between 10 and 30 millions of Americans, including a major fraction of the governmental, industrial, financial, transportation, medical, and educational leaders of the Nation. Before the significance of radioactive fall-out had been realized, the immediate deaths from the bombing of 25 prime-target cities were estimated at 9 million. The effects of lethal radiation would certainly increase the casualties immensely.

2. Burns, wounds, or radiation poisoning would injure 10 to 30 millions more, with injuries ranging in seriousness from those calling for immediate surgery and protracted hospital care, and from poisonings certain to bring death within a few days, down to minor injuries needing only first aid.

3. Apart from the possible poisoning of the world's atmosphere, the deaths and injuries from the fifth type of raid taken together, would probably amount to more than two-thirds of the populations of the central cities in the prime-target areas. Without transportation by trucks, automobiles, or railroads, how could these casualties be taken care of? A considerable fraction of all the hospitals in the country--perhaps one-third of the total United States bed capacity--would have been destroyed. The usefulness of the remaining hospitals would be cut down toward the vanishing point if fuel, transportation, and communication were destroyed to the extent which I shall show would be probable. Even to bury the 10 to 30 million dead would be quite impossible. Moreover, these casualties would include personnel essential to operating America. Can you conceive of the vital activities of the Nation going forward if from half to two-thirds of the trained executives, assistants, and skilled workers in the crucial centers of the Nation were dead or incapacitated by injuries?

B. Demolition of Vital Structures:

1. Blast-damage and fire storms would destroy the most vital buildings in each of the 24 target metropolises, including railroad terminals, electric generating plants, telephone switchboards, banks, courthouses, wholesale and retail warehouses, and other repository of vital records.

C. Paralysis of Transportation and Communications:

1. All railway transportation would cease immediately in the most populous northeast quarter of the United States, except for localized trips by such trains as happened to be outside blast-areas, and as happened to have (for the time being) left-over stocks of fuel. Repair of the bombed railway terminals and junctions would of course be impossible if wrecking crews had no trucks or trains to move them, and if the sources of repair materials were out of operation.

This railway paralysis would spread swiftly over the rest of the United States as existing stocks of coal and fuel oil became exhausted. The bombing of the 24 prime-target cities would paralyze the centers through which three-fourths of all the coal in the United States is wholesaled, and would put out of operation the most important railroad terminals, junctions, and repair centers of the United States. By bombing strategic points on seven railroads, 43 percent of all coal shipments could further be doubly blocked.

2. Practically all the automobile and air traffic in the entire United States would die down, except for such remnants as might continue for the time being until local stocks of gasoline, not destroyed by the bombing, had been exhausted. Without gasoline, trucks, busses, passenger cars, and airplanes would all cease to operate. The 24 prime-target cities include the centers through which more than three-fourths of all the petroleum products sold in the Nation are wholesaled. The additional bombs dropped on oil-line terminals and junctions, and upon ports from which petroleum products are shipped, would stop the flow of practically all the gasoline, lubricating oil and fuel oil for the entire Nation. It would also destroy a large fraction of all the reserve supplies of these products. Imagine what would happen if one of these bombs hit the oil refining and reshipping of Northern New Jersey.

3. Telephone, telegraph and radio communication is dependent on electric power, and the great bulk of this power comes from major generating stations and power lines. A paralysis raid, as outlined above, would cut down practically to zero the supply of coal and fuel oil for operating electric power plants, and would shatter the 24 most important cities from which power lines radiate in the northeast quarter of the United States. The most vital telephone and telegraph switchboards in that part of the United States would also be not only put out of operation but shattered beyond repair.

It is true that relatively few hydroelectric plants would be hit, and because of the tremendous interconnection of power systems, sufficient electric current would doubtless be available at these hydroelectric plants to operate such electrical equipment as was still in operating condition. But if it is true that railroads and motorized highway traffic would be reduced practically to zero, and that the centers in which electrical equipment (including repair parts) is manufactured would be largely obliterated, a question may be raised as to how the flow of power to this most vital quarter of the United States could be restored.

Someone has said: "Society is communication." But merely this cutting off of coal, petroleum products, and railroads would stop practically all communication in the United States except face to face conversation. Short-lived exceptions would be battery-powered radios, broadcasting stations powered by small units still having reserves of fuel, and some emergency telephone and telegraph communication based on local and temporary sources of power, and routed around the devastated central switching points. For a brief period, perhaps, an emergency pony express might be operated between some points.

4. All newspaper publication would cease in the northeast quarter of the United States and in major outside population centers such as New Orleans, Los Angeles, and San Francisco, except for a few small local sheets gotten out on an emergency basis, but without any appreciable outside circulation.

D. The "Pin-Down" Effect of Fall-out from U-Bombs:

1. The cutting off of communication which has just been outlined would result merely from the blast and conflagration effects of nuclear bombing. But the fall-out effects introduce a radical new paralyzing factor. A man 110 miles downwind from the blast of a U-bomb of the 1954 type, if exposed to the full radiation effects of the fall-out, without protection or decontamination, would receive the deadly dosage of 2,000 roentgens in the first 36 hours. (These figures were taken from Dr. Ralph E. Lapp's article, "Radioactive Fall-Out," page 48, Bulletin of the Atomic Scientists, 11 February 1955.) But the Atomic Energy Commission failed to state that if he continued to be thus exposed for a full year, he would receive 2,500 roentgens in addition. How deadly this would be gauged by the fact that of persons receiving even a gradual dose of 1,400 roentgens, 90 percent would die. Now if the problem were merely to stay sheltered for 36 hours, one might conceive

229  
that an informed populace might be disciplined so as to stay in its dugouts for the day and a half required. But if the next few weeks would still give a deadly dosage to everyone who walked abroad in the streets and fields, how could national life be reestablished--even if the wreckage of vital centers in key cities and the cutting off of coal and oil were not sufficient to stop all except face to face communications?

E. Starvation:

1. Virtually all major stores of food in such warehouses as were located in the major population centers would be destroyed by blast, fire, and radiation.
2. Practically all shipments of food into population centers anywhere in the Nation would cease as transportation died out.
3. Farm production and transportation would be paralyzed by elimination of gasoline and oil supplies. A large majority of American farms are now operated by motorized machinery rather than by horses and mules.
4. The pin-down effect of radioactive fall-out, keeping people from coming out into the open at risk of deadly radiation poisoning, would intensify all the above factors.

F. Anarchy:

1. In so far as radioactivity permitted, rioting and looting would develop on a huge scale on the part of tens of millions of survivors in search of food for themselves and their children. Outlaw gangs would form.
2. Unless adequate warning had been received and full-scale evacuation achieved, the National Government would be obliterated, with the death of a large majority of the top men in the executive, legislative, and judicial branches, and the destruction of the great bulk of the documents and records located in the National Capital. Washington would certainly be a prime target in any such mass raid. Underground shelters inside the blast area would be deathtraps rather than lifesavers in the kind of U-bombing to which the District of Columbia would be subjected. An effective evacuation program, well designed and thoroughly rehearsed, might keep key Government leaders alive temporarily. This question of evacuation will be dealt with a little later.

later in this lecture. Let us suppose that one of you was a top-ranking officer left alive in some military center outside Washington. How would you go about restoring the Federal Government if the national capital had been obliterated, if the President, all of his cabinet, and all the leaders of Congress were dead or at points unknown, if automobile and railroad traffic had been brought to a standstill, and if telephonic and telegraphic communication had been reduced to a tiny trickle? Moreover, how would the Army, the Air Force, or the Navy operate without coal or oil?

3. The legal system of the Nation would have been smashed. Not only the legislative and executive branches of our national Government would be gone, but the basic structure of legal authority in the country would have been destroyed. The buildings and records of the leading Federal courts would have been obliterated by blast and by fire. A disastrous proportion of the judges and leading lawyers in the country would be dead or dying of injuries, and lack of communication would make the law ineffective in any case.

4. Smashing of the financial structure of the Nation would parallel the destruction of government and law. The hypothetical raid would destroy 90 percent of the centers through which the Nation's financial transactions took place, and which contain the crucial records, money reserve, bookkeeping equipment, skilled personnel, and executive knowledge and ability of the American banking world.

The destruction of the governmental, legal, and financial structures of America might be likened to shooting a man through the base of his brain. But the cutting off of the fuel resources of the United States would be more comparable to shooting a man through the heart. Either type of wound would be fatal to the individual; either type of destruction would be fatal to America. The vital point is that the kind of mass raid which the Soviets may be expected to be increasingly able to launch against this Nation would be doubly fatal.

When the facts reviewed thus far in this lecture are taken fully into account, it becomes evident that six fallacies have been prevalent in public discussion of defense against possible nuclear-bomb attacks. Let us consider these briefly.

1. Static Thinking. The first of these fallacies consists in static thinking about these problems. After Hiroshima, a few clear-headed leaders realized that America would certainly become vulnerable

to raids with atomic bombs. By strenuous educational efforts, these awakened thinkers sought to rouse the Nation to realize that long-range bombing planes could come over America by way of the polar regions, and could destroy our leading cities, unless some adequate system of advance detection and interception was developed. Only a minority of the public has fully assimilated that state of thinking, but gradually this minority has been producing such results as the erection of radar networks across Canada, the development of civilian plane spotters, and in a meager way, the development of the kind of civilian defense units which might have been useful if America were to have been subjected to bombing such as occurred in World War II.

Then the U-bomb was developed. Also the possibility was demonstrated of releasing supersonic pilotless planes from mother airplanes at distances invulnerable to our defense system, and intercontinental guided missiles became more and more likely for the nearer and nearer future. These developments led a few pioneering thinkers to question whether even the best possible radar network across Canada, even when supplemented by radar ships and planes deployed in the Atlantic and Pacific oceans, could protect us adequately. The accelerating build-up of Soviet capacity to launch mass bombing raids against us began to impress some leading thinkers with the idea that massive attacks rather than mere localized bombing needed to be planned against. But before that realization had been assimilated, the fall-out development stupendously increased the intensity of the menace. Leaders of thought began to try to work out our defense problems in terms of this new threat. Even this is still being done largely by trying to develop methods of meeting the situation which we now confront, rather than beginning to think in terms of future accelerating increases of the menace. The colossal challenge which these developments are presenting to you, who are our professional defenders, is the task of developing dynamic plans for a dynamic future--plans which will grow step by step as the danger grows.

2. Exaggerated Evaluation of Evacuation. The second fallacy in current thinking is the delusion that mass evacuations could save the Nation. To criticise this doctrine involves taking issue with the man who is probably the best-known and most competent publicist relative to atomic-bombing problems--namely, Dr. Ralph E. Lapp. It means taking issue also with Val Peterson, Civil Defense Administrator.

Belief in the efficacy of mass evacuation seems to be the result of uncritical acceptance of three contributing fallacies. First, is the valiant but unrealistic assumption that 30,000,000 or more people could actually be evacuated in advance of a mass raid. Second is the unspoken assumption that cities demolished by Soviet bombing could expect help, after the raid, from unbombed cities. Third is the assumption that the prevention of immediate casualties would save the Nation without taking any steps adequate to deal with the nationwide breakdown of transportation and communication, the progressive starvation of the Nation, and the swiftly developing anarchy which would follow such a raid. Let us examine a little further each of these supporting fallacies.

To evacuate the 30,000,000 or more residents of the 24 target cities would mean putting the evening rush hour of each city into almost instant operation at the raid alarm. But this rush hour would not run along the familiar channels of back-home habit. It would call for moving the populations, not into their nearby homes, but to distances of ten miles or more, along unfamiliar routes, and into unfamiliar shelter areas. To do this successfully would require at least repeated and systematic drills. Small beginnings toward such drills have been reported from a few cities. Really serious discussion of evacuation is taking place with regard to Washington, D. C., and New York City. The mass slaughter which would take place among our governmental, financial, industrial, and other leaders if Washington and New York were U-bombed would in itself be a well-nigh fatal blow. It seems conceivable that evacuation routines might be built up which would get these leaders out of these cities before the bombs fell if several hours of warning were available. This, however, would require hours of patient drill, repeated at fairly frequent intervals. Each such drill would disrupt the life of the Capital and of our national metropolis to a costly extent. Whether the busiest men in the Nation will submit patiently and cooperate effectively in such exercises might be questioned.

On March 28 it was announced that a mock hydrogen bomb assault on 50 American cities, including Washington and New York City, would be held on 15 June 1955. It was stated that the test raid would send 15,000 Federal employees, including President Eisenhower, "streaming out of Washington to secret relocation centers in a half dozen states, there to 'operate' the government through June 17." I understand that Congress does not propose to adjourn or to move during this demonstration, but plans to continue business, as usual, on Capitol Hill. Apparently, no mass evacuation of Washington is yet

contemplated. To what extent, then, is it realistic to suppose that mass-evacuation drills could be carried out in all the target cities? In view of public attitudes toward Civil Defense, does this seem politically practicable?

But suppose that evacuation of all the 24 target cities could actually be achieved in the brief space of two or three hours. What assurance is there that any such warning will be given? If the raid were to come in the form of relatively slow bombers, approaching over the Arctic, such a warning might be feasible. But suppose that the U-bombs were carried by supersonic guided missiles, launched from distant planes or submarines, or from behind the Iron Curtain. How much warning would then be available? Yet the acceleration of destructive technologies makes such methods more and more likely in the nearer and nearer future.

Let us make, however, the unlikely assumption that the 30,000,000 might successfully be evacuated. We must then face the fact that not merely one, or a few cities, would be damaged, but that rather the hearts would be blasted out of 24 or more key target metropolises. Not only the central blast areas of these cities would be destroyed. Nuclear bombs create vast fire storms, in which the closely built-up sections of the metropolitan areas around these targets would be reduced to ashes. Residential areas, stores of food and other vital structures and supplies would be destroyed. Farms would have been paralyzed by inability to get gasoline. City water systems would be out of commission, and vast portions of the food and water supplies would have been poisoned by radioactive fall-out. No trucks or trains would be running to transport food even if it were available. Moreover, all outdoors, in the most vital areas of the Nation, would have been filled with deadly radioactivity.

How, then, would the evacuated 30 millions or more be housed and fed? Note that this problem, suddenly imposed on an unprepared and paralyzed nation, would be three times as great as the problem of housing and feeding the ten million service men and women who were under arms during World War II. Yet that smaller job required decades of experience, billions of dollars of preparatory expenditure, and organized planning by vast commissary agencies.

Even if evacuation were wholly successful, how could the Nation get back into operation? Approximately half of all the manufactured products most significantly related to the replacement and repair of

transportation and communication facilities (such as petroleum refining, fabricated metal products, electrical and other machinery, motor vehicles, tires, aircraft, railway equipment, ships and boats) are manufactured in the 24 target cities. Even if repair supplies and facilities were still available, how could they be transported to the points where they would be vitally necessary? Moreover, the destruction of records, and the governmental, legal, and financial chaos resulting from the raids, would be tremendous blocks against any effective action. As people began to starve, anarchy and violence would certainly become widely prevalent.

In brief, the fallacies of evacuation proposals may be summarized by pointing out that it is radically unrealistic to consider merely the prevention of immediate casualties, without taking account of the paralyzed condition in which the entire Nation would be left by the kind of raid which the Soviets might be expected to carry out.

3. Bomb-proofing and Dispersion. The third fallacy is the idea that making all future buildings bomb-proof, erecting bomb-proof shelters, and/or the dispersion of industry, would solve the problem--or, indeed, would be of any major value in mitigating it.

The violence and the poisonous character of the bombs is increasing with such steep acceleration that any improvements in construction cannot possibly overtake the need. Shelters are being suggested, particularly in view of the impracticability of mass evacuation. One proposal is for the development of a system of backyard shelters (for prime-target cities only) which would protect inhabitants in the C and D rings. This proposal raises certain questions:

First, to what extent will the C and D rings of the cities be preserved from the conflagrations which may be expected to rage from firestorms started by the bombs?

Second, if the backyard shelters prove sufficient to preserve lives during and immediately after the explosion, by what means could these people be fed, and be organized into some sort of a workable community if transportation and communication had been paralyzed to the extent indicated above? Even if the entire populations of these cities were sheltered from the immediate effects of the blast, any benefit would be cancelled by the fire storms, the cutting off of transportation, and the swift coming of starvation and anarchy.

As to dispersion, are the basic facts of economic and industrial geography being faced by those who believe that our vital targets could be so dispersed as to make a paralysis raid impossible? The United States today, as a highly organized Nation, has to have major concentrated centers of communication, of transportation, and of intensive social contacts, such as dispersion would seek to eliminate. Mass production is at the very core of modern industrial efficiency, and effective dispersion would be a deadly enemy of mass production. Moreover, would not the costs of anything approaching adequate dispersion to increase the costs of production as to reduce standards of living intolerably?

4. Civil Defense. The fourth fallacy is the idea that civil defense is likely to--or indeed can--make any major reduction of the risks we run or the damage which we suffer. A spot map of the major centers of civil defense would show that the overwhelming bulk of this organization is at the very spots which would be destroyed by a paralysis raid. If highly organized industrial and transportation systems would be wrecked by such a raid, the loose and largely volunteer civilian defense organizations would certainly go to pieces. Civilian plane spotters may be of some help so long as the major menace comes from piloted bombers, and pending the time when improved radar can detect low-flying planes. But may not those two needs be expected to disappear rather rapidly?

An unusually well-informed and clearly thought-out analysis of some of the basic aspects of civil defense has been published by David F. Carvers, Associate Dean and Fessenden Professor of Law in Harvard University. Dean Carvers refers to my article in the June 1954 Bulletin of the Atomic Scientists as "a pessimistic appraisal . . . ." His own analysis is based upon the assumption that railroads, truck lines, telephone and telegraph systems, the Federal Government, the banking system, and the other essentials of our national economy, will all be operating at at least a major fraction of their present efficiency--or could be kept useful by reasonable advance planning. This assumption fails to take account of a large number of the basic facts presented in the present lecture. Let me reiterate here a few of the crucial points which it seems to me that Dean Carvers fails to take into account:

a. A dozen well-placed U-bombs, in addition to those devoted to the 24 target cities, could destroy the seaports, pipeline junctions, and refineries through which practically the entire bulk of the crude oil and of its products flows in the United States.

b. A bombing raid of the type outlined in this lecture, using a total of 51 on-target U-bombs, would paralyze all of the leading railroads in the northeastern quarter of the United States, including effective paralysis of their repair facilities, and resulting in cessation of the flow of coal to all parts of the United States.

c. To insure the completeness of such a raid, it would merely be necessary for Soviet strategists to increase the number of bombs launched, so as to make sure that, after allowing for probable misses, each of the essential targets would be hit at least by one U-bomb.

d. If the above facts are valid, it is not the part of courage to ignore them. Rather, the intelligent planner must seek to formulate his programs in accordance with the actual probabilities, rather than in accordance with wishes and hopes.

5. Will Nuclear War Be Avoided by Mutual Dread? The fifth fallacy is the idea that, if World War III comes, both sides may refrain from the use of atomic weapons because of the terrible consequences. In his address to the House of Commons on 1 March 1955, Prime Minister Churchill pointed out that it would be folly to act on any such assumption. Several considerations support his position. In a dull-scale war, nuclear weapons--and particularly the U-bomb--may prove to be decisive. Indeed, the central point of the discussion of a paralysis raid, in the earlier part of this lecture, is that such use of nuclear bombing could be expected to terminate permanently all effective, organized American resistance to Communism. Recognizing that fact, we can hardly be expected to hold our own nuclear weapons in reserve until we find out whether the enemy might use his. Moreover, these weapons are being integrated in detailed ways into our fire power. The resulting increase in effectiveness is the basic justification which has been offered for the reduction in military manpower, and for the whole present budgeting of American military expenditures.

The fallacy that development of terrible weapons may prevent war has misled prominent thinkers in years gone by, as well as now. In 1911, three years before the outbreak of World War I, Jack London published an article in the Forum magazine, in which he said:

"War itself, the old red anarch, is passing . . . . Men have made for themselves monsters of battle which they cannot face in battle."

6. The Dictatorship Disease Is widespread. The sixth fallacy is the assumption that all would be well if only Soviet Russia could be eliminated as an aggressive menace to the world. In his address to Parliament on 1 March Winston Churchill tapped ominously on a dispatch box. He said:

"A quantity of plutonium--probably less than would fill this box on the table, and quite a safe thing to store--would suffice to produce weapons which would give indisputable world domination to any great power which was the only one to have it."

But one of the facts about accelerating military destructiveness is that atomic weapons are becoming more and more accessible to more and more nations. The process of their manufacture is being simplified. Scientific knowledge about them is being disseminated throughout the world. Our international relations are on the verge of reaching the state which was prevalent in our Western frontier communities at the time when miscellaneous outlaws and desperadoes possessed revolvers, but when the sheriff was likely still to be more or less timid, slow on the draw, and lacking the support of Federal troops. What kind of a world will it be when every pint-size dictator possesses bombs with which he might blow up the largest city in the world? Possibly the answer to this international Wild West situation might be similar to that which brought law and order to our Western Frontier.

You, gentlemen, as professional soldiers, and I as a College Professor, have certain things in common. Among these is the fact that, aside from our professions, we are human beings, and most of us are parents. I am interested in my grandchildren. I am hoping they are going to inherit a United States better than I grew up in. I know that a good many of you have grandchildren for whom you cherish that hope. To all of us must come the question fairly often: "What kind of a world will our children have to live in?" Will they have libraries, colleges, hospitals, economic abundance, freedom to pursue the arts? Or must such few of them as may survive go hunting for food among radioactive ruins? Perhaps some of the facts which I have been discussing make the probable answers to this question rather grim. But there are considerations on the other side which might be developed if this were an appropriate occasion.

One gleam of hope comes from the basic fact that dictatorship is not an efficient type of social organization. The food crisis in Russia,

the likelihood that that crisis may become worse because of the apparent radical unsoundness of the experiments which are being carried out in collective farming and in the opening up of vast tracts of dubious farmland, the struggle for power in the Kremlin, the unrest in the Ukraine, the smoldering rebellions in East Germany and in other satellite states--such items strengthen the hope that Russian aggression may lose its threat because of internal breakdown before too many years have passed.

A second reason for hope is the fact that world law and order are becoming so obviously indispensable. The accelerating technology of destruction may force even upon the man in the street the fact that his own survival and that of his loved ones depend upon really effective restraint of would-be aggressors.

The third source of hope is the fact that at long last those systematized and verified forms of human thinking which we call science are being applied to human relations. The systematic exploration of probable future events and of the probable effectiveness of various measures taken to deal with those events--such as is the main concern of this College of the Armed Forces--means that human intelligence at last is being used with increasing effectiveness in solving problems which are of vital import to the future of mankind.

We must have intellectual teamwork. You, here in this College, are specialists in defending America. You have in your possession information which cannot be given to civilians. You have spent your lives developing skills and insights which the layman cannot possess. Hence, in your study of military problems, you can reach forecasts which may have a trustworthy reliability far beyond anything which a civilian, without your help, might produce.

But your military findings cannot be kept in an isolated pocket. The statesmen on Capitol Hill will be listening to your representatives, and their decisions about basic legislation should be guided by your expert findings in your special field. The State Department, in laying out our international policies, and in telling the world where and under what conditions we will fight, must be kept cognizant of your expert findings if disaster is to be avoided and prevented. Thus, through your researches, and through what we may hope will be progressively more and more intelligent teamwork in the use of science as applied to human relations, our Nation may perhaps grapple successfully with the ominous problems of the Nuclear Age.

I don't believe the future is as hopeless as it might seem by this lecture, but I will leave the discussion to a later time.

COLONEL BENEDICT: Professor Hart is ready for your questions.

PROFESSOR HART: I hope you will be perfectly frank and don't pull any punches. I am used to this.

QUESTION: There must be a second chapter to your discussion. I wonder if you would like to indicate some of the possible outs on this, other than the hope that Russia will fade away?

PROFESSOR HART: Of course, there is a question of whether Russia actually would launch such an attack. The history of Russia is almost entirely free of any major aggressions. She will attack a little country like Finland or walk in on a country like Latvia, but her history has been that of resistance to invaders. It is my understanding that in World War II the Russians' tactical bombings were pretty good but their strategic bombing was almost entirely absent. Comparing that with the history of the United States, we have conducted large-scale raids over a period of years. We are accustomed to organizing that sort of thing. We are experienced in it. We have developed it and got the bugs out of the problem. I think in a way it may be fantastic to think that Russia could suddenly, overnight, do this thing successfully. Perhaps they know that, but they are certainly getting ready to do it, getting bombers, and so forth.

Of course, you say, "Except for the probability that Russia may fall down." I think one of the most reassuring things that I know personally is that dictatorships are inherently unsound. You can't run an enterprise successfully on fear, force, and fraud any more than you can keep a restaurant going on imitation food. It doesn't work. It is bound to break down. Here they are trying to produce crops by giving orders from Moscow: "You are to bring in so many million tons of wheat" from an area which has been more or less arid. "We will remove those in charge of the program up to now and we will send you some of our office help with a three-month course in agriculture. They will tell you how to do it." I think we can look forward with a great deal of satisfaction, watching for that to break down. Some of us are old enough to remember the way Russia went to pieces at the end of World War I. It can happen again.

QUESTION: Along the lines of your last answer, it seems to me, due to Russian psychology, they have a great respect for capital goods. In World War II, they didn't bomb Germany because they wanted to go in and loot it. It looks like, with the world's greatest resources of capital investment and buildings, they would regard that as a treasure house and possibly resort to biological warfare or chemical warfare. Would you like to comment on the possibilities in that?

PROFESSOR HART: I feel on that point I am even more ignorant than I am on some of these other points. I don't know whether anyone has worked out the possibilities of combining biological, chemical, and radiological warfare in a pattern that would eliminate the personnel or at least reduce them to a helpless state long enough for Russia to move in. I agree with you that that would be ideal from Russia's standpoint, to walk into America and take over. I should think, looking at the problem, on the other hand, that is something like there being a great big giant and you would like to have him for a slave. You think of the possibility of anaesthetizing him, snapping on handcuffs, and making him work for you. It might be a great deal easier to shoot him through the heart, and possibly it would be much simpler.

QUESTION: Would you elaborate a little bit more on the point on rioting and looting that you predicted?

PROFESSOR HART: The point is that the kind of mass raid that the Kremlin might make would be doubly fatal. That has been most vividly presented in some of the science fiction magazines. Science fiction magazines are not restricted by realism. They just pick up what the given factors are in a problem and elaborate. I could cite to you five or six stories which have appeared in outstanding science sheets--Galaxy, and other periodicals in this field--that have very graphically portrayed the kind of thing that would happen if desperado gangsters, after a paralysis raid, gathered around them a few subordinates and began to go around the country looking for warehouses where food may still be available, picking up anything they can and begin to develop hopefully some bows and arrows.

QUESTION: You brought us to a point where everything is a shambles. I think we have been brought there by some of the other speakers this year. Would you care to go on from there and give us your thinking on what Russia's next moves might be over a period of a year or two with respect to action against this country. Would it be internal subversion, an uprising, or would it be external moving in of troops? Or what do you think?

PROFESSOR HART: In that field I am so deeply uninformed I am afraid anything I would suggest would be at the most casual, coffee-cup level. Obviously, what you suggest are alternatives that might occur. Russia, of course, already has on her hands a tremendous job of assimilation. She has got to integrate her satellite countries. Judging by the riots in East Berlin she hasn't gotten too far.

If the United States were knocked out, she would take possession of the continent of Europe and the British Isles. She would have quite a job getting those under her thumbs. There would be the possibility of rifts occurring sooner or later between China and Russia. Why would China, if she begins developing power of her own, submit to the domination of Russia, the same kind of domination which she has been fighting against for centuries? The possibility of that kind of war developing is extremely speculative in character. I keep coming back fundamentally, as a sociologist, to some of the rudiments of social control. There are seven methods of social control, three of which are negative--fear, force, and fraud; the four positive ones are: enlightenment, inducement, facilitation, and contagion.

In the long run, those last four have survival value. If you go back over the history of the last 200 years, one very striking fact stands out. There are now in the world 12 leading countries which for from 135 to 140 years have fought no wars against each other. We are thinking about 12 countries that haven't had any wars against each other for a century and a third. They are the five English speaking nations--the United States, Canada, Australia, New Zealand and England; the three Scandinavian countries; and then Switzerland, France, Belgium, and Holland. Now these countries have learned how to conduct their international relations by agreements reached through consent. We aren't afraid that Canada would drop a bomb on Washington. England isn't afraid that we will drop a bomb on London, or vice versa. We rest in complete confidence that this area of democratic understanding of international cooperation is valid.

Now, then, at the beginning of this period of, say 200 years, these democracies were engaged in the exploitation of the backward sections of the world. When the steamboat was invented, the democracies just went out and raided the whole of Asia and Africa, and we took over South America, more or less, and Central America, and got the Europeans out. These civilized countries were exploiting these lesser peoples. But, if you look at history, I think you will find that progressively the idea of cooperation by consent has been expanding. Great Britain has

given freedom To India and Pakistan. We have given freedom to the Philippines--not entirely without selfish interest on the part of sugar producers and other people who wanted tariffs on Philippine products--but the Philippines have been freed after having been helped in developing their educational system. Even Holland gave freedom to provinces in Indonesia. If you look at the United Nations charter in the area I have just cited, there is a pronouncement that international relations shall be conducted on the basis of cooperation by consent, which civilized nations have learned to use.

You don't have to have a supreme government between Great Britain and the United States. We don't have to have some supreme executive that has power to govern us. If Russia should collapse, and if the other dictatorships should be kept in their place by whatever police action might be necessary, give us 10 or 15 more years, and this development of agreements by consent could permeate the earth. This is not a fantastic dream. This is something that has been done in the civilized part of the world. So it seems to me that the real hope of the world is to hold off disaster by whatever means necessary. After all, it might be possible to hold back attack until this cooperation can voluntarily become the standard structure of the world. If that is the case, the accelerating of technology opens up the possibility of paradise. That has been said so many times that it is very trite, but it is a fact.

Some years ago, I got myself into quite a controversy by writing a paper on "The Expectation of Life in American Cities in the year 2,000." In that paper I said that the average expectation of life in the year 2,000 would be 100 years and that a good many people would live to be 150. Dr. Louis Dublin, actuary of the Metropolitan Life Insurance Company, published an article trying to show how silly this thinking was. He said the top ceiling we could hope for was 65 years. Last year I rechartered the expectation of life figures--25 years after that prediction. We have been following the trend toward 100 years in the year 2,000. We broke through Dr. Dublin's ceiling several years ago, and when you look at what is happening now--they are apparently just on the verge of learning how to deal with more of our major diseases. Polio is the first case. They will probably learn how to deal with cancer. We will probably come to a point where science can master sickness and death.

We are now conducting experiments at Duke having to do with the abolition of emotional depression. I have students who have transcended emotional depressions for as long as six months. The average person gets depressed every week or two--really down to the point where they

are plumb discouraged. There are scientific developments that show that doesn't have to happen. You can control it as you can control small-pox, typhoid fever, and maybe the hydrogen bomb or the U-bomb.

**QUESTION:** In this context in your rather hopeful prediction of the future, would you comment on Toynbee's theory that the Communists in the Far East will be defeated as the result of a great revolution which is taking place among the yellow and black peoples?

**PROFESSOR HART:** Toynbee thinks Christianity is the answer to everything. While I was brought up that way, I went through a period of atheism in college, from which I recovered, but it left me looking at these things differently. It is a basic fact, which we need to recognize, that peoples who have been living in poverty--have people who go to bed hungry every night, as somebody said. These people have been looking at American movies. You remember the propaganda pictures of the steel strike in Gary, Indiana, which showed a negro knocked down by a policeman. When they showed that picture, the people said, "Look, that colored man has new shoes on," and it spoiled the whole effect of the propaganda. It might be all right to get knocked down if you had new shoes on, which were unobtainable in Russia--in the worker's paradise.

Here we have these nations of the world who have been educated to the fact that there is a better way of life. There is a way of life where you don't have to suffer constantly with malaria, hook worm and these other diseases. You don't have to be always hungry. You don't have to watch half or more of the babies die before they are a year old--as 9/10 of them do in parts of China. There is a place in the world where disease and poverty can be conquered where people can live in nice houses, and where negroes drive some of the nicest automobiles. One of the troubles in the South is that they are trying to catch up and give the negroes equal but separate school buildings. Their school buildings were all run down, so the negroes now have new school buildings. But now with integration, the negroes will have to move into the more miserable buildings where the white children have been going.

You have this rising demand for a higher standard of living, a demand to throw off these strutting, tyrannous, egotistical white people who say, "Chinese and dogs are excluded from this park," and pass laws which say, "No Asiatic shall enter into our country."

Naturally this resentment is getting more and more widespread. ~~We~~<sup>2307</sup> are getting to the point of world revolution. One of the reasons why our China policy failed was not that our State Department people got too sympathetic with the Communist people; rather, the trouble was we didn't recognize that a revolution was coming on. You can't deal with revolution by palling up with the landlords and the tyrannous people who are to blame. To that extent, Toynee's point would be well taken.

QUESTION: I would like to get back to chemical warfare and biological warfare because this is a question we have heard quite a bit about this year. One of the advantages of the use of biological warfare is the wide range of ability. There are those which merely anesthetize and those which kill. Each has the ability to knock off people without destroying our economy.

PROFESSOR HART: As a layman, I would say that looks very impressive. Just as we have accelerated, let us say, the range of artillery and high-speed bombing planes, and the explosive power of bombs, so also there is this acceleration in the knowledge of bacteria, the ways in which mutations of bacteria can be produced and disseminated. I should expect that the power to kill people by means of bacteria and other biological organisms would be increasing with accelerating speed. I think there has been probably more successful secrecy in that field. The general public hasn't heard so much about the details.

I don't know the extent to which this could be organized. That is to say, if you are going to paralyze America, there has to be some strategic plan. Is that going to be done by attacking the water supply? Is it going to be done by putting a layer of mist and fog full of bacteria in cities? To what extent do our bacteriological people know about the antidotes? To what extent have they developed counteractive agencies? To what extent could they immunize us in advance?

But so far as my experience goes, you don't develop a grand strategy plan without trying it out a lot of times and finding where it fails. I see you gentlemen and the members of the War College trying out exercises all the time. You keep experimenting; you keep doing the things on the scale that will give you some sort of idea of what is going to happen. In my research, every time I draw up a research instrument, I find it has to be rebuilt again from the bottom up. I don't believe some kind of administration for B. W. is going to be developed overnight, but I am as ignorant on this as I am on a lot of other things.

COLONEL BENEDICT: Professor Hart, on behalf of the Commandant, I wish to thank you for an interesting and thought-provoking lecture and discussion period.

(27 July 55--300)K/mmg