

See 1847

The following are excerpts from a memorandum prepared by Dr. Leo Szilard in March, 1945. This memorandum was to be placed before President Roosevelt, but owing to his sudden death, it did not reach him. Referred by the White House to James F. Byrnes it was placed before him by the author in a personal interview on May 28, 1945 (six weeks before the first bomb was tested in New Mexico). These excerpts contain none of the secret information which was embodied in the original document. It is believed that this was the first document which discussed the implications of the atomic bomb with respect to our future relations with Russia and the question of international control of atomic energy. It also contained the original suggestion of denaturing fissionable materials for the purpose of making more difficult their use for the manufacture of bombs.

The development of the atomic bomb is mostly considered from the point of view of its possible use in the present war and such bombs are likely to be available in time to be used before the war ends. However, their role in the . . . years which will follow can be expected to be far more important and it seems that the position of the United States in the world may be adversely affected by their existence. The following might very well turn out to be the future course of events:

Before the end of the war we shall use atomic bombs against Japan. These bombs will be much less powerful than we know could be made and which in all likelihood will be made within . . . years yet the first bomb that is detonated over Japan will be spectacular enough to start a race in atomic armaments between us and other nations.

In a few months Russia's war with Germany may be over. The work on uranium will then undoubtedly be given a high priority there but it will perhaps still not be carried out on a large industrial scale until we detonate our first atomic bomb and thus demonstrate the success of this development. For a few years after that we shall almost certainly be ahead of Russia. But even if we assume that we could keep ahead of her in this development all the time, this may neither offer us protection from attack nor necessarily give us substantial advantage in case of war . . . years from now.

. . . years from now Russia may have accumulated enough of some of the active elements which may be used for constructing atomic bombs to have an equivalent to
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The weakness of the position of the United States will largely be due to the very high concentration of its manufacturing capacity and of its population in cities. Thirty million people live here in cities of over 250,000. This concentration is so pronounced that the destruction of the cities may easily mean the end of our ability to resist. Keeping constantly ahead of the Russians in our production of these heavy elements will not restore us to a strong position. No quantity of these "active" materials which we may accumulate will protect us from attack and so far as retaliation is concerned, we might not be able to do more than to destroy the large cities of Russia which are few in number and the economic importance of which is in no way comparable to the economic importance of our own cities. Thus it would appear that we would not gain an overwhelmingly strong position in a war with Russia merely by accumulating an enormous quantity of these elements or by increasing, as we might, the efficiency of our bombs from . . . to a much higher value.

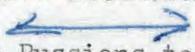
The strong position of the United States in the world in the past thirty years was essentially due to the fact that the United States could out-produce every other country in heavy armaments. It takes a very large number of tanks, airplanes and guns to bring about a decision in a war and as long as tanks, airplanes and guns are the major instruments of war the large production capacity of the United States gives it an advantage which may be considered decisive.

The existence of atomic bombs means the end of the strong position of the United States in this respect. From now on the destructive power which can be accumulated by other countries as well as the United States can easily reach the level at which all the cities of the "enemy" can be destroyed in one single sudden attack. The expenditure in money and material which is necessary to reach this level is so small that any of the major powers can easily afford it provided . . . For us to accumulate active materials in quantities beyond that necessary to destroy the cities of the "enemy" would probably give us some advantage in the war, but it is difficult to say whether the importance of such "excess" amounts of material would be really substantial. Out-producing the "enemy" might therefore not necessarily increase our strength very much.



The greatest danger arising out of a competition between the United States and Russia, which would lead to a rapid accumulation of vast quantities of atomic bombs in both countries, consists in the possibility of the outbreak of a preventive war. Such a war might be the outcome of the fear that the other country might strike first and no amount of good will on the part of both nations might be sufficient to prevent the outbreak of a war if such an explosive situation were allowed to develop.

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As to our chances of persuading the Russians to accept mutual control, much may depend on the proper timing of our approach to Russia. It would appear that such an approach would have to be made immediately after we demonstrated the potency of atomic bombs.



While it may be a great step forward to establish a tight control on the atomic power development by a reciprocal agreement with Great Britain and Russia and extend it to all territories of the world, yet we cannot disregard the possibility that one of the major powers, for instance Russia, after a few years -- during which the controls may have operated quite successfully -- may begin to place difficulties in the way of an effective control of activities conducted on its own territory. It would be quite essential that the people of this country and the world be brought to understand from the start that any difficulties which any nation may place in the way of the established controls would have to be considered as tantamount to a "declaration of war."

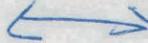
Such a "declaration of war" would have the effect that the United States and other countries involved would at once begin to manufacture atomic bombs. If up to that time the control had been effective, it would take . . . to convert the materials and installation involved in the utilization of atomic power to the manufacture of bombs. In such an "armament race" in which all countries would have to start, so to speak, from scratch, the position of the United States might be quite favorable, provided the development of atomic power had been kept up at a high level.

Clearly if any major power deliberately wants to start a war, there will be a war and all that we can hope to achieve by the reciprocal control which we have discussed is that a war may not break out as a result of an armament race.

Still, it would seem that if the situation were generally understood there might be some hope that having succeeded in setting up a system of reciprocal control and having kept it in operation for a few years, neither the United States nor Great Britain nor Russia would attempt to interfere with this system of control in such a manner that its acts would be considered by the other partners as a menace.

We would then perhaps have a chance of living through this century without having our cities destroyed

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EDITORIAL NOTE:

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ATOMIC BOMBS AND THE POSTWAR POSITION OF
THE UNITED STATES IN THE WORLD

by Leo Szilard

The development of the atomic bomb is mostly considered from the point of view of its possible use in the present war and such bombs are likely to be available in time to be used before the war ends. However, their role in the ... years which will follow can be expected to be far more important and it seems that the position of the United States in the world may be adversely affected by their existence. The following might very well turn out to be the future course of events:

Before the end of the war we shall use atomic bombs against Japan. These bombs will be much less powerful than we know could be made and which in all likelihood will be made within ---- years yet the first bomb that is detonated over Japan will be spectacular enough to start a race in atomic armaments between us and other nations.

In a few months Russia's war with Germany may be over. The work on uranium will then undoubtedly be given a high priority there but it will perhaps still not be carried out on a large industrial scale until we detonate our first atomic bomb and thus demonstrate the success of this development. For a few years after that we shall almost certainly be ahead of Russia. But even if we assume that we could keep ahead of her in this development all the time, this may neither offer us protection from attack nor necessarily give us substantial advantage in case of war ... years from now.

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Clearly, if such bombs were available, it is not necessary to bomb our cities from the air in order to destroy them. All that is necessary is to place a comparatively small number of such bombs in each of our major cities and to detonate them at some later time.

The United States has a very long coast-line which will make it possible to smuggle in such bombs in peacetime and to carry them by truck into our cities. The long coast-line, the structure of our society, and our very heterogeneous population may make an effective control of such "traffic" virtually impossible. One can easily visualize how a "friendly" power in time of peace may have such bombs placed in all of our major cities under the guidance of agents. This might be done free from aggressive intent. Such a power might know or suspect that we have accumulated a quantity of atomic bombs and fear our defenses are so strong that after the outbreak of hostilities it would be difficult to reach our cities by air. In such circumstances it may be exceedingly difficult for its "government" to refuse to take "precautions" which its "army" considers necessary. . .

So far it has not been possible to devise any methods which would enable us to detect hidden atomic bombs buried in the ground or otherwise efficiently protected against detection.

If there should be great progress in the development of rockets after this war, it is conceivable that it will become possible to drop atomic

bombs on the cities of the United States from very great distances by means of rockets.

The weakness of the position of the United States will largely be due to the very high concentration of its manufacturing capacity and of its population in cities. Thirty million people live here in cities of over 250,000. This concentration is so pronounced that the destruction of the cities may easily mean the end of our ability to resist. Keeping constantly ahead of the Russians in our production of these heavy elements will not restore us to a strong position. No quantity of these "active" materials which we may accumulate will protect us from attack and so far as retaliation is concerned, we might not be able to do more than to destroy the large cities of Russia which are few in number and the economic importance of which is in no way comparable to the economic importance of our own cities. Thus it would appear that we would not gain an overwhelmingly strong position in a war with Russia merely by accumulating an enormous quantity of these elements or by increasing, as we might, the efficiency of our bombs from ----- to a much higher value.

The strong position of the United States in the world in the past thirty years was essentially due to the fact that the United States could out-produce every other country in heavy armaments. It takes a very large number of tanks, airplanes and guns to bring about a decision in a war and as long as tanks, airplanes and guns are the major instruments of war the large production capacity of the United States gives it an advantage which may be considered decisive.

The existence of atomic bombs means the end of the strong position of the United States in this respect. From now on the destructive power which can be accumulated by other countries as well as the United States can easily reach the level at which all the cities of the "enemy can

be destroyed in one single sudden attack. The expenditure in money and material which is necessary to reach this level is so small that any of the major powers can easily afford it provided . . . For us to accumulate active materials in quantities beyond that necessary to destroy the cities of the "enemy" would probably give us some advantage in the war, but it is difficult to say whether the importance of such "excess" amounts of material would be really substantial. Out-producing the "enemy" might therefore not necessarily increase our strength very much.

The greatest danger arising out of a competition between the United States and Russia, which would lead to a rapid accumulation of vast quantities of atomic bombs in both countries, consists in the possibility of the outbreak of a preventive war. Such a war might be the outcome of the fear that the other country might strike first and no amount of good will on the part of both nations might be sufficient to prevent the outbreak of a war if such an explosive situation were allowed to develop.

One of the questions that has to be considered is whether it might be possible to set up some system of controls of the production of these active materials. Such controls would ultimately have to extend to every territory on the earth. Whether it is politically and technically feasible to set up effective controls and what we could do to improve our chances in this respect are questions that urgently require study and decisions. Some further remarks on these questions are made below, but other considerations might be put forward as soon as the question receives the attention of the Government.

A system of controls could be considered successful only if we could count on a period of grace in case the controls were denounced or obstructed by one of the major powers. This means that the system would have to be of such a nature that at least . . . would lapse between the time the nations began to convert their installations for the purpose of manufacturing atomic bombs and the time such bombs became available in quantity.

SYSTEMS OF CONTROL OUGHT TO BE CONSIDERED

From a formal point of view all countries may be considered as potential enemies, but it is perhaps not too optimistic to assume that we may disregard the possibility of a war with Great Britain in the next fifteen years. It appears, however, rather unlikely that jointly with Great Britain we could police the world and thus prevent by force the manufacture of all of the "active materials" anywhere in the world, including Russia.

It might perhaps be possible to set up jointly with Great Britain and Russia some sort of joint control of the manufacture of the active materials everywhere in the world if we could get Russia to agree to such a control which of necessity would have to extend to her territory. The purpose of such a control would be to prevent the active elements from becoming available in a form in which they could be used for the manufacture of atomic bombs. This would not necessarily mean that the development of atomic power has to be suppressed but only that the elements involved must not be prepared in certain forms and degree of purity.

This point raises the following question: What forms of atomic power can we permit to be organized if we want to make sure that the available materials and facilities cannot easily be converted for the manufacture of atomic bombs? Some thought has already been given to this question with the following result.

There are two types of active materials. Materials of the first type can be diluted by the abundant isotope of uranium in such a way as to rule out the possibility of using them for atomic bombs while leaving unimpaired the usefulness of the materials for industrial purposes. A chemical separation from the diluting material would be impossible and a conversion into materials which can be used for atomic bombs would take . . .

Material of the second type which can be used for atomic bombs can be "denatured" by . . . Whether more elaborate methods can be worked out which will permit the detonation of the denatured material is a question which would have to be carefully scrutinized. These lines merely serve to indicate that there might perhaps be a satisfactory solution

to the problem of reconciling the requirements of safety of the United States with the desire not to hamper the development of atomic power for industrial purposes. Unfortunately it is by no means sure that a satisfactory solution of this problem is in fact possible. It would be much easier, safer, and would require a much less tight control to arrest the development of atomic power by scrapping and outlawing the large and easily visible installations which characterize the first stage of this development.

CONTROL OF RAW MATERIALS COULD BE CONSIDERED

If Russia, the United States and other countries were willing to forego the use of atomic power for peacetime purposes, one could have a system of control that would be fairly simple since it would be almost sufficient to control the movements of raw materials. Ores of uranium would have to be mined under control and transported to some "neutral" territory. Whether or not it would be permitted to have in a neutral territory installations belonging to . . . and atomic power plants, is a question of minor importance. It appears likely that if the major powers were willing to forego the use of atomic power, a system of controls could be set up without encountering too great difficulties.

AN ALTERNATIVE SYSTEM OF CONTROLS WOULD HAVE TO BE MUCH TIGHTER

On the other hand, if the United States, Russia, and other countries should have atomic power installations within their territory, a very tight system of control would be needed in order to make sure that the nations would not have to face a sudden attack by atomic bombs. For a control of this sort to be effective, it would be necessary that our agents and the agents of Great Britain move freely around in Russia, be permitted to keep contacts with Russian civilians, secretly employ Russian civilians for the purpose of obtaining information, and have entry into every factory or shop throughout the vast territory of Russia.

That there may be dangerous loopholes in control systems which might be set up is illustrated by events that took place in Germany after the first World War. At that time, there were many Germans who were willing to give information to the Inter-Allied Commission about violations of the control regulations, but those who actually did so were publicly tried under the German Espionage Law and were given heavy sentences. The Treaty of Versailles did not stipulate that the German Espionage Law must be revoked.

Clearly, it would be desirable to create a situation which would permit us to appeal in various ways to physicists and engineers everywhere for information that would uncover violations of the controls. This would give us additional assurance that such violations would be detected but it presupposes that we succeed in creating conditions in which we would guarantee the personal safety of those who volunteer such information and the safety of their families.

Since Russia cannot be expected to agree to such a control unless she obtains the same rights of control in the United States and Great Britain the question whether Congress and the people of the United States are willing to agree to such a control might become of paramount importance.

HOW COULD RUSSIA BEST BE PERSUADED?

As to our chances of persuading the Russians to accept mutual control, much may depend on the proper timing of our approach to Russia. It would appear that such an approach would have to be made immediately after we demonstrated the potency of atomic bombs.

Events may be expected to move so fast that if it is intended to reach an agreement with Russia and other countries such an agreement would have to be complete before the next presidential elections.

IF THE CONTROL IS INTERFERED WITH

While it may be a great step forward to establish a tight control on the atomic power development by a reciprocal agreement with Great Britain and Russia and extend it to all territories of the world, yet we cannot disregard the possibility that one of the major powers, for instance Russia, after a few years - during which the controls may have operated quite successfully - may begin to place difficulties in the way of an effective control of activities conducted in its own territory. It would be quite essential that the people of this country and the world be brought to understand from the start that any difficulties which any nation may place in the way of the established controls would have to be considered as tantamount to a "declaration of war".

Such a "declaration of war" would have the effect that the United States and other countries involved would at once begin to manufacture atomic bombs. If up to that time the control had been effective, it would take ---- to convert the materials and installations involved in the utilization of atomic power to the manufacture of bombs. In such an "armament race" in which all countries would have to start, so to speak, from scratch, the position of the United States might be quite favorable, provided the development of atomic power had been kept up at a high level.

Clearly if any major power deliberately wants to start a war, there will be a war and all that we can hope to achieve by the reciprocal control which we have discussed is that a war may not break out as a result of an armament race.

Still, it would seem that if the situation were generally understood there might be some hope that having succeeded in setting up a system of reciprocal control and having kept it in operation for a few years,

neither the United States nor Great Britain nor Russia would attempt to interfere with this system of control in such a manner that its acts would be considered by the other partners as a menace. We would then perhaps have a chance of living through this century without having our cities destroyed.

An attempt to manufacture atomic bombs undertaken by any of the smaller countries would be of minor importance since it could be met by immediate armed intervention using ordinary methods of warfare such as tanks and airplanes.

IN THE ABSENCE OF A SYSTEM OF CONTROLS

In discussing our postwar situation the greatest attention was given in this memorandum to the role that Russia might play. This was not done because it was assumed that Russia may have aggressive intentions but rather because it was assumed that if an agreement can be reached with Russia, it will be possible to extend the system of controls to every country in the world.

(End)

First Version

ROUGH DRAFT

MEMORANDUM

L. Szilard

August 14, 1945

This memorandum is written on request and is a rough draft having the purpose to serve as a basis of discussion for a meeting of a group of scientists to be held within the Metallurgical Laboratory on August 15, 1945. Clearly, we are merely groping for a solution of the problem which now confronts us and which may not be capable of a solution at all. The consensus of the group, if a consensus is reached, may differ greatly from this first attempt to formulate a program.

The tentative conclusions of this memorandum call for immediate steps to be taken towards an indissoluble political union with Great Britain as a first step towards the creation of a world government; for an immediate approach to Russia in an attempt to establish strict control of atomic bombs and certain other types of armaments on the basis of reciprocity, and the extension of such control to the rest of the world; for immediate steps to be taken towards the dissolution of our cities and a redistribution of our population which will make the country less vulnerable to attack.

If a situation is allowed to develop in which rival powers are in uncontrolled possession of atomic bombs, our cities and the cities of other nations will be threatened by sudden annihilation within ten years. The outbreak of a preventive war will then hang over the world as a constant threat.

In the face of atomic bombs, it will not be possible for us to retain our cities as well as our political institutions and our national sovereignty. One or the other will have to go and it is more likely than not that both will have to go.

Collective security based on the collaboration of sovereign nations, essentially along the lines envisaged by Woodrow Wilson towards the end of the first World War will offer no solution in our present situation, although it could very well have offered a solution in Wilson's time. At the end of the first World War, there was an attempt to formulate general principles upon which a settlement of disputes between nations could have been based. Wilson's 14 points, however unsatisfactory, were at least an attempt in this direction and could have formed a basis which might have been improved subsequently and evolved into a rule of law.

Today, there are not even the outlines of generally accepted principles visible. Consequently, conflicting interests have to be resolved by "negotiations." The outcome of these "negotiations" is then largely determined by the available physical forces upon which the powers would have to fall back if the negotiations broke down. Clearly,

in such a situation, the major powers will be anxious to keep militarily as strong as possible and such arrangements relating to control of armaments as can be obtained will have a precarious existence and will be of doubtful duration.

In the absence of universally accepted principles upon which a settlement of conflicts could be based, there can be no rule of law; and if atomic bombs are available, there can be no stable peace as long as atomic bombs are available to more than one power or more than one group of indissolubly united powers.

International Army

One might be tempted to believe that a system of collective security based on sovereign nations could be made to work if an international army were created by the nations, on the basis of some pact or treaty. Such an international army would have as its sole function, the prevention of the manufacture of dangerous weapons in individual countries. Presumably, it would be in possession of atomic bombs and could annihilate, by means of these bombs, the cities of any nation who would become an aggressor, or who would violate the rules of security which are imposed upon her by international treaties.

It is, however, very difficult to believe that an international organization of this type could have stability. Stability of a world organization can only be achieved if the people who are supposed to support it transfer to it, to a considerable degree, the loyalties which are now directed towards their national governments. But if it is

possible to get the people of the world to transfer their loyalty to a world organization, then there is no need for an international army since then we can have a world government which can maintain the one and only police force permitted in every territory and region of the earth. Such a world government need not resort to the destruction of cities in order to secure peace. It can simply arrest officials and administrators who violate the rules of conduct which have been laid down in the interest of world security.

World Government

Clearly, at the price of a world government, we could have permanent peace; and since it is doubtful whether we can have peace at any lesser price, it will be well to begin to understand just what a world government would mean.

It is unlikely that a world government which has the sole executive power can restrict its interests to the maintenance of international peace and safety. It is hardly possible to separate the agencies which are responsible for the welfare of the population of a region from the agencies which are in sole possession of the executive power in that region. If we have a world government which polices the world, of necessity, it will quickly turn into a real government which regulates life far beyond the rules necessary for the maintenance of the peace in the narrow military sense of the word.

If we had a world government tomorrow, it would be faced with the problem of raising the standards of life in India and China and certain other countries where the population lives at ^{the}starvation level and in which the slightest disturbance in equilibrium leads to large scale famines. Such conditions prevail of necessity in every country where the birth rate is at its natural level, particularly if the introduction of hygiene interferes with the natural rate of infant mortality. There are only two possible remedies: free migration or birth control.

It is difficult to believe that free migration would be tolerated by other nations, and if it were tolerated, it would lead to conquests without war of those countries which breed slower by those countries which breed faster. We would then have no war, but we would have conquests all the same.

The first act of a world government that would consider itself the guardian of the welfare of all people would have to be the introduction of the rationing of children in countries which now have a natural birth rate.

If the world government is a democratic government, its decisions will be majority decisions. As long as we have to deal with a nation like the United States which has a fairly homogeneous population, the majority decision is perhaps distasteful, but not unendurable for the minority. But if we have to live in a democracy whose "voters" are as heterogeneous as the population of the world, the population of

a whole nation like, for instance, the 130 million people living in the United States might be part of a minority which considers the majority decisions unendurable. It is rather doubtful that loyalty to the world government could be strong enough in the near future to prevent in such a situation the breaking up of the world organization.

No good methods of government have so far been developed even on a national scale. The parliamentary form of democracy is a crude form of democracy, barely capable of tolerably functioning under present day conditions, while other forms of democracy which might be preferable have so far not been seriously discussed, let alone tried out.

Since the forces of loyalty which would hold the world organization together in the near future will be weaker than the present day forces of national loyalty, the world organization will have to conform to a better form of democracy and will have to be based on a more foolproof constitution than any of the present national governments.

This brings us to the crucial problem of how to shift the loyalty of the citizen from his present national government to the world government. A similar shift of loyalty took place in America from the states to the Federal Union. There were, however, several factors working in favor of this shift of loyalty. One factor involved was the presence of a common enemy -- England. Another factor involved was the fact that a man, born in one state, could go and study in another state, and settle down and live in a third state of the Union so that he could

naturally look to states other than his own as his future potential home. The importance of another factor, i.e., the common language and a similar educational background needs hardly to be emphasized.

But even with all these factors in favor of a federal government, the Union was not indissoluble and it took a terrible war and the devastation of the South before the Union was firmly established.

Clearly, at the price of a third world war, we can have a world government. It is quite conceivable that after a third world war in which all cities of the world may be completely destroyed, people will be willing to shift their loyalty from the ruins of their own land to the hopeful promises of a world government. But even in that case, it seems more likely that one group of nations will be the victor and another the vanquished and the victor will establish its own rule throughout the territories of the earth.

On the basis of these considerations, it appears that the only step toward a world government which is immediately feasible would be a union between the United States and Great Britain. On the eve of the defeat of France in 1940, Churchill proposed to France a union with England. If there is a third world war, it is quite conceivable that the United States would propose a union with the United States to Great Britain on the eve of the defeat of England, particularly if thereby the danger of losing the British fleet to the "enemy" could be avoided.

The question we have to face is whether it would not be wise to take steps towards forming an indissoluble union with England at once, thereby making the first steps toward a world government and toward establishing uniform principles of justice over a very large territory of the earth.

The danger of such a union would lie in precipitating an armament race with Russia by raising the specter of Anglo-American imperialism. Many people would want assurances that the Anglo-American government which is here advocated will exercise more restraint in peace time than could be taken for granted on the basis of the actions of Britain and the United States during war. Unless assurances to this effect were forthcoming, it might be difficult to obtain the popular support which such a radical steps requires.

The Suppression of Atomic Power Development -- Control of Raw Materials

If Russia, the United States, and other countries were willing to forego the use of atomic power for peace time purposes, one could have a system of control that would be fairly simple since it would be almost sufficient to control the movements of raw materials. Ores of uranium would have to be mined under control and transported to some "neutral" territory. Whether or not it would be permitted to have in a neutral territory installations of certain limited types of atomic power plants is a question of minor importance. It appears likely that if the major powers were willing to forego the use of atomic power, a system of controls could be set up without encountering too great difficulties.

An Alternate System of Controls Would Have to be Much Tighter

On the other hand, if the United States, Russia, and other countries should have atomic power installations within their own territory, a very tight system of control would be needed in order to make sure that

the nations would not have to face a sudden attack by atomic bombs. For a control of this sort to be effective, it would be necessary that our agents and the agents of Great Britain move freely around in Russia, be permitted to keep contacts with Russian civilians, secretly employ Russian civilians for the purpose of obtaining information, and have entry into every factory or shop throughout the vast territory of Russia.

That there may be dangerous loopholes in control systems which might be set up is illustrated by events that took place in Germany after the first World War. At that time, there were many Germans who were willing to give information to the Inter-Allied Commission about violations of the control regulations, but those who actually did so were publicly tried under the German Espionage Law and were given heavy sentences. The Treaty of Versailles did not stipulate that the German Espionage Law must be revoked.

Clearly, it would be desirable to create a situation which would permit the controlling agency to appeal in various ways to physicists and engineers everywhere for information that would uncover violations of the regulations. This would give us additional assurance that such violations would be detected but it presupposes that we succeed in creating conditions in which we could guarantee the personal safety of those who volunteer such information and the safety of their families.

Naturally, Russia cannot be expected to voluntarily agree to such a control unless she obtain the same rights of control in the United States and Great Britain.

If The Control Is Interfered With

While it may be a great step forward to establish a tight control on the atomic power development on the basis of reciprocity with Great Britain and Russia and extend it to all territories of the world, yet we cannot disregard the possibility that one of the major powers, for instance Russia, after a few years -- during which the controls may have operated quite successfully -- may begin to place difficulties in the way of an effective control of activities conducted on its own territory. It would be quite essential that the people of this country and the world be brought to understand from the start that any difficulties which any nation may place in the way of the established controls would have to be considered as tantamount to a "declaration of war."

Such a "declaration of war" would have the effect that the United States and other countries involved would at once begin to manufacture atomic bombs. If, up to that time, the control had been effective, it would take about two years to convert the materials and installations involved in the utilization of atomic power to the manufacture of bombs. In such an "armament race" in which all countries would have to start, so to speak, from scratch, the position of the United States might be quite favorable, provided the development of atomic power had been kept up at a high level, and provided the present extreme concentrations of her population in large cities are dispersed.

Clearly, if any major power deliberately wants to start a war, there will be a war and all that we can hope to achieve by the reciprocal control which we have discussed is that a preventive war may not break out as a result of an armament race.

Still, it would seem that if the situation were generally understood, there might be some hope that having succeeded in setting up a system of reciprocal control and having kept it in operation for a few years, neither the United States nor Great Britain nor Russia would attempt to interfere with this system of control in such a manner that its acts would be considered by the other partners as a menace.

An attempt to manufacture atomic bombs undertaken by any of the smaller countries in violation of an established system of controls would be of minor importance since it could be met by immediate armed intervention using ordinary methods of warfare such as tanks and airplanes.

Dissolution of Our Cities

Temporary safety, say for the next 15 to 20 years or perhaps longer, could probably be achieved by the United States by the complete dissolution of all its cities, leading to complete transformation of life in the United States. Irrespective of all attempts towards organizing peace, we ought to start this reconstruction at once so that we may hope to complete this transformation within 10 or 15 years.

The cost of this transformation will be exorbitant and even after the transformation is completed, the cost of living will be considerably higher in the new setting. On the other hand, dissolution of

the cities and the organization of life in a rural setting would offer advantages which would make it appear attractive to many people if it can be achieved at a cost which our economy can bear. It may very well be that if the atomic bomb forced the dissolution of our cities, it would save our civilization from extinction in more than one way. The low birth rate as expressed by the net reproduction rate in our cities may very well be an inescapable characteristic of city life which would have doomed our cities and along with them may be the whole nation in the course of time.

If redistribution of our population is begun immediately after the war, there will be no possibility to return to the system of free enterprise which is considered by many people as an integral part of the American way of life. The dissolution of our cities will have to be regulated and controlled to the most minute details and the system of government control which this transformation requires will go far beyond the control exercised during the war.

The dissolution of our cities alone would not guarantee the survival of our population in the next war even though it would be an effective means of defense against the atomic bombs at present available. Quite apart from the possible further development of atomic bombs which might produce means of destruction on an almost unlimited scale, there are other potential possibilities for the large scale extermination of human beings which are based on more biological methods than the detonation of atomic explosives. Once the moral inhibition against the development of such methods is removed, and Hiroshima shows that moral inhibitions can no longer be counted upon, the way is open for the development of methods of extermination against which the dispersal of our cities provides no defense.

Memorandum August 17th 1945

more space

The following text is a revised version of a memorandum dated August 14, 1945 which was submitted as a basis of discussion to a group of scientists who met in the Metallurgical Laboratory on August 15, 1945. It is ^{presented here} ~~submitted~~ as a supplement to the expurgated version of a memorandum dated Spring, 1945.

~~Leo Szilard~~ → *Leo Board*

If a situation is allowed to develop in which rival powers are in uncontrolled possession of atomic bombs, our cities and the cities of other nations will be threatened by sudden annihilation within ten years. The outbreak of a preventive war will then hang over the world as a constant threat.

In the face of atomic bombs, it will not be possible for us to retain our cities as well as our political institutions and our national sovereignty. One or the other will have to go and it is more likely than not that both will have to go.

*Why?
7.*

Collective security based on the collaboration of sovereign nations, essentially along the lines envisaged by Woodrow Wilson towards the end of the first World War will offer no solution in our present situation, although it could very well have offered a solution in Wilson's time. At the end of the first World War, there was an attempt to formulate general principles upon which a settlement of disputes between nations could have been based. Wilson's 14 points, however unsatisfactory, were at least an attempt in this direction and could have formed a basis which might have been improved subsequently and evolved into a rule of law.

Today, there are not even the outlines of generally accepted principles visible. Consequently, conflicting interests have to be resolved by "negotiations." The outcome of these "negotiations" is then largely determined

Why is the section on sabotage left out?

by the available physical forces upon which the powers would have to fall back if the negotiations broke down. Clearly, in such a situation, the major powers will be anxious to keep militarily as strong as possible and such arrangements relating to control of armaments as can be obtained will have a precarious existence and will be of doubtful duration.

In the absence of universally accepted principles upon which a settlement of conflicts could be based, there can be no rule of law; and if atomic bombs are available, there can be no stable peace as long as atomic bombs are available to more than one power or more than one group of indissolubly united powers.

If it were possible to reach an agreement with Russia and subsequently with other nations to permit no manufacture of atomic bombs and to set up a system of controls which could be trusted by all nations, we could at least avoid, if not the danger of war, at least the additional danger of war which would arise out of an armament race in which rival powers would attempt to accumulate stocks of atomic bombs.

The following is repeated from Memo dated Spring 1945
The Suppression of Atomic Power Development--Control of Raw Materials
(Repeated from Memorandum dated Spring 1945)

If Russia, the United States, and other countries were willing to forego the use of atomic power for peace time purposes, one could have a system of control that would be fairly simple since it would be almost sufficient to control the movements of raw materials. Ores of uranium would have to be mined under control and transported to some "neutral" territory. Whether or not it would be permitted to have in a neutral territory installations of certain limited types of atomic power plants is a question of minor importance. It appears likely that if the major powers were willing to forego the use of atomic power, a system of controls could be set up without encountering too great difficulties.

simple system

An Alternate Systemx of Controls would have
to be Much Tighter

~~(Repeated from Memorandum dated Spring 1945)~~

Simple Space

On the other hand, if the United States, Russia, and other countries should have atomic power installations within their own territory, a very tight system of control would be needed in order to make sure that the nations would not have to face a sudden attack by atomic bombs. For a control of this sort to be effective, it would be necessary that our agents and the agents of Great Britain move freely around in Russia, be permitted to keep contacts with Russian civilians, secretly employ Russian civilians for the purpose of obtaining information, and have entry into every factory or shop throughout the vast territory of Russia.

That there may be dangerous loopholes in control systems which might be set up is illustrated by events that took place in Germany after the first World War. At that time, there were many Germans who were willing to give information to the Inter-Allied Commission about violations of the control regulations, but those who actually did so were publicly tried under the German Espionage Law and were given heavy sentences. The Treaty of Versailles did not stipulate that the German Espionage Law must be revoked.

Clearly, it would be desirable to create a situation which would permit the controlling agency to appeal in various ways to physicists and engineers everywhere for information that would uncover violations of the regulations. This would give us additional assurance that such violations would be detected but it presupposes that we succeed in creating conditions in which we could guarantee the personal safety of those who volunteer such information and the safety of their families.

Naturally, Russia cannot be expected to voluntarily agree to such a control unless she obtain the same rights of control in the United States and Great Britain.

If the Control is Interfered With

~~(Repeated from Memorandum dated Spring 1945)~~

→ While it may be a great step forward to establish a tight control on the atomic power development on the basis of reciprocity with Great Britain and Russia and extend it to all territories of the world, yet we cannot disregard the possibility that one of the major powers, for instance Russia, after a few years--during which the controls may have operated quite successfully--may begin to place difficulties in the way of an effective control of activities conducted ~~in~~ on its own territory. It would be quite essential that the people of this country and the world be brought to understand from the start that any difficulties which any nation~~x~~ may place in the way of the established controls would have to be considered as tantamount to a "declaration of war."

Such a "declaration of war" would have the effect that the United States and other countries involved would at once begin to manufacture atomic bombs. If, up to that time, the control had been effective, it would take about two years to convert the materials and installations involved in the utilization of atomic power to the manufacture of bombs. In such an "armament race" in which all countries would have to start, so to speak, from scratch, the position of the United States might be quite favorable, provided the development of atomic power had been kept up at a high level, and provided the present extreme concentrations of her population in large cities are dispersed.

simple phrase

Clearly, if any major power deliberately wants to start a war, there will be a war and all that we can hope to achieve by the reciprocal control which we have discussed is that a preventive war may not break out as a result of an armament race.

Still, it would seem that if the situation were generally understood, there might be some hope that having succeeded in setting up a system of reciprocal control and having kept it in ~~operation~~ operation for a few years, neither the United States nor Great Britain nor Russia would attempt to interfere with this system of control in such a manner that its acts would be considered by the other partners as a menace.

An attempt to manufacture atomic bombs undertaken by any of the smaller countries in violation of an established system of controls would be of minor importance since it could be met by immediate armed intervention using ordinary methods of warfare such as tanks and airplanes.

Relocation of Population

An agreement outlawing the manufacture of atomic bombs, if coupled with a reliable system of controls exercised within the territory of otherwise sovereign states might very well prove to be the best arrangement that we could hope to achieve in the immediate future. If we retained, however, our present large cities, the United States, by being extraordinarily vulnerable would be in a very weak position whenever it would become necessary to settle international problems by negotiations. The temptation would be very great for Russia to reach her objectives in these negotiations by indicating that she might decide to make it more difficult to exercise the controls within her own territory.

The United States could be made much less vulnerable by relocating 30 to 60 million people and it would appear advisable to start such a reconstruction within two years and to carry it through on the basis of a

simple note

from home to home

not us

idea not clear J.

This ought to be done, however, before
of any attempts ~~to~~ which may
be made towards organizing new
H.H.

10-year plan. The cost of this transformation will be high, but ~~it might~~

did not exceed an expenditure of \$15 billion for ten years. This would be a
~~burden which~~ our economy could very well bear ^{this burden} and the number of workers
employed in the construction industry ^{need} would not appreciably exceed the
number which was actually so employed during the peak year of 1942.

say: 15-20 per year
for ten years

The necessary relocation probably would not adversely affect our present standard of living and even during the transition period there may be no reduction or only a very small reduction in our standard of living. It appears doubtful, however, whether a system of free enterprise, which is considered by many people as an integral part of the American way of life, could be fully maintained during the transition period since the relocation will have to be regulated and controlled to the most minute details and it appears quite possible that the system of government control which this transformation requires may go far beyond the control exercised during the war.

The relocation of 30 to 60 million people does not necessarily mean that we have to destroy urban life. We could build new cities following various patterns which are less vulnerable than our present cities and there would be no difficulty to having cities up to \approx 500,000. One possible arrangement would consist in having cities with a built up area of 50 square miles that would be one mile wide and 50 miles long. This is about twice the area of Manhattan island. One fast railway would move in the center along the axis of the city, but this transportation ~~along~~ line would not be used except for visits and business conferences. With the houses on one side of the city and the factories on the other, people would walk to their place of work across the city and in the other direction could walk out into the open country within a few minutes. ~~The city could be so oriented as to have the smoke ~~prevented~~ blown away from the city by the prevailing winds.~~

objection

Other patterns may be equally good or perhaps even better and it

would
 may be assumed that new cities ~~which~~ have a population of between 50,000 and 500,000 and that the relocation that would be undertaken primarily for reasons of safety would not destroy ^{urban} ~~other~~ civilization and might considerably improve living conditions. The dissolution of the old cities and the organization of life in a semi-rural setting would offer advantages which may appear attractive to many people. It may very well be that if the atomic bomb forces dissolution of our present cities it would save our population from extinction in one more way. The low birth rate as manifested by the net reproduction rate of our cities may very well be an inseparable characteristic of our present city life which would have doomed our cities and, along with them, may be the whole nation in the course of time.

Dissolution of our Cities is not the Final Answer,

We must not think that the dissolution of our cities alone can guarantee the survival of our population in the next war even though it may be an effective means of defense against the atomic bombs available. ^{at present} Quite apart from the further development of atomic bombs which might produce means of destruction on an almost unlimited scale, there are other potential possibilities for the large scale extermination of human beings ^{very different} ~~which are~~ based on methods ^{from} ~~without taking recourse to~~ the detonation of atomic explosives. ~~Thinking~~ Thinking along the lines of chemical and biological warfare has barely started. Once the moral inhibition against the development of such methods is removed, and the experience of this war shows that moral inhibitions which were still strong during the first World War, can no longer be counted upon. ^{The} way is now open for the development of methods for extermination against which the dispersal of our cities will provide no defense.

World Government

Clearly, supervision of the production of atomic bombs and other types of armaments carried out on the territory of otherwise sovereign nations is no solution that could be trusted in the long run since the individual nations would have the physical power of interfering with the controls if they so desire.

One might be tempted to believe that a system of collective security based on sovereign nations could be ^{effectively} ~~made to work~~ if an international army were created by the nations, on the basis of some pact or treaty. Such an international army ^{might} ~~would~~ have as its sole function, the prevention of the manufacture of dangerous weapons in individual countries. Presumably, it would be in possession of atomic bombs and could annihilate, by means of these bombs, the cities of any nation who would become an aggressor, or who would violate the rules of security ~~which are~~ imposed upon her by international treaties.

It is, however, very difficult to believe that an international organization of this type could have stability. Stability of a world organization can only be achieved if the people who are supposed to support it transfer to it, to a considerable degree, the loyalties which are now directed towards their national governments. But if it is possible to get the people of the world to transfer their loyalty to a world organization, then there is no need for an international ~~army~~ army since then we can have a world government which can maintain the one and only police force permitted in every territory and region of the earth. Such a world government need not resort to the destruction of cities in order to secure peace. It can simply arrest officials and administrators who violate the rules of conduct which have been laid down in the interest of world security.

important
difference
of degree
hence the
stages of
the "20-
year-plan"

leave in

~~Clearly, at the price of a world government we could have permanent peace, and since it is doubtful whether we can have peace at any lesser price it would be well to begin to understand just what a world government would mean and begin to think of the conditions that will have to be created in order to make a world government possible.~~

It is unlikely that a world government which has the sole executive power can restrict its interests to the maintenance of international peace and safety. It is hardly possible to separate the agencies which are responsible for the welfare of the population of a region from the agencies which are in sole possession of the executive power in that region. If we have a world government which polices the world, of necessity it will quickly turn into a real government which regulates life far beyond the rules necessary for the maintenance of the peace in the narrow military sense of the word.

too absolute. Single states of U.S. have certain functions; even the offences in constit. when you do social structure need not disappear at once. It is not true that the world can not exist for some time, "half free and half slave".

If the world government is a democratic government, its decisions will be majority decisions. As long as we have to deal with a nation like the United States which has a fairly homogeneous population, the majority decision is perhaps distasteful, but not unendurable for the minority. But if we have to live in a democracy whose "voters" are as heterogeneous as the population of the world, the population of a whole nation like, for instance, the 130 million people living in the United States might be part of a minority which considers the majority decisions unendurable. It is rather doubtful that loyalty to the world government could be strong enough in the near future to prevent in such a situation the breaking up of the world organization.

The non-proportional principle of Senate elections can be used, along with a proportionally elected "House"

No good methods of government have so far been developed even on a national scale. The parliamentary form of democracy is a crude form of

2/

democracy, barely capable of tolerably functioning under present day conditions, while other forms of democracy which might be preferable have so far not been seriously discussed, let alone tried out.

Do not
ask too
much
or one!

Since the forces of loyalty which would hold the world organization together in the near future will be weaker than the present day forces of national loyalty, the world organization will have to conform to a better form of democracy and will have to be based on a more foolproof constitution than any of the present national governments.

Does this
follow?

This brings us to the critical question of how to bring about a shift of the loyalty of the citizen to his present national government to the world government.

It is obvious that we can have a world government in the near future if there is another world war since it is likely that if there is another war in which the cities are destroyed by atomic bombs the victorious nations or victorious group of nations will take no further chances and will extend their own ~~own~~ government throughout the territories of the world. The question whether we can have a world government in the near future must therefore be read to mean whether we can have a world government in the near future without a third World War. If we mean by the near future something like the next six or ten years, precedents from the past seem to offer little encouragement.

One might think of the establishment of the Federal Government in America as an encouraging example. There were, however, several factors involved which worked in favor of bringing about a shift of loyalty to the Federal Government in the near future. One of these was the presence of the common enemy, England; another was the fact that a man born in one of the States was free to go and study in another State and to settle down and live in a State other than his own so that he was induced to look upon States other than his own as his future potential residence. The importance of the common language and rather similar educational background need hardly be emphasized. *Switzerland*

But even with all these factors in favor of the Federal Government, the Union was not indissoluble and it took a terrible war and the devastation of the South before the Union was firmly established.

Clearly, at the price of a third World War, we can have a world government. It is quite conceivable that after a third world war in which all cities of the world may be completely destroyed, people will be willing to shift their loyalty from the ruins of their own land to the hopeful promises of a world government. But ^{in any case} ~~even in that case~~, it seems ~~more~~ likely that one ^{notion} ~~group of nations~~ will be the victor and ^{others} ~~another~~ the vanquished and *that* the victor will establish its own rule throughout the territories of the earth.

In the circumstances, if we ask ourselves if we can have a world government in the near future, this must be read to mean whether we can have a world government in the near future without a third World War.