THE TRANSPORTATION INDUSTRY AND NATIONAL DEFENSE

9 December 1954

1135

CONTENTS

Page

INTRODUCTION--Colonel W. R. Norman, USAF, Member of the Faculty, ICAF 1

SPEAKER--Mr. E. Grosvenor Plowman, Vice President in Charge of Traffic, United States Steel Corporation, Pittsburgh, Pennsylvania 2

GENERAL DISCUSSION 20

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Publication No. L55-67

INDUSTRIAL COLLEGE OF THE ARMED FORCES

Washington, D. C.

Mr. E. Grosvenor Plowman was born in Brookline, Massachusetts, 16 December 1899. He was graduated from Dartmouth in 1921; attended Boston University, 1921-22; Harvard Business School, 1921-23; University of Denver, 1936; received his Ph.D. degree from the University of Chicago School of Business, 1937. While attending school in Boston, he taught economics at Massachusetts Institute of Technology and later at Boston University. He became industrial secretary of Associated Industries of Massachusetts in 1924, and was concurrently on the staff of the Babson Institute. Subsequently, he became professor of Business Management at the University of Denver and occupied various industrial positions in Denver. In 1937 Mr. Plowman became traffic manager of the Colorado Fuel and Iron Corporation and the Colorado and Wyoming Railway. He held this position until 1 January 1944, when he was elected vice president in charge of traffic for the U. S. Steel Corporation of Delaware. On 1 January 1951, when the U. S. Steel Corporation of Delaware merged with Carnegie-Illinois Steel Corporation, H. C. Frick Coke Company, and the U. S. Coal and Coke Company to form the U. S. Steel Corporation, he became vice president in charge of traffic. During World War II he served as traffic manager of the Steel Division, and later as transportation consultant to the chairman of the War Production Board. He organized the Department of Defense Military Traffic Service, and served as its first director in 1951. He is a member of the American Iron and Steel Institute and the National Industrial Traffic League. He is President of the American Society of Traffic and Transportation and the National Defense Transportation Association. He wrote "Business Organization and Management" in collaboration with Elmore Petersen in 1941. This is his first lecture at the Industrial College.

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COLONEL NORMAN: General Niblo, ladies, and gentlemen: A few days ago Mr. Smith surveyed for us what we in the military are to do in the way of organizing and planning for the utilization of the various modes of transportation and the accomplishment of our mission, either at limited or full mobilization.

I think as students of economic mobilization we would be remiss if we stopped at this point in our consideration of transportation. I think in the final analysis the degree to which the Nation's needs in the field of transportation are met will depend as much, and probably much more, on the state of readiness of the transportation industry, the planning policies, and the coordinated machinery outside the military department, than on our military plans in the field of transportation per se.

Accordingly we have asked Mr. Plowman, Vice President for Traffic of United States Steel Corporation, and President of the National Defense Transportation Association, to discuss with us the capability of the Nation's transportation system to meet our needs in time of stress; to appraise for us, if he will, the state of planning in the industry itself; and to pinpoint the weak links in the transportation system and also the governmental machinery that is being planned for or else in being, which is to handle this problem of coordinating transportation in times of stress.

As is apparent from his biographical sketch, Mr. Plowman has viewed this field of transportation from about every vantage point available to one individual--as a college professor; as a mobilizer, if you please, when in World War II he was transportation consultant to the chairman of the War Production Board; as a Department of Defense official, when in 1951 he organized and headed the top transportation office in the Department of Defense; and as one of the largest industrial users of transportation, in his capacity as Vice President of U. S. Steel.

As President of the NDTA, Mr. Plowman heads an organization which has representatives from the entire transportation industry, also the Nation's largest users of transportation, and also Government and Armed Forces personnel whose jobs bring them into close proximity

with the field of transportation; an organization whose purpose is centered in transportation preparedness, an organization which has been described as a bridge between the Armed Forces and the transportation industry.

We are very happy to have you with us this morning, Mr. Plowman, and I am pleased to present you to this year's class.

MR. PLOWMAN: Members of the class of 1954-1055 of the Industrial College of the Armed Forces, it is a heavy responsibility to present this lecture on the Transportation Industry and National Defense, both because I have no illusions as to my lack of qualification for the task and because I am aware of the great danger, in any future military emergency, of temporary or localized or even widespread breakdown in the transportation now being performed by our railroads, trucks, busses, passenger automobiles, barges, pipelines, ocean and lake vessels, and airplanes. I must steer a middle course between pessimism, intended as a warning of problems that need attention and, therefore, need mobilization planning; and the natural assumption that our transportation industry can surmount its future wartime problems with the same skill and patriotism that is the historical record of actual experience in every war since 1860. As I have pointed out in my brief reference to my lecture outline, my assignment is the transportation capability of nonmilitary transportation collectively called in the title of this presentation the Transportation Industry.

The Transportation Industry is not easily defined. For the most part, it consists of private enterprises devoted primarily to the peacetime objective of furnishing transportation for profit. Within this broad generalization are the comparatively large common carrier railroad companies, vessel and barge lines, and pipelines. In contrast, the term also includes the thousands of small common carrier trucking enterprises, also numerous contract carriers by highway, water, and air, many of which specialize in exempt or nonregulated carriage of particular commodities. The Transportation Industry, for the purposes of this lecture on mobilization problems, must also be considered as including so-called private transportation, furnished for one's own use as a convenience or economy by a corporation or person not engaging in the sale of transportation-for-hire. This private transportation category covers a wide variety of activities, including the millions of private passenger automobiles. Finally, the Transportation Industry includes the production of equipment, materials and fuel, and also the construction, repair and maintenance of transportation facilities.

The Transportation Industry is undergoing important changes, leading in general away from common carriage. Some common carriers, notably trolley and urban bus lines, have been declining in size and effectiveness. Other common carriers, notably railroads, have grown over a period of years but, nevertheless, have lost ground in proportion of total transportation. Ocean common carriers complain of foreign competition and seem unlikely to grow substantially, even with government assumption of differentials between foreign and domestic construction and operating costs. Barge common carriers show a strong growth trend, but complain about and seek regulation of bulk carriage by contract barge operators. Air common carriers likewise have a strong growth trend, but complain about the nonscheduled contract air carriers. Pipeline mileage also has grown enormously to meet the insatiable demand of urban population for natural gas and liquid petroleum products.

This trend towards relatively more contract carriage and private transportation affects mobilization planning. In general the change is similar to the effect noted by a ship captain when his vessel drifts because it is unresponsive, for some reason or reasons, to the rudder. The relative decline in importance of the common carriage portion of the Transportation Industry will lessen transportation capability in any future period of full mobilization. This will happen because of the lessening of response to the rudder action of controls, as well as to the guiding effect of material and manpower allocations. Slower responsiveness means less response to the effect of controls and allocations in any given time period. Therefore, this trend away from common carriage means that the extra capacity, or wartime reserve of potential transportation capability, must be estimated in smaller figures.

Present Plans for Transportation Controls

The present plans for transportation controls to be placed in effect as and to the extent required are, naturally and properly, based upon the experiences of World War I, World War II, and the recent Korean conflict. These plans consist essentially of the history of the wartime control decisions during the past conflicts. The government agencies, when they were active, received strong support and cooperation from appropriate associations, such as the Association of American Railroads, the American Trucking Association, and the Inland Waterways Operators Association. I am aware of the legal limitations upon the

appointment of persons, to committee assignments and to uncompensated (WOC, or Without Compensation) service as wartime Government executives, who are salaried association executives. Nevertheless, the rather numerous associations, each representing its own segment of the Transportation Industry, play an important role in developing and enforcing controls. To give one example, the railroads, through their association, have maintained a passenger movement scheduling service that acts as an effective central clearing house for all the carriers and that provides a centralized point of coordination that is in contact with the appropriate military traffic movement agencies. The employees of this railroad association office are properly cleared, in a security sense, and are available to furnish service at any time of day or night.

Despite the proven value of activities by many associations, such as the military passenger office operated by the railroads, there is much to be done in this field. This is largely because of the expansion in the proper meaning of the term, the Transportation Industry, to include the vast area of contract and private carriage of persons and property. The number and variety of trade associations that should recognize their necessary relation at times of full mobilization, to military transportation--and that should be encouraged to plan their own activities of coordination and cooperation now, is no longer a mere handful.

Control of the Transportation Industry by the Federal Government during wartime rests on both legal and experience grounds. In general, it is clear that military requirements for transportation come first, ahead of any civilian need. This military right includes, if necessary, the right of seizure and operation by or in the name of the Government. Obviously this right voids, insofar as military movement of passengers and freight are concerned, any effort by the carrier to solve its problem by applying its own control, or embargo. During World War I, the inevitable clash between embargo and military priority caused such confusion and congestion on eastern railroads that our Government took them over. This taught our country an expensive lesson as to the folly of Government ownership, so that it proved to be a blessing in disguise.

In World War II direct Government operation of transportation was limited to the minimum. Nevertheless the Government operated several railroad lines, a large number of truck lines, several barge

lines, several ocean steamship lines, as well as predecessor activities and operations or the present Military Sea Transportation Service and the present Military Air Transportation Service. However, the great bulk of the Transportation Industry was controlled, rather than directly operated by Government. These controls were successful.

There was little of either confusion or congestion. Much of the potential congestion was eliminated by movement planning to use alternative routes. In accomplishing this, two new activities emerged. In 1943, the railroads and Government established a joint officer to direct movements over the alternative transcontinental routes west of the Mississippi River; and in 1945, the predecessor of the present Office of Defense Mobilization interagency committee of Transportation and Storage operated effectively to coordinate and bring into use alternative through land-ocean routes, particularly by use of South Atlantic and Gulf ports.

Under Government pressure, the Transportation Industry abandoned many normal peacetime practices that stemmed from competition between carriers more than from considerations of efficiency of equipment use or combat effectiveness. For example, railroads gave up their normal "Home-Return" car service rules, so that freight cars and troop trains, when empty, were loaded at the most effective or useful point, regardless of destination. This measure saved billions of empty car miles, at the cost of some deterioration in equipment maintenance. Also, trucks and busses were interchanged between companies to some extent, with some localized benefits in speed of movement and in equipment usage. Leasing practices in inland waterway, ocean and air equipment, related in part to large-scale Government construction programs, had the same effect, as did the construction of supplemental pipelines, especially the "Big Inch" and the "Little Inch" lines from Texas to the New York metropolitan area. On the ocean, an important negation of sound peacetime transportation practice consisted of the use to a varying extent of merchant vessels as floating storage warehouses. This facilitated combat effectiveness by moving the rear zone storage up to within a relatively short distance back of the combat zone, but it also wasted ship time.

Because of the lessons of World War I, there was recognition by all concerned, including the military traffic personnel, that port congestion could not be permitted. This led to establishment of control points and depots back of the ports to which and by which all port-destined traffic was, or could be, routed. The purpose of these back-up

depots and control points was to take the surges in delivery of military materials at these interior points, rather than have these surges occur at the ports themselves. Thus, port traffic for overseas was limited to the capacity of the wharves and the number of vessels on berth. Furthermore, movement from the control point to the port could be, and was, by alternative routes and alternative modes of transportation, rail, highway, water, and even air. Finally the control point director could, and did bring about diversion of vessels and cargoes from a congested to an open port.

In any modern war, "direct military" requirements are a relatively small part of total required transportation. They are exceeded by "indirect military," simply because the tonnage of raw materials and semifinished materials necessarily exceeds the weight of the finished product. Finally, neither the raw material conversion nor the production of usable military products can be accomplished without the efforts of the civilian population which must be fed, clothed, housed, transported, and in any future war, protected from attack by bombing or sabotage. It follows that transportation control must include control of usage of transportation by civilians for civilian purposes.

The lessons of World War II teach that voluntary and semivoluntary measures can and should be taken before imposing priorities. Through the Shippers Advisory Boards, there were developed national awareness and general cooperation by shippers and receivers, who voluntarily adopted practices that conserved transportation equipment and thus increased transportation capability. These practices included rapid loading and unloading, heavy loading of each car, truck or vessel, and use of available equipment even though not well adapted to the particular usage. Government regulatory agencies provided the incentive for effective voluntary effort by promulgating penalty demurrage charges, by preparing the issuing heavy loading rules and by prohibiting use of certain equipment for certain movements, such as tanker vessels in coastwise service and railroad tank cars in short-haul movements. The lurking and persuasive threat of even more stringent Government controls was ever present.

Looking back, and then forward to the new full mobilization problem of atomic bombing and atomic sabotage, it seems that the procedures that have developed for control are adequate. Movement planning controls to bring about the use of alternative routes to avoid congestion; suspension of normal competitive practices that may lessen equipment

efficiency or that may interfere with facilitation of combat effectiveness; detailed control of overseas traffic; and development of effective shipper and receiver voluntary cooperation by association efforts and Government orders seem to cover the full range of present and foreseeable future control needs. The manner of application may change because of the increase in contract and private transportation, and this seems especially certain to be required in any metropolitan area that has received the blast effect of atomic energy.

Allocation Problems of Transportation

Since World War II, the stockpiling of strategic and critical materials and weapons has advanced far beyond previous levels. Stockpiling has the effect of making available for wartime allocation, not only materials from distant lands but also creates a kind of manpower bank account. Thus stockpiling eases to some extent the wartime transportation problems of the Transportation Industry, as well as assuring availability of certain materials needed for repair, maintenance, operation and construction of necessary transportation equipment and transportation facilities.

Helpful as is stockpiling, it makes even more necessary the proper use of the procedure of allocation of both materials and manpower during times of full mobilization. Only Government can approve dipping into stockpiles, which means allocation not only of the stockpiled material but also of the available private resources of the same kind. Further processing of stockpiled material restricts or narrows its end use, so that allocation of manpower tends to be required.

There is wide-spread belief, in the Transportation Industry, that during World War II the need for allocation of materials and manpower to transportation was subordinated to too many other requirements. Examples often cited are the suspension orders of the War Production Board that terminated production of passenger automobiles, civilian-required trucks, busses, railroad rails, railroad freight cars and passenger cars, and airplanes for civilian passenger travel. In addition there was more or less effective gasoline rationing; and a tendency on the part of draft boards to turn a deaf ear to essentiality claims made on behalf of prospective draftees. Finally, there are stories of being forced to get along with obsolete or costly designs alleged to save materials. All these claims carry the usual emotional overtone of: "It shouldn't have been done to us, because of our importance."

Allocation of materials and manpower for the Transportation Industry, in any future period of full mobilization, will be much more difficult than was the case in World War II, because of the almost universal reliance upon the liquid products of petroleum as the primary energy source for automobiles, trucks, busses, locomotives, towboats, vessels and airplanes. Petroleum is the energy source, also, for most of the pumping done at fixed points along the Nation's gas, oil and water pipelines.

In any future wartime emergency, the alternative allocation policies to the Transportation Industry appear to be either to allocate materials and manpower for the entire range, or to concentrate upon particular segments. In World War II, the segments selected by the force of events were the railroads, the canalized inland waterways and ocean vessels, the latter for exclusively military purposes. Railroads and barge operations were selected because of their ability to provide greatly increased transportation capability at minimum expenditure in terms of allocation of either materials or manpower. The railroads, particularly, met these expectations with great success.

It is my belief that it is in the national interest for the railroads to be in a position to handle greatly expanded wartime traffic, even though in any future conflict more rubber, more manpower, and more petroleum fuel undoubtedly will be allocated to other forms of transport than were made available in World War II. Because of the railroads' ability to expand their traffic readily without excessive demands on manpower or other resources, the percentage of the total traffic that the rail carriers may have to handle remains high. The Government, therefore, should consider the desirability of stockpiling rolling stock and other needed railroad facilities for the Nation's protection in case of war.

Since World War II, development of other types and modes of transportation has far out-paced our slower growing railroad common carriers. We do not need the statistics of the declining share of the intercity freight and passenger traffic carried by railroads to prove this fact. We need only to look around us at the private passenger automobiles, the private, contract and common carrier trucks, the expanding barge operations on inland waterways, the growth of petroleum pipelines and our rapidly growing commercial air enterprises. There can be no doubt that our railroads will not be able to provide, in any future emergency period, as large a proportion of wartime domestic transportation as was the case in World Wars I and II.

This emphasis on the role of our railroads in past wartime periods does not in any way belittle or fail to appreciate the great contributions made by other forms of transportation. It is a simple and proven fact that the wartime shifts in transportation flow and the wartime increases in need for transportation have, in both World Wars I and II, been largely taken in stride by our railroads. Their ability to accomplish this transportation miracle has derived from the reserve capacity of our railroad system, viewed as a whole. It is this reserve capacity that is being reduced by the decline in size of our railroads as compared to the growth of the United States. At the same time other forms of transportation have experienced rapid expansion, especially in the contract and private carriage types of organization.

In addition to this factor of relatively slow growth must be added the measures taken by the railroads to remain competitive, which, to some extent, reduce their former ability relatively to expand their operations. These measures, collectively, become a trend towards a smaller fleet of freight and passenger cars, operated over a reduced number of miles of track and with fewer locomotives, under more efficient conditions. In any future war emergency, this reduction in equipment, motive power, and track will have to be accepted as a factor lessening to some degree railroad flexibility in its relation to the total transportation capacity.

Beyond doubt, some of the loss in excess capacity created by the relative decline in our railroads and by their loss of flexibility can be met in any future military emergency by other domestic forms of transportation. Busses, trucks, private automobiles, pipelines, inland waterway facilities, and airlines should pick up some of the slack. The reason why we must consider this change in our railroad reservoir of excess capacity important in preplanning for future war is that, in past wars, it has been the other forms of transportation that have not been able to handle the extra wartime load. Either through limitation by Government order, through decline in their ability to recruit and maintain their skilled manpower, or through equipment shortage, the other forms of transportation in a major military emergency have declined in a relative sense, as compared to the railroads.

There are available at the present time a great many modern steam coal-burning locomotives which are now in the normal process of being scrapped by the railroads, as and when their remaining service life is used up. In addition, the repair parts for these locomotives,

which are now in railroad store stocks, will likewise be scrapped. These are available to the Government and could afford comfortable protection in case of trouble. In addition, many railroads still own and operate turn-tables, furling facilities, roundhouses and steam locomotive repair shops, all of which will be scrapped when railroad dieselization reaches 100 percent.

When the Korean difficulties were at their height, the government of Iran announced its intention to proceed with nationalization of the giant Abadan refinery and its related oil fields. This refinery was then a major source of gasoline for Europe, fuel oil for maritime uses, and kerosene for the lamps of India. Transfer of this load to other than existing refineries could have resulted in serious shortages if, at the same time, use of aviation gasoline and aviation jet fuel had risen to major war volume amounts.

To meet this problem in part, United States railroads were urged by the Government to retain in usable condition their existing serviceable steam locomotives. Fortunately, closing of the Abadan refinery did not cause a shortage of petroleum products. The load was quickly picked up by other refineries. Korea did not turn into a major war emergency. Dieselization of railroads has progressed to a point where by the end of 1953, 75 percent of the freight service, 80 percent of the passenger service, and 83 percent of the yard service was being handled by this type of locomotive. Further increases have been made during 1954. Further dieselization will be effected in time, but at present many roads have modern steam locomotives with usable miles available in them without heavy expenditures for repairs. These locomotives are only used during periods of seasonal traffic peaks. Because of the need for capital expenditures on other facilities, complete dieselization will be postponed until the serviceable mileage of the modern steam locomotives has been run out, unless these steam locomotives are classified as of defense importance and are, in some suitable manner, stockpiled by the Government.

At the end of 1953, the average age of all freight cars was 19 years. During the period from 1922 to 1930 inclusive, a great many freight cars were placed in service. From 1931 to 1939 inclusive, the number of cars put in service dropped off sharply, but rose again after 1939. Installations were particularly large during the period following World War II. Since 1939, the railroads often have had great difficulty in obtaining the cars they wanted because of shortage of critical material.

It was during this period of relative prosperity that the fleet should have been built up. Instead of building new cars, heavy repairs undoubtedly were made to some older equipment rather than to replace with new. As of December 31, 1953, the total of 1,781,000 freight cars, owned or leased by Class I railroads, in the United States were broken down as follows:

Box	736,341
Open Top Cars	906,474
Tank and Refrigerator	25,588
Other	112,598

During World War II, several estimates of the amount of freight car shortage were made. Looking back, it seems certain that the higher estimates were unsound. More recent estimates, that the overall number of cars should be increased about 100,000 units, seem conservative.

The Government has become a substantial owner of freight cars, chiefly tank cars, boxcars and flat cars, all considered at the time of Government acquisition to be in short supply. Boxcars were acquired in order to handle certain types of ammunition rapidly and with minimum possible damage. Heavy duty flat cars became a short supply item when tanks and other defense-connected loads required above-average strength and weight-carrying ability. These cars, when not needed for military purposes, are available to meet civilian needs, on a rental basis, and provided there are no similar cars available from any railroad or car rental source. This rental policy is subject to two criticisms. First, the Government car is withdrawn from civilian use at the very time when most needed, namely, in a time of car shortage and, second, the rental policy probably dissuades the railroads and other car owners from building the total fleet up to a surplus basis.

The military departments now seem to be moving towards a kind of stand-by policy approach, i.e., of regarding railroad passenger service as an alternative to be used only when the military unit lacks its own means of highway or air transport. This policy applies primarily outside of the United States, but may be followed within this country to some extent for exercise and practice reasons.

The Government at present, is maintaining a reserve supply of passenger cars, chiefly old purchased Pullmans, and troop train type

cars. In addition, the Government has access to some cars of railroad ownership, that are stored at military posts for possible usage.

During World War II, the need for troop movement increased both in number of men in uniform and in number of trips per man. Troop train cars of boxcar type were constructed for use as troop sleepers and as troop train kitchen cars. Every non-air-conditioned sleeper, whether tourist or standard type, was put in service. Many all-steel day coaches were also assembled into troop trains.

During World War II, the direct relation between the quality of the fixed parts of a railroad, and the efficiency of equipment usage was often demonstrated. It was necessary to allocate material and manpower to bring about lengthening of passing tracks on many railroads, just as one example.

An important phase of this interrelation is being given increased emphasis by the threat of atomic bombing, namely, the importance of alternate routes. To cite one example, study of which began in World War I, bombing of the Sault Sainte Marie locks could close the present Great Lakes iron ore, coal, and wheat routes.

1. World War I consideration of this problem resulted in planning to use an alternate route via the Twin Cities, thence via the Inland Waterways. Barges and towboats were constructed, and the Government-owned Federal Barge Line came into existence. Federal has only recently been sold to a private owner.

2. During World War II, consideration of this problem resulted in beginning of construction by the Government of extensive docks at Escanaba on Lake Michigan to provide an alternate route. This project was abandoned when calculations showed that Diesel-hauled trains could be routed over numerous light railroad lines in Minnesota and Wisconsin, lines that could not support heavy steam freight locomotives on their bridges and track.

The lessons of strategic bombing of Germany and elsewhere seem to point to the fact that railroad dispersion means maximum availability of alternative routes between and around major traffic centers. Fortunately we can hope to retain command of the air over the United States, so that the existence of alternative routes can lead to restoration of railroad service by rerouting. This consideration also gives

emphasis to the objections by military authorities to abandonment, some years ago, of the alternative Promontory Point line of railroad around the north side of Great Salt Lake.

Postatomic Explosion Problems

According to the well-known British military writer, General J. F. C. Fuller, in the September, 1954, American Ordnance Journal, a brief atomic bombing of Great Britain will cause "such chaos that mobilization will be impossible." He goes on to say that though the United States is less vulnerable, "by multiplying the number of bombs dropped, the same results are predictable." These predictions point up the fact that one of our greatest needs is to establish and maintain transportation readiness to most any local or regional emergency. According to Val Peterson, Civil Defense Administrator, we have three alternatives in meeting the problem of an atomic bomb explosion over a city like Chicago. To use his pithy words, our choices are: "Die, Dig, or Get Out." Administrator Peterson explained that the pulverizing effect in the near vicinity of an atomic explosion is so great that to do nothing is equivalent to accepting probable death in the city's ruins. To dig a bomb shelter, however crude, increases the likelihood of survival. According to Val Peterson, real safety is only to be found by dispersing our metropolitan millions of people into and beyond the outer suburbs. Orderly evacuation, according to our civil defense authorities offers the greatest promise of survival and thus would permit revival as quickly as possible of the bomb-damaged city and its industries.

These two public statements are the measured words of competent students. One of them observed the air battle over Britain and Europe in all its phases. The other more recently has witnessed and studied our own awesome experimental atomic bomb explosions. Both point to the same fact, that a future enemy may be expected to use this new weapon to slow down, demoralize or prevent full mobilization of our military and economic potential to make war.

Our great industrial cities, with their concentration of transportation facilities and equipment will be in the forefront as possible targets for atomic explosions, created by bombs transported by air or secreted by saboteurs. It is necessary to assume that one such explosion has happened and that New York, Pittsburgh, Chicago or Los Angeles lies in partial ruin. I will further assume that the advice of Civil Defense

Administrator Val Peterson was heeded, and that more than a million persons have survived by walking, driving, or taking busses or trains to the outer suburbs during a brief warning period before the bomb devastation. Half of these are now homeless. All of them are immobilized by gasoline exhaustion at surviving filling stations. There is no electricity, and no common carrier transportation, the latter because of disorganization of manpower, failure of electricity, destruction of equipment and facilities, or just plain confusion of the "fog of war" type. The "fog of war" is predominant; it must be assumed that even the local Civil Defense Authorities, with all their preparations, are having difficulty reestablishing communication with their subcenters in different parts of the city. Civil Defense is unable, as yet, to appraise the exact extent of damage that has been done to transportation, nor is it able to estimate the extent to which the industrial activities of the wounded city can be quickly resumed. This is the probable postatomic bomb problem that is to be faced by the Transportation Industry and by the Federal authorities responsible for directing controls and for authorizing allocations.

One final assumption is necessary to complete the statement of this postatomic explosion problem, namely, that our military capability has not been reduced to the point of losing command of the air over the stricken city. During World War II, it became clear that command of the air, as over Great Britain by the Allied Air Forces, permitted measures for repair and reconstruction of damaged transportation facilities to be effective. This assumption necessarily includes stockpiling of the most likely components for reconstruction of roads, railroads, inland waterways, pipelines and airfields such as Bailey Bridges, railroad rails, lock gates, pipeline pipe, and cement.

The steps that should be taken by the Transportation Industry, under Government guidance, are, although on a larger scale, the same as those taken by a municipal fire department and police department in coping with a large fire, as follows:

1. Bring to the scene of the disaster, even from distant points, all of the equipment and supplies needed to cope with the immediate problem. This is the familiar relief train of natural disasters such as the San Francisco earthquake and resulting conflagration. The relief needs will be greater and every mode of transportation will be required, but the principle is the same.

2. Regroup the equipment, and especially the emergency repair materials of the Transportation Industry stockpile, so as to fill the gaps caused by use of such materials for reconstruction. This is the familiar regrouping of fire engines, during a major fire, so that the remaining engines will provide the best possible protection to the remainder of the city.

3. Reroute all traffic, except that necessary to stop the further spread of the disaster or to find and remove the wounded. This is the familiar police action at a major fire.

4. Withdraw all limitations upon traffic flow as soon as possible. Frequently, after a large fire, the fire department must bring down a wall to prevent its later collapse and to permit a nearby street to be reopened.

In event of an atomic explosion over or in one of our industrial cities, the Transportation Industry will be expected to provide immediate relief and reconstruction, reestablish as quickly as possible depleted stockpiles and their geographical distribution, reroute via alternative routes or alternative modes of transportation all traffic not directly related to the disaster, and reestablish as quickly as possible the damaged routes or modes of transportation. Thus transportation service will be reestablished and normalcy restored.

All this cannot be done by Government alone, particularly with a Transportation Industry that is trending more and more towards contract and private carriers. The potential magnitude and, above all, the unpredictable location of any civil defense emergency requires ability to mobilize transportation and ability to change estimated transportation patterns without delay--and this, in my belief, requires cooperation by transportation executives on a voluntary basis as well as collaboration under the direction of our established civil defense and defense mobilization authorities.

The term, "voluntary cooperation" needs to be fully understood as applied to the effects upon transportation of enemy bombing either of a city or of some key facility, such as a bridge. It does not neccessarily mean following a prearranged emergency plan prepared by civil defense authorities. Such a plan is important but cannot be more than a guide to be interpreted and modified to meet the actual problem.

By "voluntary cooperation" is meant preservation by each carrier enterprise that may be affected by enemy action of its own maximum possible transportation capability. It is the preservation and restoration of ability to supply transportation service--and it is the supplying of needed transportation during and after the emergency. Above all, it involves recognition by government that the basic unit is each independent and separately organized transportation enterprise.

The literature of military campaigns makes plentiful use of the expression "fog of war," meaning the difficulties faced by a commander who is trying to get at the real facts and the real problems of the changing tide of the particular battle. There is little doubt that enemy bombing of one of our cities will produce, temporarily, this "fog of war" situation. It is then that voluntary cooperation by each transportation enterprise can help reestablish our life lines of transportation for people, food, relief materials, and materials for restoration of damaged industrial plants.

Voluntary cooperation can be successful only if many transportation executives, on both the carrier and shipper sides, will take the time now, while there is time, to study the problems that will result in their own operations in event of enemy action directed at points within the United States. These preliminary study measures include participation in the planning activities of our civil defense authorities, in the chapter activities of the National Defense Transportation Association, and in the organized voluntary disaster relief work of the American Red Cross. These agencies are readily available and can be used to develop within our thousands of transportation enterprises the important factor of Readiness, so that when a civil defense transportation emergency occurs, it can be met quickly and effectively.

There has been some thoughtless discussion among transportation executives critical of the planning work of our civil defense authorities. I have heard statements that in a particular community an emergency transportation plan has been worked out, and then nothing has happened and enthusiasm has faded. Such criticism is shallow and unfair. Our emergency transportation problem is like that of a municipal fire department. Because there are no fires is a cause for rejoicing, not a basis for loss of interest. Similarly, as long as the danger of a civil defense emergency exists the responsibility rests on both Government and on the Transportation Industry to provide the needed voluntary cooperation and the resulting readiness of emergency transportation service.

Another thoughtless and critical comment that some transportation executives have made about our civil defense plans has to do with the term "evacuation." I have heard it said that, with the likelihood of only a few hours, at best, of warning before an attempted enemy bombing against one of our cities, it will be impossible to evacuate the danger area. Mass transportation is assumed to be subject to certain breakdown under such a sudden strain. It is unfortunate that the word "evacuation" carries such connotations, when the term should mean, and really does mean, orderly transportation to less dangerous areas of those who can be spared. Orderly evacuation is the vital first transportation step towards survival and promptest possible revival of the bombed city area. Orderly evacuation puts the transportation executive and skilled employee into the front line of any civil defense emergency. His ability to provide effective voluntary cooperation with the civil defense authorities requires careful preplanning but, above all, it requires personal willingness and ability to handle the transportation problem as it presents itself. Actually orderly evacuation in a crowded area is a normal, daily fact. What is required in mass evacuation under civil defense is only what occurs in every metropolitan area between the hours of five and six o'clock, five days per week.

My position is that our thousands of free private enterprises performing transportation either as carriers for hire or as a phase of their major business activity cannot and should not be regimented in any arbitrary or unintelligent way, in event of a civil defense disaster such as a bomb attack. Our soldiers are instructed by their commanders to use their own initiative within carefully determined limitations. Similarly, the private enterprise transportation of the United States will most effectively meet any future civil defense emergency if taught how to cooperate, as well as how to obey.

Major Deficiencies and Remedies

This review has shown that the Transportation Industry is not a unit, but is rather an aggregation of millions of separate individuals and business enterprises. Within the Transportation Industry there is a trend towards relatively more contract carriage and private transportation, a fact which increases the difficulties of control and allocation during periods of full mobilization. The following major deficiencies, discussed in this lecture are presented as important subjects for mobilization planning, in order that sound conclusions may be reached and appropriate action taken:

A. The entire Transportation Industry has become dependent upon continuous and geographically universal supplies of refined petroleum products. The Transportation Industry is in competition for these supplies, in event of shortage, with space heating, electric and other power generation, and direct military requirements. World War II experience proved that gasoline rationing is a necessary step to conserve petroleum and to reduce non-essential transportation. Since then the private automobile has become even more a necessity for urban and rural travel to and from work. It seems clear that, even after full mobilization, relatively greater usage of petroleum products for private transportation must be planned, a goal which is wholly dependent upon petroleum availability. Therefore, mobilization planning studies should be undertaken to develop two or more plans for control of the Transportation Industry, one based on relatively great availability, the other based on shortage of petroleum.

My own conclusion is that Government must be prepared to maintain transportation capability, either nationally or in a local area affected by an atomic blast, under conditions of extreme petroleum shortage. This dictates preservation of common carrier priority, ahead of the rest of the Transportation Industry, for its petroleum needs, also development of all suitable substitutes, such as coal-burning locomotives for railroads and charcoal gas units for highway travel.

B. During World War II, it was proved by "trial and error" that enforcement of controls on the Transportation Industry can only succeed where there is voluntary cooperation. In fact, effective voluntary efforts often make controls unnecessary or less restrictive. The two systems go hand-in-hand, the threat as well as the fact of controls being the incentive for voluntary cooperation in desired practices to conserve transportation and to channel transportation capability in desired ways. In preserving for a future war the experience of past wars, this vital ingredient of voluntary cooperation is hidden and obscured by procedures and texts of Government control orders. When an atomic blast occurs, the temporary "fog of war" will be so great that only voluntary cooperation will be left to maintain such transportation capability as may remain.

Therefore, mobilization planning studies should be undertaken to develop plans for activating and training the Transportation Industry along voluntary cooperation lines.

My own conclusion is that Government must seek to instill the kind of voluntary cooperation that is typified by the use of taxicabs to move the Paris garrison troops to the critical Marne battleground in World War I. This suggests an area of close cooperation between military transportation and Civil Defense transportation authorities, since the need for voluntary cooperation will be greatest after an atomic blast. Because of its type of organization and its aims and objects, the National Defense Transportation Association should assume leadership in this task.

C. World War II and the Korean conflict have demonstrated the value and possibilities of stockpiling, as the safety factor in and the natural associate activity with allocation. The lay-up fleets of merchant vessels held by our Government are a striking example of stockpiling of transportation capability. The recent exchange program of two older tanker vessels (to be laid-up) for one new vessel to be constructed is another excellent illustration. There is much evidence that this procedure of stockpiling should be extended to other portions of the Transportation Industry. The coal-burning steam locomotives remaining on the railroads are destined soon to be scrapped unless stockpiled. An important factor in reestablishing and maintaining transportation capability in Great Britain, under bombing attack, was the wide distribution of small stockpiles of repair materials. Therefore, mobilization planning studies should be undertaken to develop plans for additional stockpiling of equipment, of parts for assembly into equipment, and of maintenance, repair and operation materials, in order to assure maximum transportation capability.

My own conclusion is that Government should extend its transportation stockpiling policy to include domestic transportation capability requirements, particularly to maintain railroad transportation capability, under conditions of full mobilization in the future. On this subject, Mr. James M. Symes, President, Pennsylvania Railroad, recently makes this significant statement which will be my conclusion:

> "During the winter of 1940-41, question was raised as to the ability of the railroads to meet the transportation demands of World War II. I happened to be one of a committee of three appointed to study and report on the situation then. It was the unanimous view of the committee then that we could handle the expected war load of World War II--and fortunately we did. One of the principal reasons was because then the railroads had much more excess capacity than did other industry as a whole. . . .

"I say to you, quite frankly, that if my appraisals of rail transport requirements in the event of another war are approximately correct, and I believe they are, then certainly we are not now prepared to do the kind of a job we would be called upon to perform--and will not be prepared to do so if present policies with respect to transportation are continued. The same line of reasoning that caused me to indicate 14 years ago that the railroads could handle the expected load of World War II, causes me to say now that they are not prepared to do what will be expected of them in the event of another war."

COLONEL NORMAN: Mr. Plowman is now ready for your questions, gentlemen.

QUESTION: In 1952, sir, I read in a national transportation magazine the fact that a study was made on the rate of movement of some 10,000 rail cars over a short period of time. The average rate of movement was shocking, in that it was about five miles an hour from the point of origin to the point of destination. If that were true, can we do something to speed it up? If it were not, what is the average rate of movement of freight cars today?

MR. PLOWMAN: I have not the exact figure; but I accept your figure of five miles per hour. I would guess it has gone up 10 percent since then. The rate of movement of freight cars is pulled down by the necessity for yarding, or, as it is sometimes called, marshaling. It is pulled down also by shipper and receiver practices, and, finally, it is pulled down by mere inefficiency. There are many evidences that the railroads think they could improve their yards so that they would all be hump or gravity classification yards of the most modern sort, and that the railroads would reduce that disadvantage. That is, they would raise the figure, perhaps, to double what it is today.

QUESTION: It seems to me there are other transportation agencies that have developed a tremendous amount. Even ships have increased their efficiency. There has been a lot of talk recently about replacing the obsolete heavy-type 1,500-horsepower Diesel, with its tremendous weight of a high-power engine, by other fuels. Can you tell us something about the research and development point or thinking for modernizing some of the rail transportation? I realize there is a tremendous investment in the system we have now; but there are systems that are better, I am sure. Can you comment on that, please?

MR. PLOWMAN: That's a tremendous order, particularly as my own personal railroad background was more than 20 years ago. All that I can say to you is this: The railroads were the first operators of a business along mass activity lines. They were the pioneers. Their shops, their yards, their roundhouses, their tracks, their cars were all, each in turn, examples of the most modern developments of the time. There are railroad people who express the belief that a revolution in railroad technology is possible today--and I would now like to quote from memory Mr. Downing Jenks, a progressive young executive vice president of a railroad, the Rock Island Railroad. He believes that cars can be lightened, as you say, that yards can be improved, that, as he puts it, a tape can be cut in Chicago covering a freight train that departs, at the time it departs from Chicago, and when it reaches Silvis, which is near the Rock Island Arsenal, and which is a giant hump yard, that tape, having been transmitted to that point and fed into a machine, would throw the switches, because the tape would know how much each car weighed, and would adjust the brakes so that each car or cut of cars would go down the gravity side of the hump without any damage to lading.

He made that statement and expressed the belief that it was not only possible but that the railroads could achieve it. There are many other examples and possibilities of fully automatic operation of railroads. The greatest defect, the greatest handicap, to fully automatic operation of railroads is the grade crossings. If you think for one moment, you will realize that it is the hundreds of thousands of grade crossings that require personnel control of the speed of trains, and nothing else. Trains could be controlled if it were not for grade crossings; trains could be controlled by remote control or by a tape, or by what you will.

So all that I can say is that there is a great deal of thinking along exactly the lines that it is possible to devise an entirely new approach to transportation on steel rails.

QUESTION: To agree with that comment that Mr. Symes, President of the Pennyslvania Railroad, has made seems to place us in a rather impossible situation. I wonder if you could give us a little more information on that, as to whether or not you do agree, and if so, what is being done by the industry and the Government to get us out of what seems to be an impossible dilemma.

MR. PLOWMAN: With respect to agreement or lack of agreement I can only say I quoted it because it is the competent view of an extremely

competent person, and I therefore feel that it is approximately correct. With respect to what can be done in regard to the present situation, my paper is intended to bring out at least one aspect; that is, that stockpiling of transportation components of different sorts--for example, to permit reconstruction in the event of an atomic blast--has, in my belief, become a Government problem. It is not a railroad industry, a truck industry, or any other industry problem. It is exactly the same in character as the reserve or lay-up fleet of merchant vessels and tankers maintained by the Maritime Commission, as a primarily military reserve of ocean vessels.

Those two points are about all that I can contribute at this moment.

QUESTION: Sir, assuming that tight Federal regulations on mobilization transportation are not a good thing, and the stockpiled or laid-up fleet of merchant vessels falls along that line, what specific preemergency action does NDTA recommend to the industry executives within their own circle to take in regard to preparing themselves for an emergency, and for exercising this independent action that you mention when an emergency occurs?

MR. PLOWMAN: NDTA specifically has been working on a set of understandings with various agencies. One agency is the Red Cross, and the understanding there has been activated and is advancing toward activation at the chapter level--that is, city by city within the United States. A similar understanding is planned with the civil defense authorities, which will result, hopefully, in the NDTA chapters becoming, chapter by chapter, study centers and cooperative centers for the development of the readiness factor which I have described. I can only report progress. I think I myself am very optimistic about the progress, but I can only report progress.

QUESTION: Mr. Plowman, you said what is required in mass evacuation under civil defense is only what occurs in every metropolitan area between the hours of five and six o'clock five days per week.

MR. PLOWMAN: Yes, sir.

STUDENT: I don't know how well you know our bus drivers and taxi operators in Washington. Do you really believe that those people would do anything else than head for the hills themselves with the busses and taxicabs?

MR. PLOWMAN: Yes is my answer. I believe that they will do other things, provided they have been educated, that they have had some degree of actual practice, and provided they have a realization that they are, for the period of an emergency, actually frontline troops. I believe that it can be done. I don't think it has been done. There is no doubt that the Washington situation is peculiar unto itself because of the large number of owner drivers and semindependent taxi operators, particularly, who won't even come to Washington when there is a little drizzle--they stay home.

Yes, I believe that it can be done.

QUESTION: Mr. Plowman, would you pursue that just a little bit further? When I go home from work, I go out to a place in Arlington, which may be a shambles after the bomb explosion. That doesn't seem to me to be the place to stop. My family will probably be at that house wondering what is going to happen. The question is, has any one thought of transportation? I assume they have. But would you discuss what pickup of residential people may be in the thinking?

MR. PLOWMAN: I don't know enough about the actual civil-defense exercises to be able to answer that question in detail. I only know--and I think I am correctly quoting one of the civil-defense top people--that Civil Defense itself considers that each test that it has made of a mock or trial evacuation, such as the one at Spokane or the recent one in Baltimore, has taught not only the local population but also the civil-defense people some more of the additional facets of the problem.

I would say, therefore, not in direct response to your question, that as to how you go about training people to use good judgment under the most extremely critical conditions that they will ever face, I don't think it has been solved yet.

QUESTION: Sir, may I go one step further? Does the Transportation Industry feel that the existing transportation systems and facilities, that is, the busses, and so forth, are adequate? Are they talking in terms of taking trucks and throwing people into them? There are a lot more people going to be in the residential areas than are there now. Tell us if your organization has gone into that at all, sir.

MR. PLOWMAN: The Transportation Industry is such a varied and confusing, unintegrated thing within the United States that there

is only one answer, and that is, "No." Now, on the other hand it is correct that the NDTA, under the direction of Colonel Francis Crary, has made many cooperative studies--not individual studies--where those problems have been at least partially thought through for that particular city. But, to stand before you and pretend either that a voluntary organization of 10,000 military and private-enterprise transportation executives, which is NDTA, or that I believe that civil defense authorities, on the other side, with all their studies and efforts, have actually gotten down to the bottom of this problem, I am not going to stand up and say I think so, because I don't.

QUESTION: Mr. Plowman, here on page 12 you make some reference to a new dock system at Escanaba, which you say was abandoned because it was shown that Diesel-hauled trains could be hauled over numerous light railroad lines, and so forth. I have really two questions. I understand there is at least a consideration of some new locks in the Soo. I wonder whether present thinking has assumed that those new locks would be worth a thousand of those cars. Is there any thought given as to the number of cars and the rails necessary to replace the locks of the Sault Sainte Marie with an all-rail haul?

MR. PLOWMAN: The present plans with respect to protection of the Soo locks are undoubtedly a classified subject to which I do not have access. If control of the air has been lost to such an extent that the Soo locks have been destroyed by enemy action, I can't imagine that there will be any ability to (a) keep in existence the ore transfer docks at Duluth, at Two Harbors, at a dozen other places, and (b) I can't imagine any likelihood that railroad yards, in which the hundreds of thousands of railroad cars would then have to be marshaled, could also be considered to remain in existence.

I am trying to say I think the problem is to save the Soo locks.

QUESTION: Mr. Plowman, I have been making a study of the ports and have found they are operating at only 40 percent of capacity, mainly because of the desires of our domestic shipping and coastal and intercoastal shipping. Why is that?

MR. PLOWMAN: The desires of coastal and intercoastal shipping reflect the result of a change in traffic pattern--the development of the west coast as a large-scale, independent industrial community

of its own, where in the past it was a raw material shipper and a product receiver, primarily--together with, I am told, some union problems. But on top of that, and most important of all, is the fact that the labor-handling cost of transfer of materials from one type of transportation to the other has become so large in relation to the other costs of transportation that you no longer can do it.

The best evidence is that the successful ventures that remain in the coastwise trade, as you know, are ventures like sea-train ventures, such as attempting to get into the business of handling loaded freight cars or trucks, thus getting away from the transfer cost.

The point you make that it should be possible somehow to stimulate an increase in the amount of our coastwise shipping is obvious. Yet, how you are going to do it, other than in specialized fleets like the carriage of petroleum, I can't answer.

QUESTION: Mr. Plowman, would you care to elaborate a little more on the stockpiling proposal? For example, I wonder about obsolescence of stockpiled equipment.

MR. PLOWMAN: Obsolescence of stockpiled equipment would require an extremely intelligent Government approach. There's just no question at all, but that the obsolescence problem is very difficult.

I do believe that it would be good protection to the United States to save in Government hands the better coal-burning steam locomotives for a period of time, but I believe that even more important, in a way, would be the development of plans for bringing quickly into being new types of coal-burning steam locomotives. The reason I stress coal is simply that coal is the only substitute that can be found particularly in our populous northeastern part of the country, that would relieve the petroleum situation and relieve it quickly and in very large quantities, so that I stress that phase.

With respect to troop-train cars, my own conviction, which has not endeared me, I must admit, to military officers in charge of passenger movements, is that we have just got to forget about the idea that railroads are going to carry military personnel, come a new conflict, or even civilian personnel, in anything that is higher in class than a type A boxcar, with a couple of windows and a stove pipe. I don't worry too much about the question of obsolescence in that case. But I do agree that the window frames and even the door ought to be stockpiled.

COLONEL NORMAN: That's a good note for us to stop on. It gives us something to think about. Thank you, Mr. Plowman, very much for a very comprehensive presentation of this field.

MR. PLOWMAN: Colonel Norman and General Niblo, may I express thanks to all of you, not only for your interest today but for the team--in which some of you participated and in which all of you were interested--which did such a swell job in putting on a panel presentation at the NDTA meeting in Pittsburgh.

COLONEL NORMAN: Thank you very much.

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