RESTRICTED

FACTS FOR WAR PRODUCTION CONTROL

19 December 1946

L47-59

CONTENTS

	Page
SPEAKER--Dr. George Albert Steiner, War Production Board	1
GENERAL DISCUSSION	18

THE INDUSTRIAL COLLEGE OF THE ARMED FORCES

WASHINGTON, D. C.

RESTRICTED

RESTRICTED

THE INDUSTRIAL COLLEGE OF THE ARMED FORCES

PUBLICATION NUMBER L47-59

RESTRICTE

FACTS FOR WAR PRODUCTION CONTROL

19 December 1946

CAPTAIN WORTHINGTON:

The speaker this morning needs no introduction to this audience. We have studied his book and we have heard him in one of our seminars.

He received his BSC degree from Temple University in 1933, his MA degree from the University of Pennsylvania in 1934, and his Ph. D. from the University of Illinois in 1937. From 1924 until 1937 he was associated with the Economics Department, University of Illinois; from 1937 to 1939 he was Assistant Professor of Finance at Indiana University; from 1939 to 1942 he was editor of the Indiana Business Review. He was employed by the War Production Board, as Chief of the Reports and Analysis Branch of the Comptroller Division, from 1942 until June 1943. From 1943 to 1945 he served as a Lieutenant in the U. S. Navy, as Officer in Charge of CMP, Scheduling and Related Production and Procurement Operations in the Office of the Supervisor of Shipbuilding, New York, N. Y. In February 1945, he returned to the Civilian Production Administration, successor to the War Production Board, where he is now Director of the Industrial Statistics Division.

Mr. Steiner is an extensive writer. He is the author of the following monographs and books:

Economic Problems of War.
Economic Problems of National Defense.
Retail Trade Turnover in Indiana.
Indiana State Disbursements.
The Tax System and Industrial Development.

He is also the author of many published articles, of which the following are typical:

Federal Fiscal Policy in National Defense.
Industrial Mobilization Planning in National Defense.
The 1937 Recession.
Taxes and Business Development.
The Production Requirements Plan of the WPB.

His subject is "Facts for War Production Control."

I take great pleasure in introducing Dr. Steiner.

DR. STEINER:

Our discussion is directed towards World War II experience in a relatively narrow field of management. The subject is more precisely, the most outstanding lessons of the experience of the War Production Board, and its predecessor agencies, in developing and using data from industry for policy and administrative purposes.

The breadth of industrial data collection in relationship to the more dramatic elements of total war must not be underestimated in future mobilization planning. It has vast and penetrating implications in wartime industrial management. Intelligent wartime industrial control is impossible without adequate methods for collecting and using facts. In establishing control policy over industrial production and distribution and in administering these controls, it is necessary for the Government to continuously make choices among competing demands for economic resources at all levels of economic activity. Facts and factual collection methods are managerial tools without which choices among alternative courses of action cannot be made. Once made, these choices become the part of every campaign even though the battle may be fought days, weeks, months or years afterward. Modern war is truly a battle of numbers.

The task of the War Production Board and its predecessor agencies can be stated simply. It was to manage the industrial economy of the United States in such a way that it produced the maximum war and essential-civilian goods with the minimum dispatch.

This was predominantly an administrative job. To an extent unprecedented in our history the national economy was guided by the Government between 1942 and 1945. During the war every new industrial plant was authorized by the Government. Not a pound of steel or copper or aluminum could legally be fabricated and used without government approval. In all industrial production and distribution, the decisions concerning what should be produced, who should produce it, and to whom it could be shipped were directed by the Government. In assuming its responsibilities for industrial mobilization and control it was necessary for the WPB to administer the conversion of the economy from an organization functioning through multiple choices made by millions of businessmen to a machine with but a single choice determined by the national Government. Once converted, it was necessary for the WPB to manage the machine in such a manner that it functioned with the highest possible efficiency and produced in conformance with the singleness of purpose required by war.

The WPB learned that masses of industrial facts and proficient factual collection methods were indispensable to the intelligent and efficient performance of its management functions. Actions taken in

industry were recorded on billions of pieces of paper. It became necessary for the WPB to aggregate information from these documents to provide the means for making informed policy decisions, to provide the instruments for administering the thousands of actions intertwined in a single policy decision, and to develop records of the actions taken on the basis of policy decisions. The methodology by which these needs were met was embodied largely in the industrial reporting instruments created and used by WPB.

Looking back on the beginnings in 1940 and 1941, and even the later developments of 1942 and 1943, two facts stand out in connection with the emergency data collection system. First, many of those responsible for industrial mobilization and continuous control of the economy did not have a clear concept of the vital place which systematized factual reporting occupied in the emergency management function of the Government. Second, methodological discipline required to systematize the collection and use of facts needed for emergency management was not developed and ready for use. The result was the parallel evolution of a recognition of the need for factual accumulation to support management and the development of suitable techniques to get the necessary facts. The process of meshing the two was slow and costly.

Analysis of the WPB's experience in acquiring facts to guide its management operations provides two classes of lessons for those who in the future must deal with the problems of emergency organization and direction of the Nation's economy. The first group relates to the role played by an industrial statistical reporting system in emergency management. The second group relates to the technical methodology and the principles which should be used in its application, in developing and presenting the facts needed for formulating emergency policy and administering that policy.

Before presenting these lessons it is worth while to draw attention to the applicability of World War II reporting experience to emergency problems of the future. The fundamental assumption underlying our analysis is that statistical methodology is a tool of management which can be sharpened for use and applied to any emergency administrative problem. I do not expect that the exact problems encountered in World War II and the sequence in which they appeared will be duplicated in a future emergency. On the contrary, it is more than likely that industrial management problems in any future emergency (whether that emergency be a war or a deep economic depression serious enough to require

temporarily government control over the economic system) will be different, probably telescoped into a shorter time schedule, and appear in a sequence at variance with that of the 1939-1945 period.

Our discussion assumes that future industrial mobilization problems will be different, much different from those in the 1939-1945 period. Were that not so, little more would have to be done than to set forth what was done in World War II, with modifications for recognized mistakes, as a mobilization plan. It is just this sort of stereotyped planning which we must avoid. It is my contention that no matter what the circumstances, wise wartime management is impossible without facts; that it is possible to develop a system for collecting and using facts which is adaptable to government management of industry in all potential emergencies; and that the experience of World War II establishes the outlines and basic character of that system.

The Role of an Industrial Reporting System in Emergency Management.

In the desperate search for means with which to supply the materials of war, we learned that effective decisions could only be made on a basis of knowledge. In the development of early control policies and techniques of administration it was assumed that statements of policy, supplemented by a few administrative reports, would provide the framework upon which industry could and would automatically mobilize for war production. It soon became apparent that the pull of the regular customer always diverted a substantial part of industrial output from war production unless statements of control policy were based upon understandable, complete, foolproof facts and administrative techniques. Mere statements of policy, we learned, would not provide the guns, planes and tanks when manufacturers who supplied the goods of war were at the same time engaged in making automobiles, refrigerators, cosmetics and other items which offered them profitable use of materials, facilities and labor. We also learned the hard way that control over industry, once it converted to war production, could not be achieved by broad policy statements unsupported by concrete reporting to and from the Government. No firm control was possible without a method for collecting and using facts as instruments of both policy and administration.

The experience of the WPB clearly reveals the character of the industrial factual collection system which emergency management requires to meet the fundamental problems of industrial control. Stated simply, it is necessary to have a complete and detailed

knowledge of the Nation's resources and the demands which war will make upon them. This knowledge must be available on a comprehensive scale, reveal the most minute details, be in common terms by means of which the entire range of facts can be related to one another and to aggregates, and cover specific time frequencies. It means developing a national resources-requirements budget. But the factual collection system must accomplish more than that. Not only must it provide the information essential for policy decisions but it must also provide the means through which mandates for specific action are transmitted to industry in specific terms. At every stage of responsibility this flow of authority must provide a basis for precise and definite accountability and reports of administrative action. These are the fundamentals of an adequate industrial reporting system suitable for, and flexible enough to support, emergency management.

Since the underlying problems of industrial mobilization are largely those of translating available men, materials, and machines into the greatest possible quantity of goods required for military operations and war-supporting activities, there must be a complete and penetrating knowledge of all resources. Information on resources requires a reporting system which will provide in integrated detail the actual and potential production of mines, forests, farms, smelters, refineries, factories, power plants, railroads, public utilities, and other productive facilities. The reporting system must provide knowledge of the smallest as well as the largest economic unit. The system should cover facilities for producing various types of materials, the actual level of operations, unfilled orders, potential capacity, labor requirements, material and component requirements, and so on. The entire fabric of industrial resources and their use must be revealed clearly in totality and in detail. The details must tie together in a factual picture, by means of common units of measure and definite time periods.

Against this knowledge of resources must be placed a statement of the demand for them in such terms that the two may be related. The demand for resources must be built upon a detailed, realistic and balanced statement of military, essential-civilian and export program requirements. This statement must be in terms of specific items needed directly by the Armed Forces and civilians; the materials, components and facilities required for their production; and the time periods in which both final products and the intermediate products needed for their production are scheduled. In short, total requirements must be known;

classified into procurement programs and production details. This factual statement must be realistic, accurate and in common units of measure which can be related to resources.

To determine the extent to which certain types of war activities could be supported, the WPB found that it required knowledge of the demands of a specific activity under consideration and information on all of the related supporting and dependent activities. Thus, in appraising the size of an ordnance program for Oerlikon guns, it was necessary to determine not only the quantities of nickel-bearing steel that would be used in the shafts of the guns but also the quantities of nickel-bearing steel that were required for the bearings for the gun, the shells that would be fired from the gun, the axles of the railroad cars that would haul the finished gun and the material used in its production. To appraise this one requirement for nickel-bearing steel all other requirements had to be evaluated, from the nickel-bearing steel used in the finished gun to the nickel-bearing steel required to make replacement bearings for a machine which mixed malted milks at a canteen in a war plant.

This sort of informational requirement grew out of the problems and circumstances of war. When the economic machine was straining at optimum capacity, and when shortages appeared in many areas, wise direction of the machine was possible only when the Government on the basis of facts could choose among several demands focused at one point in the production process. If the supply of nickel-bearing steel was less than the total demand for it how else could an intelligent decision be made to double the quantity of steel entering into Oerlikon gun parts and reduce the amount of steel used as replacement parts for malted milk machines? Effective decisions required a factual review of total supply of and all demands for the steel.

It should not be assumed that once the size of the expanded war program was projected and the economic system was approaching capacity operations that the need for this interrelated information became readily apparent. On the contrary, realization of the need for and the magnitude of the problem of getting such facts was gained only after long and costly experience.

In the early defense period we tried to maintain all peacetime activities and at the same time satisfy the demands of war. Only when we realized how perilous was our existence and how great was

our needs for weapons did we have the courage to stop the production of a few unessential items. Later, in mid-1942, we belatedly recognized the fact that actual war output was too small and that we could not in fact have both guns and butter. Attitudes were rapidly switched by the winter of 1942 and the military services were demanding programs which, if attempted, would not only have precluded butter but would have so strained the economy as to almost stop production of guns, too.

In all of these actions we were driven continuously between the post of desire and the post of reality. The cord that joined the two was at all times knowledge. But the precise knowledge required did not exist when most needed. It was unfortunate that in the beginning we could no more foresee our needs for information than we could foresee our needs for armament. We tried to satisfy everyone in the early defense period by a free apportionment of materials and facilities and by the avoidance of a large-scale reporting burden on industry.

Ultimately we learned that we had to have facts and we did develop the outlines of the sort of industrial reporting system required for emergencies. But this reporting structure was not built. It was assembled. It grew out of the needs of the moment; it was altered to reflect rapidly shifting objectives, organization, policy and personnel; and it was molded from the compromise of powerful opposing influences. The problems encountered in its development were as complex and broad as the industrial production system it was designed to harness, and its changing character was as diverse and complex as the diffused elements upon which it was focused. No single discipline or procedure ever animated all of its supposedly systemic parts. Its techniques were never completely mastered and its potentialities never fully realized. At no time did it fully satisfy the fundamental needs of policy and administration.

We learned also that the needs for data in war are staggering. In response to its data needs, the WPB collected more information on industrial production than any agency or group of agencies in the Nation's history in a comparable period of time. To mobilize our production resources for war, to insure that our resources were used fully and efficiently, to integrate materials and components into the greatest possible volume of finished products, and to direct the distribution of finished products to military and export agencies and the domestic civilian population in the manner most conducive to winning the war, the WPB acquired an almost unbelievable mass of industrial production facts. The statistical information covered all aspects of production from basic metals to the uses of end products. Intimate details were assembled concerning such activities as basic material supplies, metal mill capacities, basic material consumption

by fabricators, the integration of fabricating processes from basic materials through semifabrication and subassemblies to the finished product, the type of products made by all metal fabrication plants in the United States, the basic materials required to produce specified fabricated items, the flow of intermediate products, the purpose for which the end products were used, shipment schedules of producers, and component requirements of consumers.

We learned that the statistical system, if it is to fulfill its function, should produce a complete budget of all vital resources and all demands to be made upon it. The data must be complete and precise from the supplies of basic resources to the procurement programs for final military, export and essential-civilian products. With the data at hand it must be possible to adjust and balance end programs among themselves and in the aggregate and to relate them to resources in such a way that objectives established are feasible. The data must show the time sequences in which various quantities of raw materials are needed at all levels of fabrication from basic material processes to final end products. Throughout, the data must tie horizontally and vertically, must be expressed in uniform terms and must be related to uniform periods of time. Beyond all this, the methodology of collecting these data must be such that accurate results can be acquired in a matter of days. The more serious the emergency the more urgent becomes the demands for this sort of integrated reporting.

The more integrated and comprehensive the reporting structure the wiser will be the basic policy and the more effective will be the administration of that policy. With an integrated reporting system it is possible to determine whether specific policy objectives or slightly modified ones can be achieved. It is possible to translate policy decisions into actions to be taken by large numbers of people at different administrative echelons. It is possible to convey in concrete terms to every person required to act both the specific authority and responsibility which each has and the precise limits imposed on the exercise of authority. An integrated statistical system should provide the methods and procedures by means of which information essential for policy decisions can be obtained, by which mandates for specific actions can be transmitted through administrative levels, and by which precise accountability of the administration of each policy can be achieved.

It must be realized that an integrated industrial reporting system is not the sole basis for efficient mobilization and industrial control by the Government in emergencies. Time and again the WPB found that its organization had to be geared to the methods of the reporting system

if the data upon which the WPB depended were to be used to the greatest advantage. Time and again the WPB had to adjust basic control procedures to fit the realities of sound data-collection methods. This does not mean that statistical methodology dictated either organization or control policy. Rather it means, as the WPB discovered, that since all three had to be related as closely as possible to the fundamental methods and procedures of industrial operations that all three had to be coordinated for the most effective operation of each. Finally, as the WPB also discovered, the best statistical system will fail to reach its potential if there is not a free flow of information among all levels of management and if management at any important level fails to admit the importance of accurate factual knowledge in making decisions and administering them. An emergency statistical reporting system, even though it has the characteristics noted here as being important, will be no better than the degree of coordination of other elements of management and the intelligence with which it is operated and with which its data are used.

Applying the Technical Methodology of a Reporting System

In striving to produce the statistical discipline which it came to recognize as the basis of its operations, the WPB met with every important data-collection problem known or conceived. In the solution of these problems it experimented with almost every imaginable technical collection methodology. The many technical lessons which the war period taught cannot be touched upon here. A better purpose can be served by attempting to set forth a few of the more important principles which experience has taught should be kept in mind when applying the highly technical methodology of industrial factual accumulation in emergencies.

Experience shows that it is both necessary and possible to create a coordinated emergency industrial reporting discipline. An emergency industrial control agency is in a real sense an operating holding company over the productive machine of the Nation. Such an agency must be in a position to collect accurately and quickly at one central point summaries and details of the millions of actions which are taken in the highly complex production machine. The WPB's experience shows that it is possible to draw the factual threads of industrial action together at a central point in such a manner that the data are well coordinated, comprehensive in character yet penetrating in detail, accurate and quickly tabulated for prompt use. If methodology is well planned, carefully applied and used with intelligence it can be made flexible enough to provide data to meet all important problems. The WPB never created such a statistical discipline but its experience leaves no doubt about both the need for it and the ability of the Government and industry to create it.

The development of a coordinated, flexible and useful reporting system is impossible in an emergency without some centralized control of the issuance of questionnaires and the application of technical methodology. In time of crises every pressure on administrators is toward immediate action. The drive for facts is so great that any promising method is attempted. The results of unbridled issuance of questionnaires in an emergency cannot be less than an unjustified burden on industry and chaotic government administration. By centralizing control over questionnaire issuance a focal point is provided for gathering together all sorts of questions relating to questionnaire policy and methodology. An opportunity is provided for such questions to be resolved in the light of the best policy and methodology. If this function is managed with wisdom the questionnaire system and its techniques may develop into and operate as a balanced fact-gathering mechanism. If it is not, the best plans and intentions will not create a coordinated data-collection system.

To approach a coordinated statistical methodology the many tehenical principles composing it and inherent in its satisfactory maintenance and operation must be well-formulated and clearly set forth. A balanced reporting system represents a highly complex structure in which details are of great importance. Benjamin Franklin's parable of the Kingdom that was lost for the want of a horseshoe nail has peculiar applicability to this principle. Not only may injudicious instructions, or poorly phrased questions leave management without facts for crucial decision, but inattention to minute household details relating to such matters as mailing lists, follow-up procedure, editing, coding and machine tabulation may also invalidate an important survey. And, paradoxically, the more complicated in substance and comprehensive in coverage the questionnaire the more important become these details to valid results. Questionnaires of small magnitude may be hand-tailored to fit peculiarities in operations of individual respondents and hand-processed to avoid administrative problems in the Government. Comprehensive questionnaires cannot be so pampered. Slight error or miscalculation in any technical detail involved in its life cycle may become so magnified that the final results may be either suspected or ignored by management. The existence of a set of carefully considered technical standards which may be uniformly applied if the will and machinery exist to do it is a primary requisite to statistical discipline.

One of the most important groups of statistical standards which must be created and applied with the greatest skill is that relating to technical nomenclature and statistical units of measure. Not only are definitions and classifications of products, materials, plants, etc., crucial in the good use of data but in their determination there are present many problems which are administratively complex. Units of measure are, of course, basic in the functioning of a reporting system. Their determination and application also present exceedingly difficult and complicated problems. Statistics are a method of communication. They are, in addition, instruments of policy and administration. They are useless to serve these basic functions unless they are founded on a clear, understandable and administratively usable language of definition, classification and units of measure.

The WPB found that it is not important nor always desirable to embrace the complete universe of a subject matter in order to produce meaningful data. Concentration in industry of metal consumption, component usage, manpower requirements, and other production elements, is such that facts necessary to exercise control can be acquired from much less than the totality of units in a given area. For almost every product and material not more than 15 percent of the total possible plant respondents account for not less than 85 percent of the total economic activity for that product or material. By limiting reporting to these large units, and by exercising control in smaller units by means of general regulations, the objectives of emergency industrial control can be attained without imposing serious record-keeping burdens on the bulk of the small enterprises and serious clerical problems on the Government.

Reporting methodology must be geared to industrial practices if prompt and accurate data are to be acquired. The relationship between the design of centralized control procedures and methods of industrial operation must be carefully considered when developing administrative techniques. Experience teaches that any control procedure which accommodates itself to industrial practices can be instituted with a minimum of operational friction. Every new control system must go through a warm-up period to familiarize industry with the new routines and to permit necessary adjustments to them. To the extent that operational changes are held to a minimum, this initiation period is shortened. In addition, any control system which is based upon industry's existing record-keeping practices is bound to yield better and more complete results. The closer the reporting framework and the controls which it supports approximate industrial practices, the quicker and easier it is to obtain the objectives established for controls.

Better results are obtained if reporting is on a quid pro quo basis. Despite the obvious load which some complicated questionnaires, such as allocation and scheduling forms, imposed on industry, particularly on those plants whose record-keeping systems were not designed to yield readily the required data, reports were received quicker and with more accuracy than most experienced statisticians dreamed possible. On the other hand, many comparatively simple questionnaires designed to acquire general information for broad policy analysis were often met in industry with intense and bitter opposition. Response was slow and replies incomplete. The basic reason for this paradox is simple: the former eventually resulted in a right for the respondent to do something; the latter produced no direct advantages to the respondent. The obvious lesson to be drawn from this experience is that the more statistical data requirements are tied to application-type reporting forms the better the data will be both with respect to accuracy and completeness and the quicker returns will be made by respondents. In addition, industrial criticism and objections to a questionnaire, other things being equal, tend to decrease with the importance of the privileges or rights bestowed through the reporting instrument.

A comparatively long period of time is required to produce accurate and complete data from a new form. On the basis of WPB experience, from three to six months are required from the first submission of a new complicated reporting instrument to the time when both industry and the Government function reasonably smoothly on the basis of it. With advance publicity this period can be reduced, provided the questionnaire is not too complicated nor has in it injudicious procedures or questions difficult or impossible for industry to answer.

It is possible to reduce the number of data requests if a case analysis is made of the internal use of the data derived from the questionnaire and adequate provision is made within the control organization for the free and prompt exchange of information. The basic categories of information required for emergency management are not many. If sound technical standards relating to such matters as units of measure, nomenclature, time periods and other details are carefully applied, and if a well-planned statistical system is used to support intelligent and suitable control policy, there is no reason why a relatively few reports cannot be made to satisfy fully management's requirements for facts. There is nothing in the experience of the WPB to invalidate this conclusion

The adaptation of accounting techniques to statistical methods can be made effectively both to support implementation of policy decisions and to provide the necessary factual data for review of past decisions and new determinations. A statistical accounting technique can exist side by side with a statistical reporting system and can constitute an important part of the entire data-collection framework. Although WPB material accounting was not as accurate as financial accounting, it performed for production control much the same functions as financial accounting. By introducing tolerances permitted by material accounting

needs the modified accounting control was instituted and operated at a far less expenditure of time and energy than financial accounting. Statistical accounting is a practical and necessary part of any emergency data-collection structure used to support control policy.

An adequate reporting system cannot be devised overnight. In early 1940 a tremendous mass of information was available in Washington pertaining to the operation of the industrial system. The data, however, could not be coordinated nor organized to present a comprehensive statement of resources. Data on potential war demands were for all practical purposes nonexistent. The concept of an integrated reporting system was unborn. Developing the concept and nursing it to maturity was a difficult and time-consuming task.

Experience of the WPB shows that it never fully recovered from these early statistical deficiencies. Makeshift schemes and organizations became deep rooted. It was impossible to erase them completely. Satisfactory new control systems were jeopardized because of inept procedures originated when a scramble for factual knowledge resulted in the introduction of any procedure which appeared to produce some results. The erection of a statistical reporting system was, therefore, doubly handicapped.

Our experience after 1938 now demonstrates that we were as ill-prepared to create and use the proper techniques for collecting information as we were to wage modern war and produce quickly the weapons needed for its prosecution. Although we had the largest peacetime statistical organization of any country in the world, we were not prepared to provide the facts for an all-out economic effort. The largest reporting system provided a foundation. It was comparable in this respect to the world's largest steel capacity and the world's largest industrial capacity. We had the resources; we did not have the end products that we needed.

War, we found, required not merely general facts; it demanded that facts be obtained on a broader basis, on a wider variety of subject matter, and in a shorter period of time than had ever before been deemed possible. To do this job we built upon our prewar experience and techniques. Frequently, the needs of the emergency required substantial changes in available methodology. In many cases, emergency developments moved so far beyond original technique as to almost preclude recognition of the foundation upon which they had been built.

For years we had collected biennially a census of Manufacturers which covered every fabricating establishment in this country. Data were collected for each establishment showing its employment, the products which it made, its consumption of electrical energy and the dollar value which it added by manufacture. The census was taken in odd-numbered years and became available to the general public some two years after the end of the period which it covered. In addition to this periodic census, we also had a large variety of current reporting

series in the industrial field. Some of these were developed by the Federal government. To a larger extent they were the product of trade associations and business groups which cooperated in the collection of certain data necessary to their current operations. Over the years the census data had provided a series of "benchmarks" against which the current reports could be measured and projected. The data collected were good statistics. For the purpose for which they were used, they were undoubtedly all that was necessary.

The methodology and technical techniques were also adequate for the purposes for which peacetime industrial data were collected. In peacetime, data were collected to permit government and business administrators to make broad general judgments. Seldom were they used to administer specific actions. Business and government operated on the basis of a multitude of individual choices not directly related to national policy objectives. In wartime the direction of the national economy was founded on a single policy objective, made by government, and, more important, the implementation of that specific central judgment depended on directions issued by the central government. Under such circumstances statistics became the basis of action and the data had to be precisely accurate and up-to-the-minute. As a result we could no longer operate with the comparative leisurely and haphazard methods of peacetime. A methodology had to be found by means of which industrial data could be collected in the most accurate terms and made available to administrators very quickly.

Our wartime experience demonstrated that no matter how urgent the need or how willing the cooperation, an integrated reporting system suitable for emergency management cannot be improvised or built in a short period of time. The development of useful information is a product of knowledge, skill, experience and time.

If we are to profit from this experience and avoid costly errors in a future emergency, we must now determine upon a course of action which will permit us to preserve the accumulated experience of the past and to use it in molding a better system for future periods of crisis. This can be done by providing for such "emergency preparation" in an established governmental statistical agency such as the Division of Statistical Standards, Bureau of the Budget, or by creating some new agency charged with this responsibility. A good case can be made for placing the job in either an old or a new agency. The most important objective, however, is to see that the responsibility is lodged in a specific place.

A Program of Study for the Future

If we are to be prepared in the next crisis, we must now develop not only the concept of the reporting structure needed in an emergency but also we must insure that the major features of the needed system are incorporated into the current reporting structure of the Government. We must, in addition, be sure that the methods which we propose to use are readily adaptable to the existing practices and procedures of the business and industry establishments from which we seek reports.

The effective way to carry out such a program would be to charge a small group in the Federal government with the responsibility for developing the reporting system to be used in a future emergency and to have this group work continuously with industry and government organizations engaged in the collection and processing of reports. By integrating their operation into the work of the Bureau of the Census, the Bureau of Labor Statistics, the Social Security Board, and other basic industrial data-collection agencies of government, various trade associations, foundations and other private groups, they could continuously learn of new developments in the reporting field and also continuously keep before these groups the need for the introduction of the fundamentals which seem vital in the statistical system of an emergency government. An additional obligation which this group would do well to assume would be to work intimately with both the business systems groups, such as International Business Machines, Remington Rand, and McBee, and the operating manufacturing companies that are in the final analysis the organizations having the basic responsibility for maintaining the records from which industrial data must be collected.

By working with all of these groups, the agency should be able to draw off the best methodology that develops in each area and be in a position to weave these threads into a strong and simple pattern for the future data-collecting framework. If such an organization had been in existence and had been actively discharging its responsibility in the years prior to 1939, the savings to the American economy in material and man hours, and the ultimate saving to the American nation in lives on the battlefield, would have been a very real and a very great one. The absence of such plans, with the resultant delay in obtaining the needed information for war created confusion, waste and loss of production. Which of these was the more costly is immaterial. It is important rather to realize that it was not until late 1943 that the WPB had established a sufficiently integrated method of reporting to provide it quickly with the valid information which it needed. The middle of 1943 was almost two years after the Japanese attack on Pearl Harbor and three years after the beginning of an acknowledged defense program. A relatively small expenditure now, and if need be continued for the next 40 or 50 years, would be minute compared with the costs incurred in the three years of confusion attending the recent war effort, or the early period of confusion which we can be sure will be part of any future emergency program in the absence of a continuing pre-emergency effort to prepare an industrial reporting system.

The basic characteristics of an adequate emergency industrial statistical reporting system have been presented. We have set forth a few of the important principles which must be recognized in applying technical statistical methodology. There remains, finally, the directions of research and study which are indicated by WPB experience as being essential for the creation in peacetime of a reporting system to be ready, in the event of an emergency, to support government management. What minimum programs must be begun now to provide this system?

Study should be given to the question of instituting in peacetime a plant report on a continuous basis, covering a short time period and requesting sufficient information to reveal the basic activities of the principal manufacturing areas of the Nation. Such a report, perhaps on the order of WPB-732 as it existed at the end of the war, should be filed quarterly and cover quarterly periods of time. It may be restricted to the 2,000 or 3,000 of the largest plants in the United States of which the activity represents well over 75 percent of the total activity in their respective industrial areas, and of which the facilities constitute the key problems in industrial conversion in emergencies and account for the great bulk of manufactured goods. In addition to these plants a selected group of smaller plants manufacturing important products should be included to provide full coverage for special products. Information from such reporting (such as dollar shipments for specific products, employment and perhaps broad measures of raw material use) is indispensable in any preparation for emergencies. In addition, it constitutes source data, particularly when maintained on a continuous basis, which should prove exceedingly important in the event of an emergency. Finally, and perhaps of far greater importance, it would provide a testing ground for data-collecting methodology for both industry and government.

Such reporting can have profound implications in peacetime as well as in time of emergency. When related and tied to such data collections as a biennial census of manufacturers, both industry and government can acquire information of the greatest utility. These data can be developed in forecasting reports, such as CPA-4350, and provide a solid basis for trend projections which are indispensable in calculating risks in a dynamic society such as ours.

Experience of the WPB clearly points the way for the introduction of such reporting. Not only has this experience made such a program imperative for preparing for future emergencies but in hundreds of technical details it has shown how such a program can be carried out with minimum burdens on both industry and government. In addition, it has demonstrated the methodology by which such an operation can be undertaken in a period of time, between the period covered on the survey and the presentation of final tabulations, unprecedented in statistical reporting for comparable data. This experience not only must be preserved; it also must be used and further perfected.

Closely related is the further and continuous research needed to explore fully the extent to which a plant report may be used as a major structural device in a suitable emergency reporting system. The WPB perfected plant reports far beyond previous peacetime experience. That experience revealed vast potentialities in the use of such reports, not achieved by the WPB, as well as difficult problems, not always fully faced by the WPB, which must be solved in reaching those potentialities. The following avenues of exploration come to mind as those which may be exceedingly profitable: (1) the role of plant reporting in WPB experience; (2) the precise information which industry found it could report on a plant basis; (3) the extent to which data derived on hundreds of

individual product reports duplicated those on existing plant reports and those which might have been obtained on a well-planned plant report; (4) the nature and importance of plant report tabulating problems; (5) the extent to which American wartime industry was divided into single and multiple-product plants and the importance of the structural organization on data collection and use; (6) comparison of the manner in which plant and product reports fitted into industry record-keeping practices; (7) analysis of the lessons learned about writing intelligent instructions on comprehensive plant reports; (8) the relationship between plant reports and WPB control policies, procedures and objectives; (9) the relationship between plant reports and WPB factual needs; and (10) the extent to which a few well devised plant reports might provide the great bulk of information required by government from industry about its production and distribution activities in both peacetime and periods of emergency. Careful research of such questions as these can have important results for everyone collecting and using industrial data .

Parenthetically, it may be remarked that the above suggestion does not prejudge the question of horizontal industrial control methodology (such as CMP) versus vertical industrial control techniques (such as PRP). Rather it recognizes the fact that the basic industrial segments are products and plants. It proposes to capitalize on this natural fact to inject thereby into peacetime and emergency statistics much flexibility, coordination and completeness with minimum effort on the part of industry and government.

Past experience shows the precise types of data needed to support emergency industrial control management. This fund of knowledge must not be lost. Both those who are preparing for emergencies and those who are managing American industry in peacetime should be acquainted with its details. It is difficult to see how the former could be realistic without it. The latter, in knowing emergency data needs, would be placed in a position to establish peacetime records which not only might satisfy peacetime needs of industry but at the same time provide the basic records needed in emergencies. The two often go together. There is no presumption of compulsion, or contemplation of a business gratuity to government, in this suggestion. It is assumed that industry with profit to itself may incorporate into its peacetime records provisions for keeping some of the kinds of information which government must get from industry in emergencies, or in preparations for them. The practicability of this approach for industry is demonstrated by the many WPB reporting measures adopted profitably by industry in its peacetime operations.

The above suggestion leads into the next. So important is the meshing of data requests with industrial record-keeping systems that government in peacetime should continuously survey and study the record-keeping practices of industry. Such a study would put government in a position to gear its peacetime and potential emergency data requests to industry practices. The results to industry should be lessened reporting burdens both in peacetime and in emergencies. The advantage to government should be more comprehensive and accurate data, supplied by industry with more speed and used by government with fewer administrative problems. To

carry out such a program it is not necessary to cover all industry. It is probable that voluntary reporting from a few hundred well-chosen plants will supply the information required.

The most serious technical problems facing the WPB in developing its reporting structure were those relating to nomenclature, product and material classifications, and units of measure. From a study of such surveys as those noted above and the WPB's experience itself, it should be possible to develop a satisfactory dictionary of standard definitions. Such a dictionary should cover not only general definitions, such as "inventory," "capacity," "facility," and "production schedule," but all materials and products likely to be strategic in an emergency. The Bureau of the Budget has recently accomplished much in connection with general product classifications. A comparable set of material classifications ought also to be completed.

The WPB left a wealth of information relating to the concentration in industry of product production and material consumption. In its own operations these data were less used than they should have been to reduce reporting from small producers and consumers. Elimination of the need for much reporting from smaller producers and consumers could have saved industry much time and effort and could have facilitated administration by government. Further study should be made of the concentration of industrial production and consumption and its relationship to reporting and control methods of emergencies.

In emergencies, it seems that administrators sooner or later come to the conclusion that in order to effect rigid control it is necessary to relate each unit of a raw material to a final end product. Such a relationship can be developed statistically only if a system is introduced in industry to pass the data through the entire contractual chain. In both World War I and World War II abortive attempts were made to do this. Only one control system succeeded in accomplishing this objective and it achieved it at the expense of other essentials. Clearly, an attempt should be made to explore the entire problem and to determine the best statistical and procedural methodology for channeling the flow of end use information throughout industry, from the procurement agencies to the raw material producers.

Elemental in any industrial factual collection system is the existence of a mailing list of at least the 5,000 or 10,000 largest manufacturing plants in the United States. For the fullest use, this listing should show the products which each plant manufactures and its corporate affiliation, and each plant should be uniformly classified for ready use. Such a listing, accurate and current in all particulars, did not exist in any previous emergency. The WPB found its resources severely strained because of its absence and to get it the Nation paid an unjustifiably high price. With the cessation of hostilities and the lessening of pressures of war for precision, the experience of the past has been subordinated to other exigencies and no such listing exists now.

So fundamental is such a statement, both for peacetime and emergency administration, that it is inconceivable such a void will not be filled soon.

The character and methodology of a suitable emergency industrial statistical reporting system must be studied as an integrated whole. A well-balanced reporting system results only from wise use and application of individual techniques. So many fundamental methodological elements are important in varying parts of a reporting structure that application of one element without reference to the others is certain to create difficulties.

The character and methodology of a reporting system must be studied in its relationships to other aspects of emergency management. The reporting system is part of a general functioning of various important elements in the entire area of management. It cannot be divorced from such elements as basic control policies and procedures, the functioning of organizational units, the focal points of management responsibility and authority, and the realities of channels of action. The reporting system does not dominate those factors. It is part of them. They also must be considered a part of a well-balanced management program.

The greatest hopes of mankind today are for peace and prosperity. Certainly no more worthy goals can be set. And certainly all energies should be devoted to their attainment. Preparedness for emergencies is really a part of this goal for what better insurance against the appearance of a crisis can there be than that which, as a first line of defense, intelligently attempts to forestall a crisis? The second aspect of preparedness is that which provides for the mobilization of resources when an emergency arises. In both preparedness measures industrial statistical factual accumulation holds a vital place. In both, it provides for the acquisition of facts which are indispensable to intelligent decisions. In both, the facts can be more complete, accurate and current if the best of WPB experience is preserved and continuous statistical research perfects the methodology found by that experience to be crucial in the creation of a balanced emergency industrial statistical collection system.

Paula, in The Second Mrs. Tanqueray, closed with this curtain line: "The future is only the past again entered through another gate." The importance to this Nation of being prepared with the experience of the past intelligently adapted to fit the arch of any one of many different possible gates cannot be exaggerated.

CAPTAIN WORTHINGTON: We are now ready for questions.

A STUDENT OFFICER: Dr. Steiner, to what extent were I. B. M. machines used by the WPB, and if they were used to any extent how successful were they?

DR. STEINER: I will answer that in this way: The I. B. M. machine was a key link in the prosecution of this war. It was the machine that permitted thousands of tabulations of data which were absolutely essential to the operations of the WPB.

GENERAL McKINLEY: In any plan for economic mobilization it seems to me an industrial survey or census of manufacturers is essential, and the Bureau of the Census was preparing to conduct such a survey in this fiscal year but was prevented from lack of funds and Congress. I wonder if your theory of cut-off points could be used by the Army and Navy or the Army and Navy Munitions Board to obtain a substantially complete survey or census that would serve for this economic mobilization plan.

DR. STEINER: Yes, I think it could be done by a very selected list of no more than 1,500 of the largest plants in the U. S., plants which are responsible for the bulk of all activity in industry. It seems to me that continuous survey of these plants is an essential to mobilization planning and preparations for emergencies. The cost of such a survey in time and money is very small. It could be done on a quarterly basis with a half dozen people. We proved the practicability and economy of such a survey in the Civilian Production Administration, in my division.

A STUDENT OFFICER: Do you think it is feasible to keep a current record of information from industry by attaching a questionnaire right on the income tax return and in that way finding out the new industries that have sprung up or have been converted? If you do that with an I. B. M. machine, keep a running record in peacetime of certain key information, at least that would give you a good start toward mobilization.

DR. STEINER: I do not know, but I think that would be illegal. I am not sure, but I do not think you could attach anything like that to a Bureau of Internal Revenue Tax form.

CAPTAIN WORTHINGTON: We are very much indebted to you, Dr. Steiner, for your splendid talk.

(20 June 1947--450)S.