

RESTRICTED

1081

SURVEYS OF INDUSTRIAL FACILITIES

8 March 1949

CONTENTS

	<u>Page</u>
INTRODUCTION--Colonel C. W. Bunch, USAF, Assistant, Education Division, ICAF.....	1
SPEAKER--Mr. John W. Pocock, Management Consultant (substituting for Mr. John L. Burns).....	1
GENERAL DISCUSSION.....	13

Publication No. L49-98

THE INDUSTRIAL COLLEGE OF THE ARMED FORCES

Washington, D. C.

RESTRICTED

RESTRICTED

13800

SURVEYS OF INDUSTRIAL FACILITIES

8 March 1949

COLONEL BUNCH: Gentlemen, when we speak of facilities we are talking about the physical plant--the bricks, mortar, plant equipment, and machine tools. Facilities, though, are of no use to us in production unless we have associated with these facilities other equally important elements of our economy.

In any discussion of the utilization of facilities for war production, we immediately run up against the problem of balancing requirements and production potential. The problem of arriving at answers to questions on production potential has a great many approaches. This morning we will hear industry's approach to the problem of plant survey and productive capacity.

Mr. Burns, who was supposed to speak to you this morning, cannot be here. In his place we have Mr. Pocock, another member of the same firm. Mr. Pocock has had wide experience in the field of industrial engineering. He has been connected with some of our most important industries. For the past few years he has been associated with the firm of Booz, Allen and Hamilton, management consultants. He is now a partner in that firm.

More recently, he has been working directly in the field of industrial surveys and, therefore, is eminently qualified to speak to us today on the subject of "Surveys of Industrial Facilities."

I take great pleasure in introducing to the College, Mr. John W. Pocock.

MR. POCOCK: Members of the Industrial College of the Armed Forces, it is a pleasure to be with you this morning.

Bitter experiences of the last three decades have made it clear that conflict between nations now, and in the future, must be a struggle between total economies. In such struggles the factors of industrial and logistics planning have assumed ever greater importance. In our times, excellencies in strategy and brilliance in field leadership can be completely canceled by critical deficiencies in the supporting industrial machine. I need not discuss this point with you gentlemen. Recognition of the fact has led to the establishment and conduct of this Industrial College. It is to be devoutly hoped that the full development of the fundamentals studied here will prevent in any future emergencies the heartbreak and disaster of "too little, too late."

RESTRICTED

RESTRICTED

Thus, industry now steps forward and becomes a full-fledged partner of the Armed Forces. Since, as its share of the load, industry must execute the production plans as developed, there is a vital need for interdependence of planning action that calls for coordination of objectives between industry and the Armed Services. You gentlemen are seeking here the means to this full and intelligent coordination.

It is obvious, of course, that such coordination is mandatory during an emergency period--at least if the emergency effort is to be successful. But beyond this--and more important--the intelligent conduct of mobilization planning during peacetime may go far to prevent the very emergency conditions anticipated. In any event, continuity of coordination between the Armed Forces and industry is essential.

In its broadest sense this coordination reduces to two essential problems: (1) The determination of the requirements of the Armed Forces in terms of combat materiel and supplies, as a long-term schedule, giving full consideration to the possible timing of emergency conditions; and (2) formation of industrial planning in line with the forecast of requirements to insure that productive capacity will be adequate to meet these needs, as well as essential civilian needs.

These are not two distinct and disassociated areas, for obviously the requirements visualized cannot be such as to be impossible of attainment. Thus the findings in each area must serve to modify the ultimate decisions and the forms of the final planning in the other.

Indeed, a major study just concluded by the firm with which I am connected aims at just this point of interdependence. Our problem has been to evaluate the impact of production of certain weapons systems upon the material, manpower, and facilities resources of this Nation. This evaluation has been made so that an intelligent decision can be made as to whether or not the utilization of this weapon system as envisioned is possible in view of the probable drain upon the Nation's wartime economy. The limitations imposed upon the employment of a weapon system by reasons of available production capacity are just as real as those limitations imposed upon the employment by the functional performance of the weapon itself.

For purposes of today's discussion, however, we assume that the order of magnitude of requirements for materiel will have been adequately defined and determined at least in a preliminary fashion. This is a large assumption, it is true, considering the manner in which combat technology is currently being altered by rapid developments in the fields of supersonic aircraft and guided missiles, of target-seeking torpedoes, of recoilless guns, and so on down a long list of such priority projects.

Therefore, if we assume that the requirements of the Armed Services have been determined at least on the bases of desired volumes and timing of need, we are then left with the second area of the problem--that

of so shaping industrial mobilization planning as to insure that potential productive capacities will be adequate to meet these requirements.

The first step in this industrial planning is to measure the Nation's ability to provide and to meet emergency schedules. Determination of capacities must be made in several distinct classifications of production, which may be stated in the following order of ascending difficulty of capacity determination: First, civilian product required to maintain a minimum level of civilian economy (food, clothes, fuel, etc.); secondly, materiel of a civilian type required by or for support of the Armed Forces (food, articles of clothing, fuel, housing, transportation, etc.); thirdly, munitions and combat materiel of a known and fully developed type (small arms and ammunition, etc.); and, fourthly, munitions and materiel now in the research or development stage, but for which manufacturing experience does not exist (guided missiles, rocket projectiles, and so forth).

Determination of potential capacities on the first three classifications is aided by a foundation in past and current production experiences. Potential capacities for the fourth classification of production can, however, be only broadly determined, on the bases of product analyses, engineering projections, and comparisons to similar current production. And the need for capacity data in this last classification is the greatest, since it probes the unknown. In all classifications the facilities survey is a tool for determining these capacity data.

Use of the facilities survey by the Armed Forces gives rise to a series of conditions and limitations that need to be acknowledged and understood if the final result is to be effective.

First, the intelligent participation of industry is required. The Military Establishment is primarily concerned with planning in a wartime economy. Industry is, in a peacetime economy, primarily concerned with profitable operations, principally aimed at civilian usages. It is difficult to fully coordinate these two viewpoints.

Because mobilization planning is carried on in a peacetime economy, the burden of achieving coordination rests upon the Military Establishment and the Armed Forces. They cannot, in a democracy, use the powers of priorities, allocations, and directives. They must sell to industry the necessity of working with the military toward the over-all, long-term, best interests of the Nation.

This offers a rich and unique opportunity to you gentlemen. You, in effect, sit around the conference table with other executives, striving to transmit to them your viewpoints, and at the same time absorbing from industry its viewpoints and a true picture and realization of operating conditions.

It is not sufficient that the Military Establishment merely conduct certain facilities surveys, or receive completed questionnaires from

RESTRICTED

1000

a multitude of businesses. Industry knows more about its own affairs than can be determined by those who are not production specialists, even though use is made of careful and extensive surveys, and data are tabulated by the carload.

The real objective is to familiarize industry with the problems and desires of the Armed Forces, while at the same time the latter become familiar with the problems and viewpoints of industry--and thus multiply the efforts of your own mobilization planners through the intelligent cooperation of the vast industrial organization of our Nation.

If industry is properly sold on the over-all necessity; if it is inspired with confidence in the soundness of the broad planning; if it is given leadership in its long-term thinking; and if it meets a cooperative, intelligent spirit, it can and will contribute largely in this whole matter of mobilization planning.

This applies particularly in the critical areas of determining potential productive capacities, especially for materiel that has no place in a civilian economy or a counterpart in current civilian production.

Then there is a second point: Your capacity determinations should be broad and flexible rather than specific, precise, and rigid.

A great portion of the total activity of mobilization planning is carried on in peacetimes. Accordingly, the analysis of facilities and of capacity is that of a potentiality rather than an actuality. This is true even when a specific plant or company is considered and evaluated for wartime capacity on practically its currently identical product. Change of conditions or even mere passing of time will serve to invalidate any specific and precise capacity calculations.

Moreover, the assembly of precise industry capacity data on all industry and all plants can be accomplished only at prohibitive cost, and the results will be too bulky for flexibility and quick revision. It is therefore desirable to summarize capacity data by broad industry areas and to concentrate in detail only on the critical elements of a wartime program.

Now, this need for breadth and flexibility is often a difficult conception to grasp. The very terms "capacity data" and "facilities survey" imply engineering study. And engineering implies columns of figures and reams of tabulations--and figures, of themselves, are certainly rigid and precise.

It is this very train of thought that plunges us headlong into vast accumulations of figures--with no time available for analysis--when we should be carefully selecting significant controlling data, maintaining it on a current basis, and developing fundamental planning on these foundation facts.

RESTRICTED

In such fundamental planning (and we might call it order-of-magnitude planning) factors which modify peacetime capacities during a war effort can be readily introduced into the equation. These include: First, higher utilization of plant and equipment under war pressures; secondly, changes in experience and efficiencies of wartime labor force; thirdly, changes in methods and tooling because of volume production requirements; fourthly, simplified product design and standardization forced by wartime economy requirements; and, fifthly, lessened availability of materials and services which may curtail operations.

The probable margin of error within which estimates of the influence of these factors fall emphasizes the fact that any plan for capacity determination needs to be broad and flexible, with allowance for these and other modifying influences.

Another reason for flexibility of viewpoint and handling of facilities and capacity data is the fact that mobilization planning itself cannot be precise and static, but must constantly be specifying new requirements, as progress is made in weapon technology and strategic concepts. For example, the wide use of guided bombs could result in a radical change in volume of bomb production as well as introducing new and different production requirements in the sheet-metal and electronic manufacturing areas.

Thus we see that the determination of potential capacity is not an end in itself. It cannot be assumed that once a facility or group of facilities has been surveyed, that the matter is ended. Rather, this marks only the beginning of a continuing program marked by a free interchange of information and ideas between industry and the military.

I would like to quote from Intelligence interrogations of a man who should know this problem--since he helped lose a war to us--Dr. Albert Speer, Nazi Minister of Armaments and War Production. In answer to a question, "What fundamental errors do you blame for your low level of production (during the early war years)?" Dr. Speer says:

"The Reichswehr dealt with armament problems theoretically. Industry generally had no great inclination to participate in this preparatory work. After 1933, the Wehrmacht was therefore forced to build up (huge) administrative organizations. * * * These organizations, consisting of officers and civil service officials, conducted purely theoretical deliberations on rearmament, and became so large that they managed only to keep each other busy. They committed what might be called mental incest, and when Germany's rearmament got actively under way, all the mistakes which later led to the surprisingly low level of armaments production were already embryonically present."

And he underlined this statement:

RESTRICTED

1950

"We were at a great disadvantage because our rearmament had been planned too long on a theoretic basis."

Thus, extended and detail planning cannot become so involved in details, hypnotized by data already secured, and so deadened to the need for constant progress and flexibility, that it fails to keep step with changing conditions, whether in industry or in the strategy and technology of the Armed Forces.

All of these conditions point to the necessity for simplification of the planning effort wherever possible. Insofar as this concerns the use of the facilities survey, we see two specific uses for such surveys in detail--and we do not pretend to be the sole proponents of this argument: First, specific surveys of major facilities that will be critical in the war effort; and, secondly, pilot surveys needed in establishing yardsticks for an industry or an industrial group. Even these restrictions as to the use leave us with a sizable body of survey work to accomplish, especially--and I emphasize this again--if it is to be kept up to date.

Now what is a production facility? Well, a production facility, as Colonel Bunch has said, is more than just plant and equipment. While there is a tendency to evaluate the potential production capacity of an enterprise in terms of usable floor space, available equipment, and possible man-hours, use of these standard yardsticks alone will rarely provide a complete evaluation of production volume. Plant and equipment are energized by other factors. Books have been written about the four "M's" that are required to implement plant and equipment--namely, Management, Methods, Materials, and Manpower--and these writings contain valuable truths, for the physical facility is only fully energized by these less tangible, less easily evaluated factors.

To evaluate the potential production capacity of a given facility, there is first the required evaluation in the physical plant sense, by the yardsticks previously mentioned, and others by analyses of past and current records, by a composite of machine ratings, or any other feasible and desirable method, or as a composite of all methods. Then this basic evaluation needs to be scrutinized and modified as the result of evaluation of the less tangible factors. All of these elements are as much a part of the facility as the bricks and mortar of the building.

Management must be evaluated in terms of ability to get maximum possible productivity out of a facility.

Manpower requirements, sources, and capabilities must be reviewed as possible limiting factors.

Material and power sources must be evaluated for effectiveness of supply and transportation.

Methods must be checked and evaluated as to layout, suitability, characteristics and availability of equipment, and effectiveness of processing methods.

The meaning of these conceptions may be amplified in the following terms:

Management is the least tangible of these elements. But let us ask ourselves: Are the administrative positions capably staffed? Is this directive manpower experienced, trained in its present duties, having qualities of leadership?

Usually, good management is revealed by clear, well-kept and well-laid-out working space; by adequate and well-placed stock rooms; by effective production control systems; by evidence of adequate machinery and production tooling; and in low costs and good quality of final products.

Manpower is certainly a part of the facility and analyses requiring a different approach, for some of the required data is statistical while some is derived from a knowledge of current operating conditions.

Is the facility located adjacent to population areas adequate to supply this and all other nearby enterprises with the required labor force? Is this labor force, in general, skilled and experienced in activities similar to those needed by this particular facility? Is there likely to be intensive competition for workers of particular skills? Is the processing such that, in event of an emergency, women can readily be secured, trained, and inducted into the labor force? Are there civilian peculiarities, racial, religious, or otherwise, that may lead to current or future labor disturbances? Would emergency operation of all facilities in the area lead to notable scarcities of labor?

Analysis of the manpower factor is not an easy matter, but it cannot be disregarded as one element of a facilities survey.

Material sources must be part of the facility system being evaluated. And I refer not to the volume of material, or the lack of it, which controls the production actually realized. We must assume that material is made available. Rather, it is the geographical availability of material. Is the plant near to and readily serviced by its major material sources? Or are long hauls necessary with the attendant tie-up of badly needed transport? And the same applies to power sources, and so forth.

Methods are the heart of a successful facility. Do they represent the most advanced industry practices, and are they implemented by modern and adequate machinery and equipment? Or is the processing such that greater capacity could be secured through the development and usage of specially designed machine tools?

RESTRICTED

On the other hand, is the processing so specialized that the machinery is inflexible and therefore not adapted to changes in product that might be necessitated by emergency conditions? Are there inefficiencies in the usage of manpower that could be eliminated through different layouts--introduction of conveyors, greater usage of powerized units, or revision of process sheets?

This whole subject of "methods" has a large bearing upon the primary question of how much final product can be secured from the application of available floor areas and labor force. Current actual capacity may be far less than potential capacity, provided methods are realigned in conformance to best industry practice.

The factors of methods, machinery, equipment, and building type and construction all interlock to a considerable degree, and need to be analyzed especially from the viewpoint of potential requirements for emergency usage. The emergency requirements may be far different from present product actualities, and the questions of flexibility and adaptation may be paramount. Either the facility may need drastic revision for adequate emergency usage, or there may need to be revision in the potential allocation of requirements to the facility. It may be easier to adapt the facility to a different usage than to bring it to a point of desired efficiency in the proposed allocation.

This discussion of the elements which make up an operating facility is necessarily condensed and indicative. It points out certain essential areas of analysis. There are other areas to be considered that will vary in different survey situations. There are many other specific questions to be answered.

But too much detail upon the analysis of a specific facility is of less importance than consideration of the principles that govern the making of facilities surveys for the purpose of mobilization planning. We have touched briefly upon them at this time, but they will need further amplification and analysis and are thus fruitful material for subsequent seminar discussions.

Now the approach to capacity studies must vary with the situation. Admitting that broadness and flexibility of method and viewpoint are essential in facilities surveys, there nevertheless will be need for considerable detailed data in any survey and for a definite establishment of principles of analysis.

Of course the primary factor is the assignment of a yardstick for measuring potential capacity, among different plants and industries. I hesitate on the point of whether a single yardstick will fit all industry. In the case of an individual plant, potentially assigned to make the same, or closely similar, product, it may be possible to take units of final product as a measurement. But this is a rare condition and is seldom applicable when more than one plant is considered. Moreover, few plants make a single product, in a normal civilian economy.

Therefore, broader bases are generally used. One often used is that of man-hours available, or which can be absorbed by the facility. Another may be that of the prime cost of the product, taken as of a certain year, though this in the end is very little different from the index given by productive man-hours and has the disadvantage of fluctuating with price trends. Another measurement may be the tonnage of final product in a given period of time, though this is more closely applicable to process industries rather than fabricating industries.

Whatever the yardstick may be, the idea is to secure an index to the measurement of the end product of the facility. It will be found that the problem of measuring potential capacity, and the selection of applicable yardsticks, varies according to the type of facility and its planned emergency usage. The following types of facilities may be noted: First, going facilities of which final products will not be changed by the emergency condition. This comprises those producing food, clothing, truck, and other civilian-type items; secondly, going facilities of which products will not change substantially, but the products will mix; thirdly, facilities to be converted to a related but different product, on which some experience is available; and, fourthly, facilities to be converted to an as yet undeveloped product, on which precise experience is completely lacking. And that, gentlemen, is going into the "wild blue."

As will be seen, the problem of measurement becomes increasingly difficult in the foregoing sequence of classifications.

Data that may be secured for measurement purposes ranges from the actualities of former experience up to the broadest sort of engineering projections. It may be secured from production figures available within a given business, from usage of industry figures, or as the result of some rather complicated analyses of design and machine production rates.

At the moment there is a tendency to place considerable reliance upon the broad or specific production data developed during the peak 1943-1945 war period. Supposedly, this represents individual or composite capacities under emergency conditions.

Now actually these data are rapidly becoming obsolete in many areas due to the withdrawal and conversion of war facilities, to the changes in combat technology, to further developments of industrial technology, to changing size and composition of the labor force, and to changed basic raw material situations. Reliance upon such World War II data will become increasingly dangerous.

At about this point I have to get specific. The only way I know to really get specific is to cite a few examples. Facilities surveys are made in many different situations. These examples are nameless but are based on true situations or accomplished projects.

RESTRICTED

First, a facilities survey of an aircraft engine facility. The engine is a new design--jet. The management is experienced in design and production. It is the facilities' own engine. Labor is readily available. Most of it is experienced.

The objectives of the survey are to determine: First, how many engines can be turned out today? Secondly, how much additional equipment is required to reach a given schedule? Thirdly, how many engines can be turned out if the facility were completely utilized and what additional equipment would be required?

This is a routine affair. It is time-consuming and requires sound production engineering knowledge; but it is straightforward. First you locate your bottlenecks, after assuring yourself that no process irregularities exist, and compute the production rates. That is today's production.

Second, you bring, on paper, capacity of all operations up to the given schedule by machine-loading computations. The additional equipment needed can be readily listed. In this case I mentioned, the additional equipment was actually several hundred thousand dollars below what the first estimate had been, which was made without the benefit of a detailed facilities study.

Then last you balance your machine or operation loads and fill the plant with equipment. You calculate the peak capacity possible and the equipment needed to get there. In this particular case, the ultimate, as I remember, was about four times what the mobilization schedule called for. The additional equipment necessary was, I believe, about twice as much. The extra production was achieved by the integration of balanced operation and the cross-use of equipment.

Well, that is easy. The main problems are getting competent engineers to do the job and then keeping the management cooperative while you probe. The next example of a situation goes all the way to the other end of the scale: A nationwide preliminary survey to determine productive capacities available to produce a weapon not yet successfully developed, and on which operational expenditures are as yet exploratory estimates. Obviously, only an order-of-magnitude study could be attempted and this must be based on a great many assumptions. But it can be done.

First, we set a range of the requirements--minimum to maximum--so that some measure of the size of the program was available. These were based on operational estimates.

Second, the study engineers sat down with the research people and projected a "most likely" design for the weapon, assuming the currently promising development thinking would prove successful.

Third, these "most likely" designs were reduced to requirements for material, men, plants, and facilities, required to support the projected program.

Fourth, these requirements were matched against what was available-- a rather broad industry-wide comparison in this case.

And, fifth, the program was revised in the light of findings and a tentative allocation of portions of the program to various industrial groups was begun.

This was a long reach into the future and took a lot of "informed imagination," but the project was completed and a valuable appraisal of the capacities of a facilities group was obtained.

Now as a last situation--I think you will run into a lot of these; often we dodge them--just let me draw you a picture of a real planning problem, one in which your facilities survey would surely need special adaptation.

I was talking a few weeks ago with the mobilization officer of a large eastern company--a nonmetal working company. He told me of the mobilization plans being worked out with his company and showed sincere enthusiasm that "this time the planning was different." Mobilization planning was largely completed, he understood, and even phantom orders were in hand for the company's products.

But completely missed was an evaluation of the company's potential as demonstrated in World War II when, in a plant of approximately 5,000 workers, 1,500 were retained on civilian-type and closely related products, but 3,000 worked at airframe manufacture, with magnificent success, and perhaps another 1,500 were engaged in the manufacture of shells 20 mm to 105 mm, incendiary bombs, and so forth. These figures may not be exact, but they represent the magnitude of the effort.

This is certainly an example where breadth and flexibility in mobilization planning and facilities studies are necessary. And we haven't licked this type of a situation yet in our planning procedures.

Now who does the work of making capacity and facilities surveys? There cannot be much question that the responsibility for seeing that surveys of facilities used for production of munitions rests upon the Military Establishment. Accordingly, the Military Establishment will also have a major part in developing the methods and coordinating the results of such surveys. But who is to accomplish the vast and continuing volume of detailed work involved in the making of surveys?

Perhaps government agencies within and without the Military Establishment should attempt this. But the work load will have severe peaks and valleys, wide varieties of technical know-how will be required, and there is always the danger that the recurrent pressures of inadequate budget appropriations might slow or stop the undertaking.

Perhaps the whole work could be assigned to private industry, but problems of controlling the consistency of data would be great. There would also be a constant necessity for keeping it moving, current, and applicable to changing strategic, tactical, and technological conditions.

It might be possible to use professional consultants, as a source of experienced manpower and consistency of methods, but that is not the over-all answer nor would it provide for full coordination between the requirements of the Armed Forces and the capacities of industry. Such usage should be expedient to cover gaps in manpower or technique and not as a continuous crutch to the whole undertaking.

These three sources of effort are all applicable in varying degrees and usages, and the task is great enough to warrant a careful analysis of the capabilities involved and the areas which may be covered thereby.

One suggested approach to the problem may be expressed in this manner:

First, the Military Establishment and its agencies should administer the whole program and provide adequate manpower for normal requirements of pilot surveys, analysis and coordination of findings, development of changing requirements, and coordination of all activities.

Second, consultants may be used on specific projects of a highly technical nature and to provide experienced manpower during peak survey or analytical loads.

And, third, industry should prepare current data as requested and should have a major responsibility for keeping the survey findings up to date after the original pattern has been set.

This is merely a broad approach to the organization necessary for the purposes of the whole undertaking. The essential requirement is that it be well organized, shaped toward the meeting of definite objectives, and not allowed to lapse into a condition of static and obsolete files of once-valuable material.

In a democracy, which does not initiate international conflict but waits until attacked, mobilization planning works at a disadvantage. Past experiences show that time for preparation has been essential before counter-offensive action could be taken. Now the changes in world conditions and in the technology of conflict indicate that no lengthy preparatory period may be possible, in the event of another emergency.

Mobilization planning at present must be shaped differently from that in the past. The requirement is for an extremely rapid conversion from planning to execution.

Whatever plan is developed, it must be practical and capable of rapid activation. It can gain in direction and control if emphasis is placed upon the details of mobilization planning in certain selected and critical areas, which will then influence the broad activity of the Nation. In these areas the facilities survey will be a primary tool of measurement.

In laying out the peacetime program of capacity determination and facilities survey, two objectives should be paramount: First, the development of a cadre of men who will become experienced in the coordinating and administrative requirements; and, secondly, the education of industry as to the vital necessities of the program and the responsibilities it must assume in an emergency period.

The tremendous scope of the undertaking of planning for industry in a wartime period is such as to continually emphasize the responsibilities of the Military Establishment outside of the strategic and tactical areas. War may not be inevitable, but it remains a threat, and there is little reason to suppose that it will ever become any less than a conflict of total economies. Industry looks to you gentlemen--whose professional responsibility it is to prepare the Nation to meet ultimate eventualities--for leadership and guidance in its preparedness planning.

I thank you.

QUESTION: I would like to ask whether or not you have a standard time which it will take to survey, say, a factory employing around 1,000 people? Do you have any standard at all?

MR. POCOCK: That's a fine question. I would like to answer it in two ways, if I can.

First, you have a standard of personal experience. When you are walking through a plant, you look at two or three things. You look at the number of square feet in the plant. You look at the equipment and you get some idea of the machines you are going to require. You try to figure on the replacement value of the property itself. That all gives you a general idea of the magnitude of the survey.

So far as coming right down to the detailed time required on any particular survey is concerned--I'll get very objective here--that is rather difficult until you have had a chance to have one preliminary go-around. It may take only a day, or a few hours--in one of our projects it was four weeks--to check through and evaluate, first, what the size of the job is going to be; secondly, and more important, how available and accurate the data are that you can have, and whether it has been reduced to usable form.

I think you gentlemen can bear me out on this. When we went into Germany following the war (as opposed to going into Japan), and checked up on the Germans' plants, we found they had a lot of data that was reduced

to readily usable form. They worked that way. In Japan, on the other hand, we are still translating and organizing.

But those are the things we have to check. We have no exact standards to go on.

QUESTION: What have you found to be the main deficiencies in the plants you have surveyed?

MR. POCOCK: I don't know that I could generalize on that one. I think a generality would be rather dangerous.

First of all, I have been surprised--and in our business we are always surprised--at how much management still has to learn in the actual scheduling of planning and production in some of our munitions programs. Some do it very well. But it is surprising to find the gaps that do exist.

Second, I would say--and this holds true today--a lack of urge, shall we say, to go over to more modern equipment. We got so much machine tool equipment jammed up during World War II that it is rather difficult to get processing converted over to a more efficient basis of manufacture on the basis of new equipment and new machines. That is not the case in civilian production so much because you have the profit motive driving you on there. An example of that might be the current developments that are underway in connection with the grinding of serrations in the jet-engine turbine (a long, overdue improvement which has come through just in the last 18 months). Formerly, we gouged those out with standard mills, and so forth. So, you see, your equipment is another gap.

That is about all I can think of right off.

QUESTION: How do you make a survey of a plant that is in an idle, stand-by status?

MR. POCOCK: You have to tell me first what you think you might want to put in there. You might, in a certain plant, figure that generally it was adaptable to, let us say, turbo-superchargers, aircraft engines, aircraft accessories, and things along that line, that require a high-precision-machine and assembly-type operation.

Now wait a minute. Are you talking about a bare plant that has to have equipment put in; or is the equipment already there?

QUESTIONER: I am assuming that at the end of the war everything is there.

MR. POCOCK: It's just there in a stand-by condition.

Well, I'll tell you. First of all, you have to evaluate what that facility can do. The way we have attacked the thing is to take the various categories of machine tools, which, in turn, represent a general type of operation that could be performed, and figure out the machine hours available. Then you take the total, over-all machine hours that you would get out of that stand-by facility and try to convert it back against any project that you might have, or any specific allocation you might wish to make. Beyond that, you have to work through in detail to get facilities and programs integrated.

QUESTION: This is not intended to be personal, but what are the qualifications for a person who is to go into a plant to make a survey? In other words, what should he know?

MR. POCOCK: He has to be a fool, first, being willing to stick his neck out.

I repeat once more that I think generalities are dangerous. But I would say a fellow should have actually had some production experience. You know, there are some things you have to learn the hard way. It is really the only way you can learn them.

I would say a man has to be able--and this is very important--to get along with other people because he is operating in a shop where he has no real authority. You have to talk with people. You have to lure information out of them. You are imposing on them, they often feel in their minds, by coming in there and working on a facilities survey. So, he has to be a good salesman.

We like a keen analyst. If you will give us a man with an analytical mind, we can make a facilities-survey man out of him, even though he may not have specific knowledge in that industry. I would not put too much weight on experience in a specific industry in which a man was working. As a matter of fact, we found that some of the best analyses, most constructive and creative ones, come from people who are going into an industry with which they are not specifically familiar.

So, if you will give us a man who has actually been out operating in a plant and has had some hard knocks; if you will give us a man with a good analytical mind and who has the ability to get along with people; a man with some engineering background--I don't care whether it is civil engineering or manufacturing engineering; just give us one area of engineering--we can turn him into a good facilities-survey man.

QUESTION: To what extent is the normal commercial data, which are built up over normal operations, useful in determining the capacity of facilities? For example, we read in the paper that the steel industry is working 93 percent of capacity. What does that mean? Are these data of any value in determining the capacity of the steel industry?

RESTRICTED

1950

MR. POCOCK: Well, yes, I think so. You picked an industry where the data happen to be fairly well collected and constantly published. The 93 percent figure you mentioned really has very little meaning, inasmuch as it is applied on a purely theoretical base.

So far as your over-all tonnage figure is concerned, though, that is good. I think, in the gross, those figures are valuable in that particular case. Where you lose your definition is when you start going down into what use that tonnage is put to. You get into special steels, as, for instance, your stainless steel, which is becoming more and more of a problem as you go forward into your mobilization plans.

If you go over to some other industries, you get into what I call public-relations industry data.

This type of data--to answer your question--is not worth very much. So you have to dig into the available data and make a few tests. That is the way we do it. We test the validity of it. Sometimes we can accept it as a whole; other times, we have to go back and establish all-around data ourselves.

QUESTION: I have a question with reference to the safety survey. I am certain you must make it, although you did not mention it in your speech.

MR. POCOCK: That's right.

QUESTIONER: When do you make it? Do you make it special or at the same time you make this whole survey?

MR. POCOCK: As a matter of fact, you could talk safety surveys, you could talk power surveys, and break any facilities survey down into functional surveys like that right across the board.

I do not know how others do it, but I can tell you how we do it. We do it all at once. We have men who are working on the safety factor, the power factor, and so forth, as they are going through the plant. We try to pick men who can go clear across the board on that. That is simply in the interest of speed on the job.

COLONEL MCKENZIE: I gather from your remarks, Mr. Pocock, that your company has been carrying on these surveys directly for the Government. Is that correct?

MR. POCOCK: That is right, sir.

COLONEL MCKENZIE: And you are also engaged in making them for private industry?

MR. POCOCK: That forms, by far, the larger percentage of our work.

RESTRICTED

COLONEL MCKENZIE: Would it be practicable to have a half-dozen military officers tagging along with those people to observe how they are making the surveys? In other words, provide a sort of training course for them, not in a schoolroom but actually going along and observing the work that is being done.

MR. POCOCK: I had three of them following me out on the west coast about six months ago. I have another one coming up like that from out at Wright Field in the next couple of months.

Yes, it can be done. I will be very objective about it. It takes much more time when we are working like that. But we have done it and I think it has proved very useful.

COLONEL MCKENZIE: That is the point I want to make. I would like to have your own reaction to this.

MR. POCOCK: Sure.

COLONEL MCKENZIE: You spoke of the three. I would like to suggest we pay a little more and let you take more time and train, say, 10 or 15, as you go along.

MR. POCOCK: It gets to be quite a problem, Colonel. This may answer your question a little further. In one of our surveys that I can think of, particularly, the survey itself was of such a nature that there would be a long, continuing program of keeping the facilities data up to date, and so forth. We certainly did not feel we should carry that program. It was necessary that members of the Service carry it on. Therefore, it was essential that they work extremely close with us in the initial stages of the survey so they could carry it on intelligently. They have done a grand job.

On another project it went the other way. The officers were not available. When we finally came to the end of the project we had a concentrated training period, trying to get men ready to take it over.

We are fully sympathetic with your point and only wish we could do more of it.

QUESTION: In connection with the appraisal of management, is that just in general terms--good, bad, or indifferent--or is it more specific, saying good for this and not for that; assign that type of product to that company because of management, but not another type, and so forth. What sort of standard can you use?

MR. POCOCK: I don't know how far you can go with an empirical yardstick. Any time you get a yardstick like that, with numbers on it, or values, they have to be assigned on the basis of cumulative personal judgement and can certainly become a political football within the industry.

RESTRICTED

1960

However, I think that very definitely you do, even though you do not know it, consider that factor in making some of your allocations. I am thinking now of a certain project you had two or three years. That project was very definitely switched from the designing company, which was a large company with a large capacity--generally assumed so, over to another company which had more experience in that particular type of production simply because it was felt that the management would give it more chance to thrive over in the other company. I never saw the point-by-point rating on which that decision was based, but it was certainly very consciously shifted over on that basis.

I do not think I could go much further than that.

QUESTIONER: I was thinking more along this line. When you make the survey, you have to name it. It's something, whether it be words or standards.

MR. POCOCK: Sure; that's right.

In our work we generally do it like this: We say we deem that the management is inadequate for the program as laid out; or that we believe the management has certain deficiencies--here, here, here--that should be corrected if the program is to have an even chance.

I do not know of any program where we have said the management cannot do the job. I do know of one where we said management was doing an excellent job and because of that it was adding to the stature of the program.

By the way, a very interesting study will be coming out soon, and will be made available to you gentlemen, on certain industrial areas, giving their productive capacity. In it, reference is made to this problem of management and manpower. The study makes some attempt, necessarily preliminary, to evaluate it on a factor basis. It is the first attempt I have seen to put it that way.

QUESTION: Mr. Pocock, in your surveys how do you take care of the interdependence of one industry upon another for material? For example, you isolate one industry and you make a survey of that. How do you correlate that with the requirements for the same material or facilities of five, six, or seven other industries which may have a claim on the same material or facilities?

MR. POCOCK: Well, fortunately, we haven't had a project as yet that carried us back into those ramifications.

You can follow that same thing right back until you have one big industrial machine, that is, the Nation, which includes all your civilian economy, your munitions production, and so forth. As I understand it,

RESTRICTED

that is the job of the National Security Resources Board, to more or less lay out that over-all pattern and then let the Armed Services, the Military Establishment, and the Munitions Board pick up those areas where they have primary interest.

To be specific, when we go into a facility we assume certain conditions will be true. We very clearly postulate those conditions at the start. For instance, in one survey I have in mind we stated that the availability of materials and the availability of supporting capacity, such as wire drawing, will be the same, percentage-wise, as it was during a certain period in 1944. That happened to be in a facility where your product, manufactured in any immediate mobilization period, would be similar to that manufactured in that period. In the use of such capacity data you have to be sure that you understand the conditions upon which it was based.

In the over-all planning you probably have to go back and revise your evaluation of capacity. For instance, if you do a complete capacity study on a little baby-buggy manufacturer who is going to change over to something else, you should--theoretically--follow it all the way through. You could go to the evaluation of the whole national economy.

QUESTION: You mentioned in the course of your talk that stainless steel is a critical item. If each facility survey is premised on the thought that it will have ample supplies of material and there should be a breakdown somewhere, I wondered how you would work it out.

MR. POCOCK: One of our projects--and I, necessarily, have to be vague here--came up with several answers just like that, which said, in effect, "There isn't enough material available for you to do what you want to do." So what comes out of that? Well, it was working on a materials substitution program. It may seem odd that a facilities survey had to force that program, but that was what first crystallized it.

However, in one particular place it was felt impossible to substitute materials. So you have to go back and build up the capacity of the supporting industry. It was a case where such a large percentage of the capacity of the supporting industry would be necessitated to support this particular program that the program really controlled the capacity requirements of this supporting industry.

Do you get my point there?

QUESTIONER: Yes, sir.

MR. POCOCK: If you are going to use only two or three percent of a supporting industry's capacity, that is within the margin of estimating error.

RESTRICTED

1200

QUESTION: What assumptions do you make on manpower resources? Do you envisage national service or voluntary recruitment?

MR. POCOCK: So far, we visualize voluntary recruitment, although the "voluntary" aspect of it gets to be a little forced, as you know, by patriotic motives, and so forth.

In our manpower work we have started with--let's say a mobilization date of 1955. (We have used several different dates.) We have assumed that in 1955 the labor force in the country will be 70 million people. That is the emergency labor force, which takes into account the pressures that are brought on people to move out of their housewifely chores and go into munitions work, and so forth. That is an equivalent labor force in that it takes into consideration your 45-man-hour, average, applicable work week.

We have knocked out 10 million for the Armed Services, leaving us 60 million. We have taken one-third of that--I think the exact figure is 32.8 percent--to go into the manufacturing industry. That is based on both World War I and World War II ratios. Normally, your manufacturing industry takes in about 27 percent of your national labor force. During wartime it comes up. In World War I it hit, I think, 33 percent. It hit slightly over that in World War II.

This gives us the 20 million in the manufacturing labor force. You can start allocating this labor out among the industries.

So far as the general industrial classification goes, we have continued, up to this point, to fall back on the percentage breakdown, or the averages, existent during, I believe, those 24 months (1943-44).

So, whether you are talking of voluntary recruitment or direct employment, you still have so many bodies; you have so many hours that you can put them to work. I do not think that particular problem comes into it.

COLONEL BUNCH: Mr. Pocock, on behalf of the College, I thank you for a most instructive lecture.

MR. POCOCK: It has been very pleasant. Thank you, Colonel.

(15 April 1949--450)S.

RESTRICTED