

A R M Y I N D U S T R I A L C O L L E G E

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THE POWER SITUATION

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I think that you are familiar with the history of the power situation during the war that led up to the need of the survey now being conducted by the Corps of Engineers. What happened, briefly, was that as soon as the war load was placed on the country, power shortages developed at certain points, such as, Niagara Falls, Buffalo, Philadelphia and Pittsburgh. These were met by an emergency organization, headed by Colonel Charles Keller, formerly of the Corps of Engineers, who has covered the situation in a publication called "The Power Situation during the World War".

After the war Colonel Keller conceived the idea of attempting a power survey of the country, gathering all available statistical data which might be required in time of an emergency. This plan was approved by the Assistant Secretary of War and has since been carried on by the Engineer Corps. It was at first under the direct charge of Colonel Keller, who was succeeded by Colonel Hoffman, and then by myself.

The first thing to remember about the power survey is that it is a procurement study, like the others being made by the War Department. It is, however, a procurement study of a special class. It concerns a commodity which is needed by everybody -- by all the procuring bureaus of the War Department and other Federal agencies, by industries and by the civilian world generally. Moreover, in most cases it is supplied to all users in a certain neighborhood from a common source, namely a large central station. You cannot assign the source of power, namely, the central station, to any single procurement agency, as you can usually assign an individual factory. Power must, therefore, be controlled in war time by a Power Administrator who, while we consider he should be under the Assistant Secretary of War, must function not only for the War Department but for all users of power.

The power survey is being made by the Corps of Engineers in time of peace because, in connection with our river and harbor and other civil works, we have permanent offices throughout the country and are in direct contact with the civilian world, probably more than any other War Department bureau.

The work of the survey falls into three parts: first, obtaining the data for making up an emergency plan; second, making up the plan itself; and, third, keeping it up to date. The data have been obtained and the plan made. The third part of the work, namely, keeping the plan up to date, is, of course, a continuing job.

I will go over, briefly, the past history of the survey. A start was made on it during 1920 and 1921, at which time we sent out instructions to our District Offices to collect a large amount of information. A large amount of detailed information was called for and, as we had no special funds for the work and had to use our regular force, it took a long time to work it up. It was really a year and a half

before the Districts had the information assembled. In 1923, instructions were sent out to submit summary reports, which were submitted and form the basis of the final plan. The data obtained from them may be illustrated by the following map, selected at random, of the Charleston District, covering most of South Carolina and part of North Carolina. (The speaker then discussed the map). There are also tabular data on total installed capacity, on inter-connections, on the consumption per year in K.W. hours, and information, in the case of hydro-electric plants, of fluctuations of water supply, etc. The reports in themselves, setting aside any question of the power survey, are of great value. The information they are based on is, of course, public property; but I have never before seen it assembled in such form as giving a picture of the power situation in the entire country. It is also of continuing use in connection with problems of Federal Power Commission.

It has proved of great value in certain super-power studies, and in problems arising from the functioning of the Federal Power Commission.

I may add that, in addition to the summary reports referred to, certain districts in the southeast, acting under or in cooperation with the then Division Engineer of the Southeast Division, were also able to prepare much more elaborate studies, copies of which are available both here and in the local offices. The area covered is the important southern Appalachian section, and the data are elaborate and are of peculiar interest and value.

I have said that our main purpose in getting the data was to devise a permanent plan for the survey. This has been done and general instructions sent out to our districts.

The plan had four requisites: The first one was that we are dealing, as in any procurement study, with existing conditions. This survey is not a super-power study. We are required to state what we would do if war came today, basing our answer on installations as they actually exist. If and as the installations change in twenty years, we will modify our plan.

The second of the four requisites was that this work, being a procurement study, had to be coordinated with the other procurement work conducted under the supervision of the Assistant Secretary of War. The Assistant Secretary has, as you know, divided the country into fourteen areas called Procurement Districts. The plan is that every Bureau shall use those areas as its field units in making plans for war time procurement, and carrying them out. In our power survey we must similarly plan for decentralization ^{and for territorial} districts or zones; and these should coincide with the regular Procurement Districts as far as possible.

The third requisite was that our power zones should be natural power areas, i.e., areas in which power is produced by one or several big groups of interconnected companies, and across whose borders the smallest amount of power flows. The point of that is obvious. If you have power produced in one zone but used in two,

there might be a conflict of authority between the zone administrators which would require reference to higher authority. Of course, you cannot draw any line across which no power moves, but that is the ideal.

The fourth requisite was that we want to get results with the minimum annoyance to the industry in time of peace, and the least disturbance to normal industrial conditions in time of war.

I do not know how it is now, but three or four years ago, when I was handling work of this sort in the field, many Federal agencies had the questionnaire habit. They attempted to solve such problems as are involved in our procurement studies by obtaining great masses of information which they could not digest and which the industrial interests knew they could not digest. This is basically wrong. The way to solve a problem of this sort, is first to learn the elements of it; then go to the industrial interests themselves, who know their job better than we can hope to, put our problems up to them, and get their idea of the solution; and then check the solutions against our knowledge of the military situation. In that way each of us, the industrialists and the military man, is working at the angle of the problem which he knows best.

Similarly, in time of war we should plan to interfere as little as possible with the normal working of the industries, depending on them for actual operation. We should not attempt to develop an elaborate Government organization to operate the power industry.

These, then, are the four requisites of the plan: it is based on present not future conditions; its territorial zones should coincide as far as possible with the regular Procurement Districts and with natural power areas; and it should involve the minimum disturbance to industry.

The present plan is incorporated in a circular letter from the Chief of Engineers to all District and Division Engineers, dated May 15, 1925, from which the following is quoted:

"The general conduct of the survey will continue in the hands of the Chief of Engineers, field work being handled by Division and District offices as indicated below. The continental United States will be divided into areas to be known as Power Zones, which will be units for controlling all activities of the survey such as collection of data, selection of personnel, establishment of liaison with the power industry, and exchange of information with procurement organizations concerned with facilities in the Zone. The general policy will be one of decentralization to these zones."

(The speaker then exhibited a map showing the principal consuming centers of electric power, and showing also the boundaries of the eleven ^{power} zones. He indicated where and for what reasons the zone boundaries differed from the regular Procurement District boundaries).

The headquarters of these zones are, in every case but two (Seattle and Charleston) the same as the headquarters of the procurement districts, and so we are always in direct touch with the procurement people, both in peace and in time of war. I do not think, that we will have much trouble in establishing satisfactory liaison with the officers handling other procurement work in the field.

Our basic problem is - "How to meet, in time of war, the extra load which will be placed on our industry?" The trouble is that we do not know what the extra load will be. The various bureaus of the War Department have in varying degrees computed their war time requirements, but they have not translated those requirements into terms of power. I do not believe that the Navy has gone as far as we have with its procurement studies. That is, no one really knows what the additional demand for power will be in time of war. So from our point of view it appeared that the best thing to do was, not to attempt to figure out how we could meet the expected load (which we did not know), but to figure out the maximum load we could meet. If then it later develops that the maximum is not needed, it will not be provided. But if it develops that current procurement plans involve more than the maximum load, then the plans will have to be changed.

What is desired, then, is first, a statement of the amount of power which, under normal conditions, will be available in each particular zone in intervals of six, twelve and twenty-four months from "D-day" (taken as ^{this} the first of the current year); and second, how much power can be increased, in an emergency, at those intervals of time.

All big central-station companies make their plans several years in advance for expanding their facilities to meet expected business. These plans are in various states of fruition. On the one hand, perhaps a generator is expected to be delivered and set up in an existing station three months from today. At the other extreme, the company's engineers will be making the first rough studies of a plant which will not be completed for three or four years. If we can gain the confidence of the company officials and assure them that their information will be kept strictly confidential, they will tell us of their plans for the future. We can then figure out how much, and in what way, ^{those} plans can be speeded up in an emergency. This involves a study of necessities so as to meet priorities, labor, transportation, manufacture, etc., involved in an emergency.

The attached diagram (which the speaker exhibited) shows the essential data we desire. The heavy vertical lines show, for a hypothetical Power Zone, the installed capacity in K.W. on "D-day", and the probable installed capacity at 6-month intervals thereafter. Line AC thus shows the normal growth of power. If, beginning on D-day,

every possible step were taken to increase the installation, there would result instead the line AB. Also, if non-essential users were restricted, a certain part of the capacity which would normally be in use would be rendered surplus. This is indicated by the line AD. The difference between AB and AD is then the maximum margin which can be made available for strictly war requirements, which as stated is the essence of the problem. I may add that the difference between AC and AD, that is, the amount by which normal load can be reduced, is very difficult to estimate with any accuracy: partly because the amount to which ordinary civilian usage is restricted is simply a matter of degree, varying with the critical character of the emergency; partly because industries which are normally "non-essential" might, after declaration of war, turn to the production of essentials.

Having found the maximum power that can be made available for each zone, we must study in what amounts and by what means it can be distributed to various critical points within the zone, or to adjacent zones.

Both these studies involve an investigation of just what power-house extensions, generators, transmission lines, interconnections, etc., will have to be created or installed; how long it will take; how much they will cost; and, in the case of big units like generators, what priorities will have to be obtained from manufacturers. Also the question as to who will pay for them may arise. It may be that a certain interconnection, say, would be very desirable for war time purposes, but would not do much good to the companies concerned in time of peace. In that case it might be that the Government would have to finance it by loaning the money, or perhaps paying for it outright.

Another study we have to make is ⁱⁿ the matter of personnel. In time of peace the survey can be run by the permanent engineer offices, with the assistance of the power industry and such Reserve Officers as care to get into the game and help us. In time of war my own thought is that the Power Zone organization would be built up from this peace time skeleton organization by taking on Reserve Officers picked in advance. I do not believe we should assign them to certain jobs in advance, for this reason. We do not want to establish an organization any greater than we have to. We would need a big active zone office only where there was trouble with the power situation and we cannot tell in advance where the trouble will be. In the last war the trouble was, after all, restricted to a few localities. And at that time our industries had been under an exceptional ^{war} load for three years, making munitions for the Allies, before our own load was thrown on them. Since the war, moreover, the power industry has not only increased greatly, but is building more and more for the future, thus keeping a jump ahead of demand.

The place where trouble might occur, then, is uncertain; it may change from year to year; and we do not therefore want to assign a lot of Reserve Officers to specific zones or duties. What we do want is a certain number of good men assigned to the power survey

as such. Then, when an emergency breaks, we will place them where most needed. My estimate, subject to further study, is that between twenty-five and fifty men should be ample. The selection of these men will be made shortly.

In time of war, then, we will have a central Power Administration, which I believe should function under the Assistant Secretary of War, and should be headed by a Power Administrator with five or six assistants, reserve or regular officers. In each of the zone headquarters we would at once establish a skeleton organization, with perhaps one reserve officer, who would be vested with full power to order interconnections or increases in plants, or to cut off power from non-essential industries, or to take other necessary steps. He would keep at all times in close touch with local conditions, and would begin to exercise ^{his} power wherever the need arose. If and when serious trouble developed, the local force would be increased as necessary.

The last thing I want to emphasize is that the proper solution of this problem should be on broad lines, and flexible. I personally am a little skeptical of any war procurement plan which endeavors to map out with too much detail and accuracy just what is going to be done, from day to day, if an emergency breaks. The trouble with such a plan is that nothing ever happens, especially in the confusion of the early days of a big war, exactly as you had anticipated. We want to have a general policy as to what we may need and how we expect to get it; and we want at all times to keep in close contact with the important men of the industry who, in the last analysis, are the ones who must get it for you. Having attained that, the operation of our plan involves simply watching the situation, and directing or coordinating where necessary, while interfering in the least possible degree with actual operation of the power machine.

NOTE:

The three charts referred to herein are not readily reproducible and are, therefore, not included in this mimeograph copy. These charts are on file in the Planning Branch, Office of the Assistant Secretary of War, and also in the Office of the Chief of Engineers for the use of anyone interested.